

Energy Efficiency in China: Regulation, Deliberation and Capacity- Building in State-Owned Enterprises

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Statement of Originality

This is to certify that the content of this thesis is my own work. This thesis has not been submitted for any degree or other purposes. I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

Signed

A handwritten signature in blue ink, appearing to be 'Nima Masroori', written in a cursive style.

Nima Masroori

Abstract

This study looks at the regulation of energy efficiency in giant Chinese state-owned enterprises (SOEs) operating in refining and petrochemicals. It asks what factors firms respond to and why, as they seek to become more energy efficient. Using the framework of regulatory theory, the study identifies factors that affect energy efficiency regulation in these SOEs in four cities: Xi'an, Shanghai, Luoyang and Ningbo.

The study seeks to understand how three broad groups: regulators, regulatees, and third parties collectively interpret, apply and respond to regulatory influences intended to promote energy efficiency among Chinese SOEs in the energy sector.

Regulation of energy efficiency in Chinese SOEs occurs in an elite policy space where enforcement and compliance have a different complexion from those domains of regulation where consumers or the public are directly involved, such as environmental protection or food safety. This study looks at the dynamics of regulation from the ground-up, using an object-specific and sector-specific approach. Data for this study was collected between 2013 to 2015 and updated through to 2019, through document collation, direct observation of refineries and petrochemical plants and interviews with 42 respondents from government and industry.

This study finds that, while laws and legal enforcement remain an important part of the regulatory landscape for energy efficiency regulation in China, they are not the forum where regulation occurs for the energy sector's SOEs. Instead, informal factors aimed at increasing willingness to comply and capacity to comply are currently used to drive enterprises along a maturity curve, making individual enterprises more self-actuated to drive energy efficiency.

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List of Abbreviations

CASS	Chinese Academy of Social Sciences
DCS	digital control systems
DP	discussion papers
EMC	energy management contracting
ERIM	Erasmus Research Institute of Management
EST	Energy Savings Trust
IEA	International Energy Agency
LEM	Laboratory of Economics and Management
MOT	Ministry of Technology
NDRC	National Development and Reform Commission
PCOC	PetroChina Changqing Oilfield Company
PITI	Pollution Information Transparency Index
PRC	People's Republic of China
ROI	return on investment
SARI	Shanghai Advanced Research Institute
SASAC	State-owned Assets Supervision and Administration Council
SFDA	Safety of Food and Drug Administration
SOE	state-owned enterprise
CNOOC	China National Offshore Oil Corporation
GDP	gross domestic product
HK	Hong Kong
LPEC	Luoyang Petrochemical Engineering Corporation (a Sinopec design institute)
NGO	non-government organization
PPP	public-private partnership
RMB	renminbi
SARS	Severe Acute Respiratory Syndrome
US	United States
VP	vice-president

Chapter 1. Introduction

China is a main energy consumer and, therefore, is also a big greenhouse gas emitter. We must use energy resources rationally and must conserve. This needs us to adjust our economic structure, transform the mode of development, to make economic development more dependent on progress of science and technology and the quality of the work force.

– Wen Jiabao

Yes, this is hard. But there should be no question that the United States of America is stepping up to the plate. We recognize our role in creating this problem; we embrace our responsibility to combat it. We will do our part, and we will help developing nations do theirs. But we can only succeed in combating climate change if we are joined in this effort by every nation—developed and developing alike. Nobody gets a pass.

– Barack Obama

1.1. Overview

Chinese state-owned enterprises (SOEs) make up around 50–60% of the national economy¹ and consume massive amounts of energy. Despite being owned by the government, they are not always easily controlled and often behave in ways that conflict with central policy goals such as energy efficiency and environmental protection. For decades SOEs have been commanded to drive economic growth as a top national priority, but in recent years state attention has been turned towards sustainability and other imperatives that sometimes compete with unbridled economic growth. Central government efforts to steer SOEs towards different behaviours, however, have met with challenges. Understanding the behaviour of SOEs and their interactions with government is important to predicting and influencing future patterns of industrialisation within China.²

This study asks two main questions: What are the factors that contribute to regulatory effectiveness when moving Chinese state-owned enterprises towards greater energy efficiency? How do state-owned enterprises respond, and why?

Using the framework of regulatory theory, and drawing on the concept of responsive regulation (Ayers & Braithwaite 1992), the project studies energy efficiency regulation in the petrochemical industry in four Chinese cities: Xi'an, Shanghai, Luoyang and Ningbo. This study looks at the city-level dynamics of regulation from a ground-up perspective to identify factors that contribute to regulatory effectiveness. These are defined here as including such outcomes as compliance as well as the assimilation, interpretation and

¹ Although details are debated, some figures put the percentage of state ownership in the economy over fifty percent, not including corporate debt, which would raise the figure even higher.

² See Lawrence Berkeley National Laboratory (2016), *Key China Energy Statistics 2016* at <https://eta-publications.lbl.gov/sites/default/files/ced-9-2017-final.pdf>.

distribution of policy learning that helps to further regulatory aims. The focus of this study (Chapters 4 through 8) is on the non-formal regulatory factors that affect regulatory effectiveness, such as norm building, deliberation, capacity-building, political influence, and social influence. Formal factors, including laws, are discussed and contextualised in Chapter 3.

This study identifies two key axes in regulating Chinese SOE postures on energy efficiency: willingness and ability. SOEs and the actors within them were found to be influenced by a mix of factors that have varying effects depending on the way in which they are combined and deployed. Certain mixes of factors result in a high degree of regulatory uptake by firms and key actors within them. Notably, given the emerging nature of some of the formal and structural institutions in China—as well as the complex nature of managing energy efficiency—legal and rule-based factors alone are of limited effect. Endeavours focused on better enforcement alone are inadequate, while factors that engage at normative and cultural levels and build capacity of firms and actors to achieve desired results contribute to improved outcomes. These findings are introduced in detail in Chapter 2.

1.2. Structure of the thesis

This chapter sets out the problem statement and justification for this study, describing the contribution that this work hopes to make. It identifies the approach and methodology applied to this research and addresses limitations related to this undertaking. It introduces the key sites and actors studied and provides some theoretical and historical context to help orient the reader.

Chapter 2 deals with literature and theory that inform this study and addresses the theme of why traditional regulatory models sometimes fail in China. It explores two key ideas that span the findings of the study—willingness to comply and capacity to comply.

Chapters 3 to 8 unpack the ideas of willingness to comply and capacity to comply by identifying in detail several factors that emerge from the qualitative data in this study as having pronounced effect on regulatory outcomes in Chinese SOEs. While these factors closely interact, they have been classified in this way for ease of discussion and because it reflects how interviewees saw them.

Chapter 3 introduces laws and formal regulatory factors relating to energy efficiency and explains how these laws are not the main factor firms or their employees look to in making decisions about energy efficiency.

Chapter 4 focuses on structural dynamics and the relationship among certain actors; introduces what I have termed ‘shadow regulation’, which is important to understanding the behaviour of large SOEs; and concludes that ‘social licence’—in the sense in which it is used by regulatory theorists—is of limited use in this setting.

Chapter 5 focuses on political factors that affect energy efficiency regulation. It identifies a new dimension of licence beyond social and regulatory licences, a dimension that I call

‘political licence’. It also explores the challenges of regulating in an authoritarian landscape and the nuanced role of political influence and mandates.

Chapter 6 examines the influence of careerism in driving energy efficiency behaviour and outcomes among both regulators and the regulated. It notes that careerism is a relevant factor but identifies that careerism is more significant in some settings than others.

Chapter 7 explores the prevalence of deliberation as a process, a habit, and even a cultural trait that contributes to learning, adaptability and responsiveness within SOEs. This has some probative value in explaining how a centrally controlled system is still able to function despite its systemic complexity.

Chapter 8 reflects on capacity-building and the need for widespread localised ability to think and act in line with policy in a locally empowered way.

Chapter 9 analyses the implications of the conclusions drawn in this study, addresses its limitations, and outlines a potential agenda for future research.

1.3. Why study energy efficiency in China?

Since 2010, China has been the world’s largest consumer of energy (IEA 2010). This has occurred far ahead of projections³ and has added to the pressure on China to improve its energy intensity⁴ and the efficiency of overall usage.⁵ Regarding the implications for climate change, one scholar has stated that ‘[n]o single country will have a larger impact on the global community’s ability to reduce its greenhouse gas emissions than China’ (Schreurs, in Dryzek et al. 2011). This emphasises the importance of China’s role in addressing energy efficiency and governance.

Given the investments China has made, and the targets it has set, for emissions reductions—which are impressive compared with those of the USA, Australia and Europe—some have hailed China’s attention to this issue as marking a bold leadership role in energy efficiency pursuits.⁶ The question of whether China is taking a leadership role is more one of international relations and geopolitics. However, the signalling that comes from senior government officials conveys nationalistic pride around China’s role as a differentiated leader in energy commitments and this drives certain behaviours, which are explored in the substantive chapters of this study.

³ China was not expected to surpass the United States until at least 2015 according to the Energy Information Administration forecast in the US.

⁴ Energy intensity is a measure of energy efficiency of an economic system’s economy. It is calculated as units of energy per unit of GDP.

⁵ Overall usage refers simply to the total amount of energy used and represents to overall volume of energy consumption rather than the efficiency with which it is used. For the most recent data on China’s energy efficiency macro situation, see: <https://www.iea.org/weo/china/>

⁶ For examples, see World Economic Forum: <https://www.weforum.org/agenda/2017/08/how-china-is-leading-the-renewable-energy-revolution>; Carbon Brief: <https://www.carbonbrief.org/china-leading-worlds-clean-energy-investment-says-report>; NY Times: <https://www.nytimes.com/2017/01/05/world/asia/china-renewable-energy-investment.html>

Considering the various ministries and ministry-level agencies closely involved with the issue of energy shows how the issue of demand for energy puts a hard edge on several issues central to the focus of Chinese leadership.⁷ Among these are maintaining economic growth, social stability, environmental protection,⁸ and international relations that support its energy dependence.⁹ Each of these issues highlights the importance and relevance of energy efficiency and will be explored in further detail below.

However, domestic regulators are faced with an intractable problem: how to maintain economic growth while curbing energy intensity. Given the scarcity of China's own resources, particularly clean fuels, there is broad consensus that the question of the management of energy production, transmission, and consumption will be at the core of China's development strategy (Smil 2004; Berrah et al. 2007).

1.3.1. Energy efficiency affects growth and vice versa

China's sustained economic growth has staggered observers and defied predictions and expectations since the 1980s, with average annual growth rates of around 8% in the 2000s and around 6–7% in this decade. Except for a few lulls, the average economic growth in China during the first decade of the new millennium was around 11% (National Bureau of Statistics 2007—China Statistical Yearbook). Even at the slowed-down rate of the second decade of 2000s, floating around 6–8%, China's growth is impressive compared to most of the other large economies in the world.

According to Zhou and Levine (2010), in the two decades prior to 2002 authorities were able to limit energy demand growth to less than half of GDP growth. This decline in energy intensity is mainly attributed to four factors: changes in the structure of the economy, improvements in the efficiency of supply, increased efficiency in consumption in some industries, and, to some extent, changes in the mix of energy supply (Andrews-Speed 2009, p. 1333). In particular, research has indicated that productivity changes within industries, driven by technological improvements of various kinds (Sinton et al. 1998; Fisher-Vanden et al. 2004; Liao et al. 2007; Sheehan & Sun 2007), had a significant impact. Several studies indicate that particular attention to and improvements in certain energy-intensive sectors (cement, petrochemical, steel, and others) have been particularly impactful (Hu et al. 2005; Steenhof 2006; Rosen & Houser 2007; Liao et al. 2007; Lin et al. 2008).

Despite early success prior to 2002, the recent rate of economic growth and the focus on maintaining industrialisation and modernisation at all costs have resulted in slippage in energy efficiency. By 2006, nearly 50% of global energy demand growth was due to China. This reflected an increase not only in volume and rate of demand but also in energy intensity (Zhou et al. 2010; IEA 2010). Since approximately 2002, the decline in energy intensity has reversed markedly. A combination of factors—a further upturn in economic growth with a focus on heavy industrialisation, including major infrastructure investments (Naughton 2007;

⁷ For example, Ministry of Environment, Ministry of Technology, Ministry of Foreign Affairs, Ministry of Finance, and National Development and Reform Commission.

⁸ Environmental issues such as air quality are increasingly giving rise to mass incidents and social protests.

⁹ Vis-à-vis sourcing energy and resource dependence.

Liu & Zhu 2006; Lin et al. 2008), diminishing impact of technological advances on energy efficiency (Ma & Stern 2008; Lin et al. 2008), and a change in the energy mix (Han et al. 2007)—have contributed to this (Andrews-Speed 2009).

Apparently, energy efficiency improvements have been greater among private actors than large state-owned actors (Wei et al. 2007). This is in some ways counterintuitive, since, if energy efficiency is a major state priority, one might expect to find it foremost in those actors over which the government has more direct influence. What then, are the factors that can drive greater energy efficiency within these state-owned actors? Given the proportion and sectors of the economy occupied by SOEs, this question is important to future patterns of industrialisation within China (and provides insights for other emerging economies like Brazil, Russia, and India). Chapters 4 through 8 draw on qualitative evidence from the SOEs and their local regulators to answer this question.

To a plant manager or Chief Financial Officer, the story of energy efficiency looks something like this. Since energy is a cost of production, a savings in energy means a reduction in costs, which means better margins and greater profitability. The questions faced by a firm or entity in deploying energy efficiency solutions are, how much money is needed up front, how long will it take to recover the investment, and what is the most appropriate technology to select?¹⁰ For this reason, the regulation of energy efficiency differs from classic environmental regulation, where many environmental solutions are perceived as zero-sum for a plant. They invest in environmental improvements—emission filters, processing discharge etc.—as a cost. Of course, advanced environmental solutions often incorporate efficiency as a part of the solution.

Typically, economic growth and environmental protection are pitched as being at odds with each other; a sort of win–lose relationship where improving environmental protection equates with a slowdown in or burden on unfettered economic growth (McElroy et al. 1998). Energy efficiency is different, especially at the level of individual industrial implementation. Although improvements in energy efficiency equate to environmental protection and resource preservation, they do not necessarily slow or burden economic growth. How they are viewed by *homo economicus* is mostly a factor of return on investment and timing of that return. But Chinese SOEs are not purely economic or rational actors. Their behaviour is affected by a host of other considerations that complicate the dynamics of regulation.

1.3.2. Energy supply and continuity are relevant to social stability

The mere availability of power to run basic infrastructure and secure daily life is an issue that affects stability. In the last decade and a half, reports of shutdowns and blackouts in major cities within China have become commonplace (Kong 2005). One scholar comments that ‘[t]he realization by China’s government in 2004 that the country faced a major shortfall in domestic energy supplies, particularly of electricity, brought energy security to the top of the agenda. Immediate and radical attention was needed to ensure that the economy and people’s

¹⁰ See Worrell et al. (2006) concerning recommendations for technology improvement for the petrochemical sector. <https://china.lbl.gov/sites/default/files/guidebooks/petrorefining-guidebook-en.pdf>

livelihoods were not seriously damaged by a shortfall in energy. Attention switched from the production of energy to its consumption and to the challenge of reducing waste in all parts of the energy supply chain' (Andrews-Speed 2009).

Energy efficiency is critical to the project of maintaining social stability in China, a prominent concern of the current administration. Maintaining social stability is perceived by government leaders as necessary to maintain power and sustain economic growth and prosperity (Herber and Schubert 2017; Shambaugh 2008).

Social stability is linked to continued economic growth.¹¹ These scholars basically argue that people are willing to accept limitations on some of their political freedoms or other encroachments on their lives (environmental, social, legal, technological etc.) as long as the overall standard of living rises and everyone has a chance to become 'prosperous'.

Another dimension of the social stability issue is that if the price of electricity or heating becomes too high, or availability of electricity is compromised because of poor management of resources, there is likely to be a reaction from the public. China is not unique here; other middle income countries struggle with similar challenges. For example, the removal of significant subsidies for consumer energy in Indonesia has been a hot political issue over the last fifteen years (Mourougane 2010, Von Motke et al. 2017). Reference to that experience can also be useful in understanding the dynamics of social stability and energy governance.

Chinese regulators and planners have been criticised for not addressing issues of energy pricing in a sufficiently robust manner. The charge is that retail consumers of energy and prized key industries are protected from actual energy prices through pricing mechanisms or subsidies that insulate them. These mechanisms skew the forces of the market and impede some of the 'natural' drivers of energy efficiency, whereby energy is priced at a more even-handed level (Andrews-Speed 2009). In China, regulators have a delicate line to walk between putting pressure on industry and power consumers to treat electricity as a valuable commodity that should be used efficiently, and making electricity so valuable (expensive) that an outcry is raised about the impact on costs of living.

1.3.3. Energy efficiency affects the environment

In addition to affecting economic growth and social stability, the relationship between energy efficiency and environmental protection is well documented (see Reddy et al. 2009; IEA 2010; Bleischwitz et al. 2011). Thus far, environmental impact alone has not proven sufficient to make energy efficiency a top priority on the agenda of central planners in China (Meidan et al. 2009), much less provincial and city-level authorities. Economic growth, as a fundamental precept and as a measurable factor for judging bureaucratic and industrial success, has remained the trump card in the offices of human resources or 'Organisation Department' (*zuzhi bu*) of the Communist Party. However, combined with the other factors

¹¹ Theories of trust in state institutions are dominated by two approaches. (For a review of this literature, see Heurlin 2012). One posits that trust is rational: based on largely on performance in the delivery of political and economic outcomes (see Levi 1998). The other approach posits that citizens trust institutions because they resonate with a larger political culture (Putnam 1993).

raised here (security, stability, and impact on economic growth), as well as the increased international attention and national reputational issues associated with climate change, (Neiderberger et al. 2006), energy and energy efficiency have been gaining attention and priority from political elites and, in turn, bureaucrats.

There have been studies on the environmental regulation in China and its relationship to energy efficiency, such as that by Fang and Zeng (2007) (discussed in detail in Chapter 2). One commentator has observed that the relationship between energy and environmental law is interesting because ‘energy issues sometimes divide the environmental movement’ and energy law ‘concentrates on the causes, rather than the effects, of environmental problems’ (Bradbrook 1993, pp. 215–216; see also Heffron et al. 2018). Energy law can directly affect environmental outcomes, since how energy is used has a massive impact on emissions and resource depletion. Thus, the way that laws and other instruments are formulated and applied to energy use and efficiency directly impacts environmental outcomes. This makes it important to study how these laws and other factors around them are interpreted by enterprises.

Chinese SOEs are caught in a tension between prioritising economic growth and championing environmental protection. Chen and Porter (2000) studied the tensions affecting Chinese enterprises, managers, and senior officials in reconciling economic and environmental goals in driving ‘greener industry’ in the steel industry. They concluded that ‘Chinese experts’ believe that changes need to occur in thinking, technology, funding, and management processes to lead to better energy conservation, but that such changes are heavily influenced by the overall political and economic context in China. Their study is not clear as to how to reconcile these issues, nor does it describe in detail what these contextual issues are. As my study makes clear, how these tensions are reconciled is often influenced heavily by factors beyond the laws and formal instruments themselves. This makes it important to look beyond laws and traditional instruments of regulation.

Fang and Zeng (2007) carry out an important analysis of formal instruments for energy-related environmental management and a description of some of the challenges related to these instruments and the institutions charged with implementing them in China. They argue (at p. 2256) that ‘[t]he existing ineffective and fragmented policies or measures fail to meet the need of energy development and environmental sustainability’. In their view, policy efforts have been mostly ineffective in meeting the needs in this field, and barriers remain to effectiveness, mainly in the form of operability of laws and regulations, government structure, market equality, capacity-building, price mechanisms, incentives, and controls. However, their analysis, in China, is—by design—limited mainly¹² to formal instruments and traditional policy tools such as laws and incentives, and does not consider some of the more contextual or non-formal factors that affect regulatory compliance. The present study endeavours to focus more on some of these non-formal factors, identified, through qualitative interviews with the informants for this study, and show what gains are being made, and what

¹² Notably, they do mention in passing the lack of coordination among administrative agencies and the lack of ‘determination for capacity-building’ as factors that weaken the potential for making energy efficiency progress (Fang & Zeng 2007, p. 2257).

challenges faced, in energy efficiency regulation, and the subtle factors that affect those gains and challenges.

1.3.4. Energy efficiency is a matter of national security

National security is another important domain that is affected by energy efficiency; hence, perspectives from international relations are relevant to this study. Energy efficiency is a part of energy security.

China's foreign investment strategy (Jakobson & Daojiong 2006; Downs 2004; Zhang 2008), development and aid budget (Downs 2007), and international relations agenda (Zweig 2005; Woodard 1980) are all influenced by energy- and resource-related considerations. Energy—and, by extension, energy efficiency—plays an important role in China's international affairs (Kennedy 2010).

China relies heavily on external sources for energy resources. Since 1994, China has been a net importer of oil (IEA 1994). Since 2009, it has also been a net importer of coal and petroleum. This makes energy an issue of national security and international relations, especially in terms of relations with countries that can act as providers of energy or competitors for energy resources as they become increasingly scarce.

A rapidly growing body of literature explores the international relations implications of China's resource needs (Harrison 1977, 2005; Dannreuther 2003; Andrews-Speed 2002; Woodard 1980). A debate has emerged among Chinese scholars and government actors over whether to emphasise increasing energy supply or regulating demand. One group argues for greater acquisition of resources (mostly internationally but also through technology) that will allow more supply of energy in various forms. Others argue that greater attention needs to be paid to regulating demand and consumption. Some scholars have aptly focused on the importance of energy efficiency for the question of energy security. Kennedy observes that China's energy needs affect international relations.

Over the past ten years, China's soaring demand for energy has complicated its foreign relations on many fronts. China's growing oil imports have sparked criticism that this demand puts upward pressure on world oil prices. Investments by China's national oil companies have vexed governments trying to isolate regimes such as Iran, Sudan and Myanmar. (Kennedy, 2010, p. 137)

The danger that Kennedy identifies goes beyond being a diplomatic problem to potentially being one of international security and peace.

China's growing energy-related interests abroad have raised concerns that Beijing will build a powerful navy that could challenge the United States for control of the seas. And China, continuing to rely heavily on coal, has become the world's top emitter of greenhouse gases. As the December 2009 Copenhagen conference revealed, this last development may pose the most difficult challenge of all ... In the early years of the twenty-first century, most commentators on energy security in China had a traditional view of what 'energy security' means. Commentary tended to be state-centric, focused on energy supply more than demand, infused with the belief that insecurity arises from external dependence, and fixated on oil in particular ... At the same time, renewed tension with the United States over Taiwan from the mid-1990s highlighted the possibility of

conflict with a state that seemed well positioned to exploit China's growing reliance on oil imports. (Kennedy 2010, pp. 137).

Kennedy points to a growing focus on efficiency as a way of lessening reliance on external energy sources. There are two persuasive reasons for this focus. Since energy is lost in transmission, generation, and other steps of energy delivery, savings in consumption of energy or energy intensity have a disproportionate impact on energy needs. Put simply, a one-unit saving in energy equals a 1+ unit of energy generated. Thus, energy efficiency is one of the strongest levers in efforts to improve security. It is also a lever that can be controlled domestically, rather than internationally.

Zhu Chengzhang, who served in China's Ministry of Energy until it was disbanded in 1993, argued that 'electric power security is the most important energy security problem' for China. Zhu proceeded to call for a variety of administrative and market reforms to make electricity generation more reliable and environmentally sustainable. (Kennedy 2010, p. 144)

Energy efficiency contributes to the bottom line of taking pressure off energy reliance. This, in turn, affects national security and international relations.

Kennedy traces several milestones that have contributed to making energy efficiency and domestic concerns a more acute focus of China's overall energy security strategy amidst these debates. He marks three developments in the discourse, starting with one of China's program managers for the IEA, Chen Xinhua.¹³ Chen is currently vice-president of BP China and is affiliated with a variety of foreign and domestic institutions. Chen began arguing for increased emphasis on internal factors as a means of increasing energy security. This argument was further advanced by Zhao Hongtu of the China Institutes of Contemporary International Relations in 2007.¹⁴ Zhao stated that the issue of energy consumption deserves greater attention than the issue of supply, as it presents greater environmental and international relations challenges. This idea was supported by Zha Daojiong (2006), a prominent energy-security specialist at Peking University, who argued that more attention should be paid to the many 'domestic, non-war/non-adversarial challenges'.¹⁵ This approach highlights the potentially positive impact that energy efficiency regulation can have on issues of national security and China's role as an emerging power internationally.

1.4. State-owned refineries and why they matter

In recent years, several key industries have been identified as major energy consumers and have been targeted for special regulatory attention. One of these is the refining and petrochemical industry, which processes and provides fuels and all sorts of chemicals and products used widely in industrialised economies but is also a massive consumer of energy.

The petrochemical sector features several characteristics that make it an important area for study. The sector is representative of the nation-wide networks of major industries that

¹³ See Chen (2003).

¹⁴ See Zhao (2007), p. 48.

¹⁵ See Zha (2008), p. 80. See also Zha (2006), pp. 185–7.

constitute a huge part of China's economy; as such, solving the problem for one could help present solutions for all; there may be a multiplier value. Moreover, due to the massive energy consumption of this sector, small improvements could move the needle for overall consumption and efficiency. A massive 18.9% of China's total energy consumption is in petrochemical and refining.¹⁶

This is also an industry that has been reticent in responding to government signals for efficiency and improvements because of the privilege it enjoys as a lifeline industry that feeds into all other industries and hence, to the government. Refining is critical not only to nearly all industry but also to a country's military apparatus. The refining and petrochemical sector is integral to the state's war machine, and that means it will be treated differently to other industries. This affects regulatory dynamics. By understanding the dynamics of this sector, certain characteristics of intra-governmental regulation in other sectors of China's lifeline industries may be clarified.

1.5. Questions

This study asks two main questions: What are the factors that contribute to regulatory effectiveness when moving Chinese state-owned enterprises towards greater energy efficiency? How do state-owned enterprises respond, and why? These questions are explored through the study of refineries and the petrochemical sector given their relevance as detailed above.

These questions help us to understand how macro-policy is translated into action at the working level within state-owned enterprises in one of China's critical industries, refining and petrochemicals. They also shed light on the dynamics of regulation emerging in an important part of the Chinese industrial economy, one previously subject to strict central control and planning even during parts of China's industrialisation period and the emergence of China's 'regulatory state'.¹⁷ More broadly, these questions consider how regulation occurs in circumstances where legal factors and instruments may not be that effective. This has obvious implications for developing countries, but also in developed countries for economic sectors that are not easily regulated by legal instruments.

1.6. Brief theoretical framing

My theoretical framing for this study is situated primarily within the field of regulation and, in particular, work on responsive regulation (Ayres & Braithwaite 1992) and nodal governance (Buris, Drahos & Shearing 2005). However, I also refer extensively to institutional theory (Williamson 2000; Toke 2000), mainly because it helps to see and make sense of the non-formal, non-instrumental factors that affect regulation. The theoretical framework for this study is explored in detail in Chapter 2.

The methods used in the empirical work and analysis in this study have been significantly influenced by the theory of nodal governance (Burris, Drahos & Shearing 2005). Nodal

¹⁶ <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A070Q&sj=2018>

¹⁷ References to China's 'regulatory state' are described in more detail in Chapter 2 in the section 2.3.3.

governance emerges from an acknowledgement that ‘governance at all levels of social organisation is typically complex, and the various governance systems throughout social space interact with even greater complexity’. The approach of nodal governance is also well-suited to examining dynamics of regulation where there are a ‘plurality of actors ... forming more or less interconnected governance networks’ (Burris, Drahos & Shearing 2005, p. 31), which is an apt way to describe the regulatory landscape in which large SOEs are situated.

Nodal governance is described as ‘an elaboration of contemporary network theory that explains how a variety of actors operating within a social system interact along networks to govern the system they inhabit’ (Burris, Drahos & Shearing, 2005, p. 33) Nodal governance emerged naturally during fieldwork for this study as a very practical way of understanding and explaining how the different actors operated. It helped in tracing interconnectedness and influence across some very complex relationships within and between industry and government.

Although increasing energy efficiency has been a goal of Chinese policy-makers for several decades, particularly since the People’s Republic of China (PRC) Energy Conservation Law was enacted in 1997, domestic regulators have had limited success in achieving national energy efficiency targets in the last two decades. Some of the reasons for this have already been discussed above. The history of energy efficiency in China presents a complex blend or interplay of legislative, organisational/institutional, commercial/economic, and political dynamics that have influenced each other. For students of governance and regulation, this provides a rich setting for study. Understanding the challenges of an authoritarian state that is transitioning from a planned to a hybrid planned-market economy—as evidenced by the opening up and privatisation reforms in recent decades—requires some flexibility in terms of attachment to theoretical frameworks.

The field of energy efficiency and the petrochemical industry are ideal in this regard because they provide a combination of international standards, technologies, and dialogues, together with very local bureaucratic challenges, politics, and rules.

1.7. Approach and methodology

This study selects the petrochemical sector for study because of its importance to energy efficiency, the insight it offers into intra-governmental regulation, its importance to the Chinese economy, and because it contains a variety of firms with respect to the economic, political, and contextual factors outlined in the research questions. It is also a sector that I have significant experience working in and in which a strong network of contacts enabled rich fieldwork. My background allowed this access but also presented certain methodological challenges in terms of bias; these are made explicit and discussed below.

1.8. Description of sites, actors and industry history

1.8.1. China’s petrochemical sector in 2018

While valuable research has been carried out on regulatory dynamics in a few of China’s so-called ‘lifeline industries’ (*mingmai hangye*) (Pearson 2007, 2008; Yeo 2007), these studies

have tended to focus on the finance, telecommunications, or automotive sectors. Other broadly regulatory work by China scholars has been carried out on the mixed results of regulatory dynamics in areas such as coal-mine safety (Wang 2006) or food safety (Tam & Yang 2005). There has been little regulatory work done on the petrochemical sector in China. This may be partly for reasons to do with access and sensitivity around this industry.

After significant restructuring of the petroleum sector around 1998, PetroChina and Sinopec stood out as nationally backed champions. Somewhat akin to the Japanese practice of coordinating competition, these two enterprises—which can be referred to as commercialised but not privatised—were formed through a two-fold process of devolution of certain ministerial responsibilities and government-coordinated acquisition of many local wholesalers and retailers (Ma 2008). Even among these giants, what exists is not unfettered competition, and there are some demarcations between upstream (PetroChina), downstream (Sinopec), and offshore (China National Offshore Oil Corporation, or CNOOC) enterprises.¹⁸

Most scholars argue that the national oil companies (NOCs) are the dominant drivers of domestic and international energy policy (Ma & Andrews-Speed 2006; Downs 2006; Constantin 2007; Houser 2008; Kong 2009). Constantin (2007) argues that the ministries and major SOEs enjoy veto power and ultimate say in major policy matters.

The four plants listed below were the key localities around which this study pivots. There are two other organisations listed that were not localities per se, but which provided very useful reference points and perspectives as described below.

a. Sinopec Star Xi'an

Located in Xi'an near the airport, with annual total production capacity of 25 million tons of crude oil, Sinopec Star was among China's five largest refinery and petrochemical plants. It occupied a total land area of 0.84 million square metres, with a production area of 0.79 million square metres. Mainly engaged in oil refining and road asphalt, Sinopec Star was the second largest petroleum asphalt production base in China. Major installations include crude oil distillation units, petroleum asphalt units, a catalytic cracking unit, hydrogenation unit, gas fractionator unit, and sulfur recovery unit; major products include 100# road asphalt, AH-90 road asphalt, SBR modified asphalt, gasoline, diesel oil, fuel oil, liquefied petroleum gas, and propylene. This site was quietly closed in 2015 (less than two years after my interviews occurred there), in large part (it is said) for environmental reasons.

Xi'an Petrochemical Corporation was first established in 1967; in 1998 it joined Sinopec Star, in 2000 merged into Sinopec Group, and in 2004 was officially acquired by Sinopec. Up to 2011, the total assets of Sinopec Star Xi'an reached approximately ¥2 billion, and in 2012 the company's annual revenue exceeded ¥10.65 billion, achieving a year-on-year growth of 36.69%. These statistics are generally reliable as they are cited by several international organisations as and conversations with industry experts also confirm them.

¹⁸ In the petrochemical sector, other actors also exist, not directly or dominantly petroleum players, but still petrochemical. One example of such a company is Sinochem.

b. Sinopec Zhenhai

Established in 1975, Sinopec Zhenhai Refinery and Petrochemical Plant, formerly Zhejiang Refinery, is a large holding subsidiary directly under the Sinopec Group. Located in Ningbo, a pivotal hub of the Yangtze River delta, Sinopec Zhenhai has been the largest and most emblematic enterprise among the refining and petrochemical division of Ningbo Economic and Technological Zone; with an annual production of 23 million tons of crude oil and 8500 employees, it is the seventeenth largest refinery worldwide, the tenth largest in pan-Asia and the largest in terms of production in China. Sinopec Zhenhai is also China's first world-class refining enterprise. Sinopec Zhenhai has been a publicly traded corporation on the Hong Kong Stock Exchange since its restructuring in 1994; through Sinopec's strategic deployment, the company later retreated from its public listing status and founded Sinopec Zhenhai. Besides crude oil, major production per annum includes 1 million tons of aromatic hydrocarbon and 0.2 million tons of polypropylene, in addition to 45 million tons of deep-water marine throughput and 3 million cubic metres of storage capacity. In 2015, Sinopec Zhenhai processed 21.8 million tons of crude oil, with a year-on-year growth of 4.09%, realised an annual revenue of ¥94.3 billion, with a profit of ¥10.81 billion. It is one of the most profitable plants in the Sinopec portfolio.

c. Sinopec Shanghai

Sinopec Shanghai Petrochemical (formerly Shanghai Petrochemical) was established in 1993 as part of a reshuffle of the state-owned Shanghai Petrochemical General Factory, founded in 1972, and was officially renamed Sinopec Shanghai Petrochemical Company Limited in 2000, directly supervised by and controlled under the Sinopec Group. Located in Jinshan District of Shanghai, Sinopec Shanghai has experienced six stages of large-scale centralised construction. As of the end of 2014, the company had been equipped with annual synthesis processing capacity of 16 million tons of crude oil, 0.7 million tons of ethylene, 3.27 million tons of organic chemicals, 1 million tons of synthetic resin, 1.09 million tons of synthetic fibre materials, 0.59 million tons of synthetic polymer, and 0.28 million tons of synthetic fibre. The company also has an independent utility and environmental protection system, as well as marine, railway, and haulage facilities. In 2014, the company processed 14.17 million tons of crude oil and produced 2.87 million tons of gasoline, 4.07 million tons of diesel oil, 1.49 million tons of jet fuel, 0.8 million tons ethylene, and 0.51 million tons of propylene. In 2015, the company's annual revenue totalled of 67 billion renminbi (RMB), with a gross output of 12.97 million tons, of which petroleum products and petrochemical products constituted 45.9% and 20.5% respectively.

d. Sinopec Luoyang

Sinopec Luoyang Company is a medium-large refinery founded in 1984 with a capacity of 8 million tons of crude oil per year. The company has refined output capability with an emphasis on petrochemical products and chemical fibres. The company was given a boost of growth in 2004 by the central government but many of its facilities are old and in need of modernisation. There is talk (in my personal communications with Sinopec officials) of

relocating the entire plant to a more remote location or a possible merger with another production facility.

e. Xi'an PetroChina

Xi'an PetroChina was treated as a reference site and not a research location per se. Located in Xi'an City, Shaanxi Province, PCOC (PetroChina Changqing Oilfield Company) is a regional branch company of PetroChina. PCOC is mainly engaged in the exploration, development and production of crude oil, natural gas, associated gas and other resources in Ordos Basin, as well as oil and gas gathering and delivery, refining and petrochemical, product sales, exploration and development planning and scientific research.

All the other facilities visited were part of the Sinopec Group. The impression from the interviews with the managers at the PetroChina plant was that they are less focused on or organised around energy efficiency than Sinopec generally. Subsequent to completing the field work, this impression was confirmed with several senior leaders from both Sinopec and PetroChina, who stated that currently the culture at Sinopec is more corporatised, focused on good governance generally and, thus, altogether stricter in terms of internal controls and regulation. With regard to energy efficiency, some speculated that the superiority of Sinopec's effectiveness and its focus on this may be attributable in part to this overall 'better' corporate governance, and to its general culture of being 'mid/downstream' while PetroChina is more 'upstream' focused. The upstream culture is more one of abundance, of finding and extracting resources. Upstream culture is associated with a prospecting and resource industry mentality, while the mid/downstream culture is more one of engineering and science. Thus, there is an inherent predisposition to innovation for energy efficiency. Intuitively, also, mid- and downstream work lends itself more to energy efficiency since it is more energy-intensive.

f. Luoyang Petrochemical Engineering Research Corporation (LPEC)

LPEC was also treated as a reference site and not a research location per se. Established in 1956, Sinopec Luoyang, aka LPEC, is a design institute. Its focus is on engineering work that spans various refineries. The institute boasts over 1130 employees and it has managed nearly a thousand mid- to large-scale engineering projects across China.

1.9. Research methodology

In this project, I take an object- and sector-specific approach rather than attempting to study regulatory effectiveness in the abstract. The major practical outcome is a contribution to questions about the regulation of energy efficiency in the petrochemical sector in China during a specific period; this outcome may not apply perfectly to other subjects of regulation beyond energy efficiency. This study is not expected to make a priori conclusions or widely generalisable findings (Opschoor 1994, p. 35). The primary reason for this is the complexity of factors that affect regulatory effectiveness. So many dimensions of potential influence exist that it is necessary to narrow the field of focus as much as practicable. In this project, this is achieved by narrowing the subject, object, national context and temporal space of study (discussed below).

Having a background as a legal practitioner for the last twenty years in China, I came to this study with concrete questions. At the outset, I was not steeped in theories nor attached to methodological doctrines. Rather, throughout the process of study, I was constantly searching and evaluating methods and approaches that might help inform my design and findings. My experience, prior to starting this research, was as a lawyer in private practice and then later as general counsel in the Asia-Pacific region for a US-based multinational corporation, listed in the Fortune 100. Hence, much of my thinking was experience-based.

In terms of epistemological approach, I take a pragmatic worldview (Patton 1990; Rossman & Wilson 1985; Cherryholmes 1992; Morgan 2007) and apply a qualitative design to research. My focus is on addressing the challenges of regulation in China. I seek to generate and analyse qualitative data in answering the questions posed. The distinguishing feature of this study is the unusual depth of access to senior interviewees who have felt comfortable enough to open up about how they view sensitive issues in their webs of influence. This qualitative data provides a perspective that complements the many qualitative studies related to energy and energy efficiency in China.

I have been loosely guided by a grounded theory approach and elements have been borrowed from Parker's (2009) guidance on empirical work in regulation. However, Parker's methods are relied upon more as a guide to avoiding errors of conceptualisation rather than for structures of method. Regarding method, I have taken a highly active learning process based on the hermeneutic circle approach discussed by Gadamer (1975). This approach rejects the idea that objectivity can be achieved through methodological means and, instead, takes an intersubjective approach to enhancing understanding around the issues in question. Thus, in this study my focus is on the testimony of the interviewees and how they perceive and interpret regulatory factors. The emphasis zooms in on the details of how outcomes occur in settings where decision-makers are influenced by a web of actors.

Importantly, too, a few scholars who have ventured to carry out empirical work on regulation or regulatory enforcement in China have cautioned against extrapolating generalities from small-*n* studies. As two scholars who looked at environmental enforcement in three cities commented: 'Overall, the results suggest that caution is warranted when interpreting current findings about China that have used samples from a single region and that enforcement agency directors in non-democratic regimes must consider a complex array of contextual factors in attempting to promote a particular style of enforcement' (Lo & Fryxell 2003). Hence, I have been cautious not to make broad claims about effectiveness of enforcement styles or regulatory patterns based on my four research sites. To avoid too narrow a sample, I have sampled qualitative data from several different regions as described below.

1.10. Methods

Data were collected through a mixture of document collation, observation, and interviews. I carried out semi-structured interviews involving open-ended questions, reference to existing images, statistics, reports or data, queries about successful projects and failures, current funding, operational procedures, plans and implementation, and relationships with

regulators/regulated. A template of initial questions in the interviews is attached in Appendix 1.

The petrochemical sector in China has a massive footprint across the nation; almost every major city has some petrochemical processing presence. There are some thirty or so major refineries across China, the bulk owned and operated by Sinopec.¹⁹ To explore the research questions on the first page of this chapter, I carried out fieldwork in four localities in China with varying characteristics.

The four cities selected for study are Xi'an, Shanghai, Luoyang, and Ningbo. Originally the research design for this project included only two cities, Xi'an and Ningbo, based on their difference from each other.²⁰ As fieldwork unfolded, opportunities arose to visit facilities in two other cities, Shanghai and Luoyang. Figure 1 provides a map showing these locations.

I interviewed employees of refineries in each city and, where possible, local regulators, suppliers to the refineries, and other experts. I also interviewed SOE executives in headquarters and central regulators in Beijing. A total of 40 interviews were carried out over a period of eighteen months with managers of various levels in plants, government authorities that regulate those plants, suppliers of energy efficiency technology to those plants, lawyers and lawmakers who work in energy efficiency, and senior managers at the headquarters of the SOEs. Details of the interviewees are set out in the table in Appendix 2. The interview process was discontinued after about 40 interviewees because a point of saturation had been reached. Interviewees began to provide repetitive testimony and the same themes and outcomes kept emerging. Towards the finalisation of this dissertation, several refresher interviews were carried out to ensure the vitality and relevance of the earlier findings. These interviews were confirmatory of the earlier findings.

Where Chinese interviewees were involved, which was predominantly the case, I carried out the interviews entirely in Mandarin.

1.10.1. Avoiding anecdotalism and bias

There is a danger in qualitative research of being overly subjective and falling victim to the tendency to present a series of examples that serve to confirm one's existing premises. 'One of the main concerns in analysing large amounts of qualitative data is how to ensure that reported findings are in fact grounded in the data' (Outhwaite, Black & Laycock 2007, p. 505).

¹⁹ Sinopec will be introduced in more detail below, in the section describing sites, actors and industry history.

²⁰ See Mills (1843) for a description of the methods related to 'most similar—most different' analysis. Further references and discussion regarding selection of fieldwork targets occurs below under the heading, Selection of Fieldwork Targets



Figure 1: Locations of fieldwork.

Outhwaite et al. articulate this concern further, describing how ‘in presenting qualitative data the results can sometimes be opaque ... where quotations from the text are the only source of data, as is commonly the case with qualitative research, there is a danger of “anecdotalism” or “selective plausibilisation”’ (2007, p. 505).

In order to address this concern, several methodological measures have been taken. One is triangulation of interview findings through multiple interviews with the same actors over a temporal horizon of several months, and, in some cases, nearly a year. Another is triangulation of interview findings through cross-checking and verification of information provided by various actors who have different perspectives on the same issues. Another form of cross-checking employed is the verification of technical or investment-related information against publicly available or documented sources. Details of this are provided in the specific chapters where such analysis occurs. Finally, computer software has been used to systematise and facilitate the storage and computation of large and complex sets of data collected from the interviews. It is acknowledged that the coding and interpretation of this data represents a major interjection point for biases; nonetheless, such biases will be systematised and made more transparent and thus, hopefully, more readily detectable.

This study is hindered by the potential bias of its data sources. The virtue and vice of this project is that it revolves around interviews with actors in the underbelly of the management

of energy efficiency and production in SOEs. Each actor has his or her own biases and reasons for presenting information in a particular way—consciously or otherwise. To mitigate this effect, an effort has been made to counterbalance views from those within the SOEs and their corresponding regulators with views from other related actors, such as suppliers, lawyers, academics, and other industry experts. Statistics and data have also been referenced to assist in triangulation of claims. However, since this study finds that energy efficiency statistics relating to these refineries are not very reliable and are prone to gaming, their importance has not been emphasised. No story is free from hues; this one is no exception. In each chapter, where a source is cited from within an enterprise, effort has been made to also cite alternative sources from either government or somewhere outside the enterprise to provide to counterweight testimony.

1.11. Selection of fieldwork localities and targets

Fieldwork carried out at the city level is the primary source of data for this study. The localities selected (Xi'an, Shanghai, Ningbo, and Luoyang) represent a strategic sampling of four geographies that have differing characteristics and allow for triangulating observations of firm behaviour.

Importantly, this is not a comparative case study project and so the four localities do not represent units of measurement; nor are they intended to serve as most similar or most different type localities to prove a hypothesis, in Mill's (1843) terms of design.²¹ Rather, the objects of study are the firms, government institutions, and the individual actors that exert influence over the firms and government bodies.

Empirical exploration of various regulatory factors often oversimplifies reality. In this regard, Burris, Drahos and Shearing's (2005) contribution in terms of conceptualising influence on duty holders in terms of 'nodal governance' and the approach that they take is useful. Burris et al.'s approach affirms that they 'take complexity seriously'. Their approach is valuable because the factors relating to regulatory effectiveness or 'good governance' are often embedded in thickly networked relationships where correlations are hard to follow and 'good science' is hard to achieve. As will be described in Chapters 4 and 5, findings in this study repeatedly uncovered networks and social phenomenon that resonated with the methods and theory of nodal governance.

One locality, Xi'an, is in the centre of China, is land-locked, and has an abundance of energy resources and, thus, usually, a surplus of power. It is one of the four great ancient capitals of China.²² The city is located in Shaanxi, which is considered a more traditional and government-led region where some of China's sensitive industries, such as aerospace and defence, are located. Another locality, Ningbo, is a coastal city on China's booming eastern seaboard, and suffers a shortage of resources and power. It is in Zhejiang province, considered one of the more entrepreneurial regions in China. However, Ningbo is distinctive

²¹ See also Engeli (2014) and van der Heijden (2013) for description of 'most similar—most different' approach.

²² A distinction coincidentally shared by Luoyang, another locality included in this study.

for another reason. It has been one of the highest scoring cities (the highest in 2009) in terms of the PITI (Pollution Information Transparency Index). The third locality, Shanghai, is China's financial and economic hub. It boasts a robust economy and is usually at the forefront of regulatory innovation in matters that affect the economic interests. For example, Shanghai is currently an experimental point for a major free investment zone. Jinshan, where the facility in Shanghai is located, is at the edges of Shanghai on the coast. The refining and petrochemical industrial complex there is a dominant part of the area's landscape and make-up. Finally, Luoyang, located in Henan province not far from the capital Zhengzhou, is a city on the central plain of China. It is one of the poorer regions of China but, because of its historical significance as an ancient capital, is a famous tourist destination. The city in general and the site located there have a strong sense about energy efficiency as a part of its identity. For example, the major development zone there identifies energy efficiency as one of its pillar industries.

Another series of decisions had to be made regarding which enterprises to include in the data sample. Again, given the nature of this study, this process does not lend itself well to randomisation. Indeed, randomisation is likely to produce skewing, since there are only a limited number of actors, with several key actors dominating the bulk of the industry. Several cautions and limitations of qualitative empirical research in regulatory dynamics are considered below. Attention is given to several challenges raised by Christine Parker (2009) when she discusses empirical work in this field. Although Parker's observations are directed at regulatory capitalism, they translate with just as much validity to other areas of regulatory studies.

Many empirical studies use qualitative interviews and participant observation to investigate how different organisations and individuals within them respond to legal and non-legal regulation including what motivations, attitudes and perceptions regulatees have towards regulation, regulators and compliance, what actions they take in response to regulation and to what extent they take responsibility for their own regulation and compliance. (Parker 2009). The challenges Parker identifies are examined in further detail below under the heading 'Limitations'.

Two cities, Xi'an and Ningbo, were initially considered to be the focus of the study but, ultimately, four cities were included. The depth of study possible in Shanghai was substantial, so it was added as a third city. Shanghai adds an interesting data set to the study because it is a wealthy coastal city but the petrochemical facility located there is relatively aged. The facility in Luoyang, which became the fourth city, was also aged and not particularly large in scale; indeed, it showed no special characteristics except that several energy efficiency managers in other plants referred to it as having a strong energy efficiency management office. Therefore, it was visited as a special case to improve my understanding of the sector. Findings from Luoyang have also been included in the data set. In Xi'an, there were two separate facilities belonging to different SOEs, PetroChina and Sinopec; each had very different characteristics, which will be described below, but the PetroChina facility (since it is further upstream) is not considered one of the fieldwork localities per se. As mentioned,

the cities are not the units of study, and so having additional cities has allowed a broader and more varied sampling of data sources.

1.12. Limitations

There are some real challenges to this sort of research. One of the most significant obstacles is access. The refining-petrochemical sector is sensitive and part of national security. Visiting plants often requires multiple levels of approvals and senior sponsorship. Foreign nationals are subject to even more scrutiny. Managers of such plants are cautious about discussing issues with outsiders, let alone foreigners. Many of the interviewees are considered part of a corporate or governing elite at the municipal, or sometimes national, levels, so aside from the sensitivity of the field, simply being granted time and an audience is a hurdle. This made for a rich fieldwork experience that involved much relationship-building and deployment of my social capital. Fortunately, my having lived and worked in China for nearly two decades and having existing ties to several of China's 'lifeline industries', including the oil and gas sector, made the significant level of access required for this study possible.

With the paucity of empirical and theoretical work in China in the field of regulation, particularly energy efficiency regulation in the petrochemical sector, this project suffers from several limitations. Given the nature of the field, it must be primarily exploratory in nature. In some respects, it attempts to add depth to the empirical work done on the application of regulatory theory to Chinese enterprises and government.

Attempting fieldwork, particularly interviews and observation, as a foreigner has its advantages and disadvantages. When encountering a foreign researcher, most interviewees—whether representing government or industry—can at least rule out certain risks and concerns about whether their comments will be reported to more senior Party officials or within other circles. They can also rule out concerns that the true purpose of the study is for some other agency to 'check up' on them.

However, other issues, such as maintaining 'face' in front of foreigners, may come into play. Not everyone is comfortable airing 'dirty laundry' in front of an outsider. Also, given the sensitivity of the petrochemical industry in terms of its relationship to energy and, hence, national security, other sensitivities need to be borne in mind. Thus, beyond the significant challenges of access, even where access to researchers is granted access to full information may be limited. Such issues are not exclusive to China, but certainly exist there.

Another limitation is the impossibility of generalising from findings from just four localities. China is a vast and diverse nation with huge variations from its western provinces bordering Central Asia, to its eastern booming coastal cities, to the southern regions that border Vietnam and form part of the Golden Triangle, up to the northern areas like Inner Mongolia. It would be foolish to imagine that qualitative interviews with people in a few cities could represent national phenomena reliably. Thus, this study is an effort to understand in close detail the workings of industry and local regulators in the context of broader laws and policies at the national level in four localities. In some cases, there may be features that echo

experience in other places; whether, and to what extent, these features amount to national or general phenomena will remain a question for further studies.

As indicated above, the exploratory nature of this project means there is less in the way of hard hypothesis testing. The approach is more of a grounded approach that has relied on certain working hypotheses, but will only serve to make suggestions about these hypotheses rather than prove or disprove them.

The cases will not be fully representative of the petrochemical industry in China or elsewhere in the world. They will certainly not in any way be representative of energy efficiency cases across other industries, since each industry has its own needs and challenges. However, to the extent that large industries interacting with state-owned actors consider energy efficiency, there may be some commonalities that provide value for other scholars. In principle, however, it is accepted that ‘in the complex world of regulatory design, a priori is inferior to case-by-case analysis’ (Turner & Opschoor 1994, p. 35).

Perhaps the most significant limitation of this study relates to reliability of data, whether government ‘official’ figures or data provided by interviewees. This ties in directly with challenges related to definitions of compliance, which are discussed in detail below based on Parker’s treatment of empirical challenges in doing research in regulation. Several measures were taken to control for such problems with data, including triangulation of data through cross-checking and verification, discussed further below.

The challenge in studying particularly the ‘non-legal regulation’ Parker describes is that reality is so messy and complex that inconsistent conclusions can be drawn and correlations are difficult to isolate or keep sterile. This study is cautious in that it does not make grand claims of hard science. It is an attempt to shed a little light in a small space that currently is not highly visible to Western scholars. The existing literature points to a few ideas that are explored in Chapter 2. This study attempts to explore those ideas within the Chinese, SOE context in connection with energy efficiency during a span of some years to look for patterns that recur and themes that emerge.

1.13. Contributions made by this work

By exploring the question of what factors are effective in moving SOEs towards energy efficiency and why SOEs behave the way they do in the field of energy efficiency, this work will endeavour to contribute to the existing field of knowledge at three levels: empirical, practical, and theoretical.

1.13.1. Empirical contribution

This research seeks, in part, to make an empirical contribution to closing a gap described by several key scholars in the area of governance in China. Notably, for example, Pearson (2003) writes: ‘I do not do sustained case studies in this paper, but rather draw examples from different industries. I also do not look at regulatory institutions as they exist at the provincial

and local level; this is an extremely important part of the story.²³ Thus, this broad mapping must eventually be populated by narrower sectoral and local studies to fill in the empirical basis.’ Local and sector specific studies, such as this one, are necessary to provide further empirical insight and give colour and texture to existing theories.

1.13.2. Practical contribution

There is also practical value in terms of energy governance and environmental protection. For the global community, effective engagement with China is indispensable, given the importance of China’s role in energy consumption, processing, and production, and the emissions that accompany these processes. One scholar has commented that:

International collaboration, in any form, requires trust, and such trust is built on understanding. In the case of collaboration in the field of energy, potential partners need to have an appreciation of frameworks for energy governance in each other’s countries. Only then can they accurately interpret the data, the statements and the declared commitments provided by other parties. (Andrews-Speed 2010)

Although there is an abundance of information—and speculation—about energy in China, there is a distinct lack of understanding beyond the level of macro observations—mostly at the conglomerate level. More detailed understanding is necessary in order to predict trends and behaviours, but also to enrich and facilitate discussions and positions that are taken in international dialogues.

This study asks why SOEs behave the way they do towards energy regulation. In particular, it examines the behaviour at these enterprises at the level where actual energy savings occur—the plant level. This gritty examination of regulatory uptake is intended to serve the broader discourse about macro policies, economic incentives, and other instruments used in directing firm behaviour.

1.13.3. Theoretical contribution

Theoretical implications of this project occur at three levels: normative, institutional, and governance/regulatory. At the normative level, there are many questions and a few views emerging from research on the choices that Chinese authorities are making about how to govern their markets since the market-oriented reforms of recent decades. In other national settings, political economists have demonstrated that industry relies government involvement and regulation, in even the most market-oriented economies (Fligstein 1996; Lindblom 1967).²⁴ The extent to which—and the modalities through which—such involvement occurs to create conditions for markets to work effectively, relates to the realm of institutional and regulatory theory. However, questions of whether the government should be involved in certain markets or industries, which parts of the government or party-state should be involved, and whether competition should be unfettered, coordinated, planned, or some

²³ On the local governmental aspect of regulatory reform, particularly the need to use national regulation to combat local protectionism, see OECD (2002). See also OECD work on competitive neutrality and SOEs as global competitors, OECD (2016).

²⁴ Fligstein (1996); Lindblom (Basic Books).

hybrid, are to some extent normative in nature and have been hotly discussed in recent years in the discourses on competitive neutrality (OECD 20012, 2015, 2016, 2017).

At the institutional level, there are questions of how government interventions will look, what systems will contextualise and provide social spaces for their implementation, and which structures will frame them. The underlying element of these questions relates to the path dependencies of existing institutions and the extent to which these are affected by local experiences and context, social and political factors, capacity-building and education, and participation in discourses that bear on these institutions.

At the regulatory level, there are questions about which actors will have the dominant role in driving regulatory outcomes, how outcomes are perceived and measured, which instruments or mix of instruments are effective, and how and to what extent non-formal factors impact on the actors, instruments, and outcomes. The answers to these questions will go some way in helping understand what form the new ‘regulatory state’ in China will take and what characteristics it will have. The concept of ‘shadow regulation’, emerging from the findings of this study and discussed in Chapter 2, is a theoretical innovation that facilitates thinking about how regulatory influence occurs between government and large SOEs. The concept of the ‘regulatory maturity curve’, introduced in Chapter 3, is a new idea emerging from interviews and describes how issues are introduced with strict legal standards which are at first aspirational. Then, as capacity to understand and comply increases, stronger enforcement occurs. In the period leading up to full application and enforcement of the laws, a range of other factors are used to increase the capacity of firms to respond to the regulations. The result is that enterprises are pushed along a maturity curve in terms of their ability to understand and comply with new regulations. Another new idea emerging from this research is the notion of ‘political licence’ (discussed in depth in Chapter 5). Political licence adds a new dimension to the theoretical framework conceived by Gunningham and Kagan (Gunningham, Kagan & Thornton 2003, 2004; Thornton, Kagan & Gunningham 2009), who describe three dimensions—economic, social and regulatory—that affect firm behaviour.

Increased understanding of the shape and mechanics of the Chinese private and state-owned sector can help inform theories about how the Chinese state is and how it should reinvent itself under the new ‘socialist market economy’ (Shue 2008). Shue (2008, p. 3) comments on the need for this sort of research:

What are the emerging firm types, their patterns of ownership, and the principles of coordination among them and between them and their creditors, suppliers, and employees? Once this basic reconnaissance has been done, then deploying some general typologies like those few sketched above, we may better discern the degree to which the new ‘socialist market economy with Chinese characteristics’ is coming to share the organisational and operational features of one—or more likely, more than one—of these already-identified types of capitalist market economies. We would then have in hand at least one important indicator of which forms of state supervision over China’s wealth generating markets would be likely to be best adapted to the tasks ahead. And this knowledge we might then use to good advantage in assessing the party-state’s ongoing exercises in reinvention.

Although Shue does not list regulators as one of the key relationships for firms, it can be assumed from the context of her paper that regulators are also important. In terms of theories of governance, this fits into work by scholars like Schneider (2008), Amable (2003), and Hall and Soskice (2001), about varieties of capitalism.²⁵

Finally, there is a significant debate among some scholars about relationships between the type of regime (authoritarian or democratic) and environmental protection performance. There are those who argue that authoritarian regimes perform more poorly in environmental protection (Feshback & Friendly 1992; Shapiro 2001; Economy 2004). Others contend that this depiction is over-simplified, although not completely inaccurate (Turner & Zhi 2006; Schreurs, in Dryzek et al. 2011). Examining regulatory effectiveness and the factors that contribute to it in an authoritarian setting such as China may provide more detailed insights into how the government and other actors relate in the project of conserving energy or protecting the environment. And though the lessons from China will not be entirely transferable to other nations, they will provide reference points.

Clearly, this small project will not address all of these theoretical strands. Nonetheless, there are implications for each of these issues that will emerge from the in-depth examination of the petrochemical sector at the city level.

1.14. Conclusion

This chapter has described the challenge of improving energy efficiency in the Chinese refining and petrochemical sector and highlighted the reasons for its importance. It has set out the problem statement and questions that will be explored and the justification for this work. It has outlined the contributions that the work hopes to make and the approach and methodology adopted. Importantly, this chapter has acknowledged the limitations related to this undertaking and the scope of this study. We have been introduced to the key actors and had a very brief reading into some of the historical context to provide some basic bearings to the reader.

The next chapter reviews the literature relevant to this work. It visits some theories in regulation and their application to the question of regulating energy efficiency in SOEs in China. It will look at how Chinese regulatory practice and discourses have evolved in the decades since China's modernisation began and identify the interplay between Western theories and Chinese theories and experience. The chapter will consider three main issues. First, it will look at why traditional regulatory approaches, which focus heavily on strengthening legal institutions, fail in regulating energy efficiency in SOEs in China. Once the limitations of traditional regulatory approaches are considered, the chapter turns to the existing discourses on regulation and energy efficiency in China. It examines Chinese isolation from contemporary theoretical regulatory debates and argues that recent theoretical developments in regulatory theory are relevant to China but need to be adapted to apply meaningfully. After addressing the current discourses relevant to energy efficiency

²⁵ These include liberal market economies, coordinated market economies, network market economies, and hierarchical market economies.

regulation, the chapter examines several bodies of literature relevant to the underlying argument of this study: that non-formal regulatory factors are critical to effective energy efficiency regulation in these massive state-owned refineries in China.

Chapter 2. Regulatory theory and its application to energy governance in China

Energy efficiency has been a priority in the five-year plans. The laws have been there for years. Something more was needed to catalyse the laws, to breathe life into them. The laws are aspirational when they're first written. It takes time for the authorities and the companies to function at the standards that the laws set. But, over time they become the norm...

– Interviewee [JD-MV]

2.1. Overview—conventional ways of viewing energy problems and the need for something more

China has struggled to regulate energy efficiency in its large SOEs, particularly in the last two decades. Despite energy efficiency being a priority goal in several of the five-year plans,²⁶ significant change was not been achieved until recent years and there remains a long way to go to achieve the kind of improvements that China has committed to internationally, in the Paris Agreement for example.²⁷

Most prescriptions for improvements in China's regulation of energy efficiency involve strengthening the formal legal institutions (such as laws, courts, enforcement and audit agencies etc.) that allow enforcement of laws and regulations (for example, Zhang 2019 Yang 2004; Wang 2006; Fang & Zeng 2007; Sinton et al. 1998, discussed in the section 2.3.3 below on regulatory discourse relating to China). This assumes that legal system reform is proceeding rapidly and that a law-centric approach to energy efficiency will be effective. I examine both these assumptions below.

The perspective from the enterprise and plant level in Chinese refineries and petrochemical SOEs reveals that several factors are particularly important in regulatory effectiveness in energy regulation. These are not, however, limited to the factors typically predicted by regulatory theorists in Western scholarship or practice. Nor are they consistent with the mainstream Chinese discourse about strengthening rule of law and regulatory infrastructure discussed below. Rather, several nuanced factors that span disciplines of regulation, governance, and institutional development play an important role in driving regulatory outcomes. Voices from the plant level talk about the challenges with two aspects: corralling willingness and developing capacity among regulators and enterprises, at the corporate and plant level, to drive improvements in energy efficiency.

It is important to understand these non-formal factors and the impact they have on regulatory outcomes. Understanding them has implications for policy design and implementation not only in energy efficiency but also for SOE reform in China. Understanding the dynamics

²⁶ See the Tenth (2001), Eleventh (2006), Twelfth (2011), and Thirteenth (2016) Five-Year Plans of China

²⁷ See Communiqué from China's NDRC to UNFCCC, 30 June 2015.

surrounding the willingness and the capacity of enterprises to comply is critical to achieving regulatory outcomes.

The next few sections explain how this study has applied three theoretical framings to help generate these insights. The first is a framing of responsive regulation (Ayers & Braithwaite 1992; Braithwaite 2011) and regulatory pluralism (Gunningham & Sinclair 1999). The second theoretical framing is situated in institutional theory (Williamson 2000). A third theoretical phenomenon important to both the substance and the methods of this study is nodal governance (Shearing & Wood 2003; Burris, Drahos & Shearing 2005). These theories and their application and relevance are discussed below.

2.2. Why formal regulatory models fail

2.2.1. Challenges in energy efficiency regulation of SOEs

It is often thought that Chinese SOEs, because they are government-owned, can be easily influenced by government; that they can be commanded and controlled through mandates. Wang Jianguo (2014) provides a thorough descriptive account of the governance structures of SOEs and the important role of the Party apparatus and the webs and nodes of control throughout organisational structure, especially at the leadership level. He also provides some opinions on the implications of the dual control structure existing in SOEs. Wang notes that there is a legal framework, under the *Company Law of the People's Republic of China 2006* and other related laws, and a political framework, under the Party apparatus. Wang observes that 'China seems to be developing a new model of SOE governance that combines universal elements of corporate law with communist political institutions' (p. 667).

Reading Wang, one might imagine that SOEs are simply commanded and controlled through one or both of these dual, parallel governance structures—or that, at least, the Party structures within the SOEs have ultimate influence over the behaviour of SOEs. While to some extent this is the case, the experience of energy efficiency regulation within these SOEs is more complex than this dualist story acknowledges. Rather, it is multi-nodal, as the following sections show.

Interviews in this study revealed that government officials have mixed feelings about enforcing energy efficiency regulations against major SOEs. Chinese regulators are sometimes nervous about enforcement because their counterparts are also Party members with priorities that compete with energy efficiency. 'Government will' cannot be conceived as a singular thing that simply needs to be communicated through the ranks. Government, or rather Party, will is complex, multifaceted, and, at times, contradictory—for example, the description of one interviewee, that the 'government wants industry to have its foot on the gas and the brake at the same time' [BP-HA]. Hence, existing work on Chinese SOE reform can benefit from more theoretical and empirical work that unveils how senior officials interact with each other and how contradictions in policy priorities are reconciled at the working level between cadres.

van Rooij has identified the impact of non-legal issues and some of the dynamics of political influence in the domain of environmental regulation. Although his was not a study of SOEs,

his observations are relevant here. In his in-depth study of Dianchi Lake in Yunnan province, van Rooij (2006) provides a textured view of the limits of laws alone in having direct effects and identifies the influence of economic, political, and social factors on firms and how they respond to regulation. In his conclusions, he highlights the complexity and interrelatedness of factors in understanding firm behaviour.

Our study of compliance and violation demonstrated that even around one lake the same rules led to different outcomes depending on a complex set of interacting variables both internal to the regulated actor as well as external. The complexity of even one lake pales compared to the complexity of a large country as China with a unitary legal system. National legislators and law enforcement strategists face the daunting and perhaps impossible task of understanding how the multitude of various regulated actors in different geographical, economic and cultural settings will respond to their rules and enforcement actions. The complexity of compliance and violation behaviour therefore severely challenges the possibility of designing balanced laws and enforcement schemes, especially in a developing legal system. (van Rooij 2006, p. 382)

Meidan (2016) provides a brief treatment of the challenges relating to SOE reform in the oil and gas sector. His work juxtaposes the socio-political circumstances of China's development with the efforts of the Party to adapt to different experiences in driving reform. He also observes the differing focuses of various ministries and the tensions that result for the SOEs. He concludes by observing that '[t]he relationship between China's state owned energy giants and the government has, since the industry's creation, been a story of successive waves of centralisation and decentralisation ... But the tension between state control and market liberalisation has varied according to the policy preference of China's top leaders and the political developments in global markets' (Meidan 2016, p. 55). Regarding the current levels of control on refineries, Meidan suggests that

[t]his latest episode in the history of the Chinese oil industry—which has also coincided with the collapse in global oil prices—has once again altered the dynamics between the party-state and the industry. In the aftermath of the corruption probes and the appointment of new technocratic leaders to head the NOCs, central control has increased substantially. Their power has been clipped, but at the same time, their mandate is increasingly to find ways of becoming more efficient and increase their role in global markets, throughout the value chain. (2016, p. 55)

With less power and more pressure to be efficient, SOE CEOs and managers must triage. They must interpret, reconcile, and apply the sometimes-differing signals they receive from laws, higher-up officials, local regulators, and other actors. In the next few sections, we will consider the existing focus on formal legal factors and their limitations in driving energy efficiency in these SOEs. Then we will look at how Chinese isolation from contemporary regulatory debates has affected approaches to regulation in energy. In this section, we will look at the frameworks of responsive regulation and regulatory pluralism as they apply in the Chinese context. The last two sections of this chapter will begin exploring non-formal regulatory factors, their importance, and how to think about them in this setting and how the theoretical lenses of responsive regulation and regulatory pluralism and institutional theory juxtapose to show how non-formal regulatory factors affect energy efficiency regulation.

2.2.2. Existing focus on formal legal institutions

International scholars examine and compare the Chinese legal environment with Western developed models and look for ways to move China further along the path of strengthening its institutions. Increasingly, these prescriptions are gaining popularity among some Chinese scholars as well (see, for example, Yang 2004; Wang 2006; Fang & Zeng 2007; Sinton et al. 1998, discussed below in the section titled, Regulatory discourse relating to China). This is a worthwhile effort, though costly and gradual. Other scholars, such as Gillespe and Peerenboom (2009), Tung (2019) and Dowdle (2002, 2005, 2009, 2011, 2013), advocate Chinese endogenous approaches to legal reform.

This work does not advocate one model or another. Rather, the top-down prescription is challenged empirically in this study by my data from the enterprise and plant level.

The Western literature on regulation has progressed significantly in recent years, moving further from a narrow focus on command and control approaches and the institutions that support them to explore a range of other factors that drive regulatory outcomes. These developments in regulatory theory are visited in the next section. Notwithstanding the theoretical advances in regulatory thinking in Australia, Europe, and North America, much of the energy policy advice provided by Western scholars to Chinese regulators, and the material that Chinese scholars choose to read and pay attention to, takes a simplistic approach, recommending stronger basic (or formal) institutions that support the effectiveness of a command-and-control model of regulation (for example, Sinton et al. 1998, 2005). With a few notable exceptions, this advice usually involves a narrow focus on legal and economic institutions, placing less emphasis on other factors that shape and drive responses by the regulated actors. For at least two decades starting in the 1990s, scholars were critical of deficiencies in the legal framework and regulatory system. Immature legislation and fragmented authority were blamed for compromising regulatory effectiveness (Chan et al, 1995; Alford & Shen, 1997; Yang 2005). Laws were seen as, ‘vague’ and ‘exhortational’ (Beyer, 2006, p. 205), reading ‘like policy statements rather than laws in the Western sense’ (Economy 2011, p. 107). Economy (2011), who examined China’s solid waste laws, points out the ambiguity and vagueness of laws resulting in uncertainty about what agencies have responsibility and authority to carry out laws. Tam and Yang (2005), who studied food safety in China, point to fragmented authority among multiple government offices with responsibility for food safety as a cause of incongruities and deficiencies in regulation. Other scholars, like Andrews-Speed, who studies the energy sector, also acknowledge that the flexibility afforded to local governments at the city and provincial level allow spaces in which local empowerment occurs and decision-making can be tailored (2004, pp. 190–192). There are obviously pros and cons to allowing bureaucratic discretion in an emerging legal system. Perhaps one of the greatest risks is that of corruption, as White (1996, p. 45) points out. Interviewees in this study readily acknowledged corruption and influence at the city level, but they often described the need for some flexibility in the rules and authority as a necessary part of the path of development, challenging me in interviews by asking how practical it would be to suddenly have a comprehensive set of rigid laws without the requisite capacity in other formal institutions to support such laws.

A few regulatory scholars with experience in China consider the nuanced effect of political, economic and social factors on how regulation occurs, looking at the law, but also cautioning scholars to look more holistically. One scholar whose work has broadened thinking on regulation in China is Dowdle, who argues persuasively that regulatory outcomes are not simply a factor of political will and that a country's regulatory capacity is affected by its socioeconomic structuring. Dowdle argues that the 'Weberian regulatory model used by scholars and organisations working in legal and economic development use to evaluate the regulatory effectiveness of developing countries' (2011, p. 576) is inadequate. He notes that '[t]his model which is often captured in the rubric of "the rule of law" sees regulation largely in terms of stable, rationalized, predictable and codified rules that are technocratically enforced by independent and third-party agents' (2011, p. 576). Thus, when we study China's refineries and their implementation of energy efficiency policies, Dowdle's observations are a helpful reminder to look for what is actually there in the developing system, rather than simply identifying how it departs from the Weberian model we are accustomed to building and aiming for.

2.3. Formal regulatory factors

Formal regulatory factors, often referred to as regulatory instruments, can generally be conceived as factors that are situated in or rely upon formal legal and regulatory institutions for their effectiveness. They include traditional regulatory instruments, such as laws and rules, that threaten penalties for violation; economic instruments; standard-setting; and government-supervised or controlled access to an industry through permits or covenants (Gunningham & Grabosky 1998). Such formal instruments are commonly associated with command-and-control regimes but can also be present in self-regulated, market-oriented, or voluntary regimes. Much of the experience with formal instruments has occurred, and been studied, in systems that have a combination of elements such as effective legal systems, the presence of civil society, and relative freedom of media for effectiveness. Formal instruments rely on these elements to function. Strong courts are needed to enforce violations; civil society provides feedback and helps with monitoring; the media exposes issues that are left unchecked.

Two of the most influential theories in Western-liberal countries are responsive regulation (Ayres & Braithwaite 1995) and risk-based regulation (see, for example, Black 2010). The theory of responsive regulation (Ayres & Braithwaite 1995) disaggregates the actors in the regulatory paradigm and allows for a nuanced conception of regulators and industry. In this model, firms are not seen merely as amoral calculators but, rather, as exhibiting a spectrum of potential behaviours that can be encouraged or discouraged using a disciplinary pyramid. By suggesting that different firms behave differently and that regulators need not treat all actors the same, this theory enriches the range of options available to regulators in seeking to achieve their objectives: enforcement and compliance. The ideal is that an enlightened private sector (or industry) and an informed public participate and contribute together to a regulatory process that is deliberative and constructive (Ayres & Braithwaite 1992; Gunningham & Grabosky 1998). The practical and theoretical contribution that this concept has made to the field cannot be overstated. However, the theory is still designed around a

predominantly centralised notion of regulatory activity wherein authorities seek to enforce a set of existing rules, albeit through a widened range of tools. Although the preferred nature of the relationship is cooperative, the relationship is still between authorities and industry. This is consistent with the stated aim of Ayres and Braithwaite's book, which is to transcend the regulatory debate and provide a framework in which the traditional actors can relate to one another in a way that is appropriate to their demonstrated level of cooperation. Braithwaite's later work, *The Essence of Responsive Regulation* (2011) provides a heuristic for good regulatory outcomes. His nine principles of responsive regulation attempt to reformulate existing theories on responsive regulation along practical lines that acknowledge the importance of the discursive nature of regulatory dynamics and place real emphasis on the importance of developing capacity and encouraging efforts and innovation. Indeed, the reconceptualisation of *actors*, *instruments*, and *outcomes* is a worthwhile and ongoing process, which this work seeks to continue.

When we start to view *actors* through the more nuanced conception provided by responsive regulation, and can draw on the pluralistic approach to *instruments* suggested by smart regulation and regulatory pluralism—the design of policy or regulatory mixes to address a regulatory agenda as conceived by Gunningham and Sinclair (1999)—a rich matrix of possibilities begins to emerge for would-be policy-makers to achieve their desired *outcomes*. However, as the aims of policy-makers become increasingly complex, it is important to also elaborate our thinking about the aim of regulation. Besides mere compliance, policy learning, adaptability, and decentralisation become part of the aims; or, if not explicitly part of the aims, part of the metrics for measuring regulatory effectiveness.

Risk-based regulation is another model of regulation that aligns closely in its language and methods with corporate language and approaches to risk. Although there are varied interpretations of risk-based regulation, Black, in a presentation to the OECD, summarises this model as: 'Systematized decision-making frameworks and procedures to prioritize regulatory activities and deploy resources, principally relating to inspection and enforcement, based on an assessment of the risks that regulated firms pose to the regulator's objectives' (2008, slide 2).²⁸

This definition is sufficient for the purposes of this study. It is noteworthy that at the centre of this method, as with responsive regulation, are the 'regulator's objectives'. While risk-based regulation provides a very practical 'Ockham's razor' type tool for decisions about allocation of scarce regulatory resources to the areas where risk is perceived as highest, it is a model that places attention on 'avoiding bad' more than on 'doing good'. For this reason, regulatory outcomes that may involve gradual or long-term transformations of regulated actors, imbuing them over time with the qualities for 'socio-political' involvement as described by Fiorino (2006), should be sacrificed for immediate outcomes that prevent major risks in the immediate or near term. Naturally, this model has strong traction with industry actors, since it echoes the way that regulation and related expenses are treated on a balance sheet or in corporate governance and risk management processes.

²⁸ For further definitions in Black's work, see Black & Baldwin (2012).

The other aspect of Black's definition that should be highlighted is that the frameworks of risk-based regulation are 'principally relating to inspection and enforcement'. Prior to the emergence of Black's contextualisation of inspection and enforcement, there already existed a large body of research on enforcement. These studies tended to focus on the dynamics of enforcement (Bardach & Kagan 1982; Kagan 1984; Lipsky 1980), enforcement styles (Hutter 1989, 1997), cooperative approaches (Lubell & Scholz 2001), and deterrence (Rechtschaffen 1997). While cooperative approaches deal with some aspects of developing firms' ability to comply, there has been insufficient work done on capacity for compliance, making questions of know-how, expertise and decision-making central to this inquiry.

Risk-based regulation has limited application to energy efficiency because while energy efficiency creates an upside for firms, its absence does not create an immediate or palpable risk for anyone. It is non-zero-sum in mathematical terms. Energy efficiency risk can be characterised as very important but not urgent and not immediately or obviously noticeable. Thus, the dynamics of risk assessment, aversion, or mitigation are not prominent features of energy efficiency cases. The risk is by no means trivial; however, it is such that it does not move the traditional 'needles'. Nonetheless, risk-based regulation does explain the behaviour of firms and enforcement agents in selecting where to target their attention. The risk in this situation is not risk of 'low energy efficiency' but, rather, risk of 'getting caught' or risk of 'disappointing seniors' or 'missing targets'.

The regulation of energy efficiency has its own further special characteristics that affect how industry responds to risk-based or responsive regulation. Energy efficiency is often seen as 'win-win'. The simplistic characterisation of this is that firms benefit from reduced power bills, governments and utilities benefit from the saving in generation, and the public benefits from the resulting environmental upside. The trouble with the 'win-win' in energy efficiency is that the costs or investments are, mostly, up-front (for example, new technologies, equipment, or processes) and the benefits tend to be long term (recovery on investment can take years). How do firms and regulators overcome this problem? For the refineries in this study, local regulators are not a critical threat when it comes to energy efficiency issues. Unlike environmental or safety issues, which can involve immediate criminal responsibility or result in shut-downs, energy efficiency issues take more proving and currently have less severe consequences. Thus, according to local regulators and SOE leaders, solving the energy efficiency puzzle raises the challenge of aligning the will in the plants and the expectations of local regulators along several competing priorities (growth-continuity-profitability). It also requires improvements in the ability of the enterprise and individuals to innovate and execute solutions. Evidence of these elements is described in the next seven chapters.

Sometimes governments try to sponsor improvements and change. Firms are often willing to volunteer for incentives from government that will help save costs in the long term; however, many voluntary initiatives have not had the positive impact anticipated in contexts outside China (Parker 1999). Centrally planned, extrinsically driven or controlled solutions, such as those sponsored by the government, tend to lack relevance and adaptivity (Fiorino 2006). Other regulatory strategies can be applied that involve the firms more deeply, such as information sharing, advisory approaches, sharing of best practices, community and cross-

institutional deliberation, investment support and incentives, funding, and other approaches to promoting innovation, investment, and participation. However, achieving the right mix of these strategies in different circumstances requires experience and a nuanced understanding of how these strategies interact with each other and with local conditions, including social and political dynamics that can have a significant impact on regulatory outcomes.

The theory and practice of regulation in China reveal elements of responsive regulation and risk-based regulation, even though scholars and policy-makers often do not explicitly reference these concepts. The Chinese regulatory discourse is discussed in more detail in the next few sections.

2.3.1. Chinese isolation from contemporary theoretical regulatory debates

While an analysis of Chinese regulation based on formal regulatory strategies is a useful starting point, significant advances have been made in Western regulatory theory that can enhance this analysis. These theoretical advances seldom find their way into the Chinese discourse or studies of China's regulation (discussed below), and they are not always easy to apply to the Chinese context because that context differs in terms of how its legal system is evolving, while elements such as media and civil society are shaped very differently from Western settings.

Energy efficiency highlights the complex issue of regulatory effectiveness in the Chinese setting. A useful framework for thinking about this issue is provided by the literature on regulatory pluralism. By this we mean the design of policy or regulatory mixes to address a regulatory agenda. Effective regulatory outcomes are the result of a combination of factors (Gunningham & Grabosky 1998). In addition to government policy in the form of statutes, it is commonly accepted that non-formal factors such as economic mechanisms (Hahn 1989; Tietenberg 1990) and social forces (Gunningham & Kagan 2004) also influence regulatory outcomes. More recent literature on regulatory pluralism also highlights the importance of political factors and the distorting or enabling influence that local conditions and relationships have on regulatory performance (Kooiman 1993b; Teubner et al. 1994; Hay 2006; Schmidt 2008; McAllister, van Rooij & Kagan 2010). This literature acknowledges the importance of such non-formal factors and melds closely with some of the new economic institutional theories that also discuss local conditions, historical institutions, and path dependencies and their effects on choices and outcomes (Milgrom, North & Weingast 1990; North 1990; Williamson 2000). Indeed, according to Goodin, '[e]ach of the several disciplines that collectively constitute the social sciences contained an older institutionalist tradition' (1998, p. 2). Thus, regulatory literature outside China increasingly recognises the importance of social forces, political factors, and local conditions for regulatory outcomes. Also, from a theoretical perspective, institutionalism is not only not in conflict with regulatory theory as a social science; it is a constituting part of it.

2.3.2. Regulatory effectiveness and its contributing factors: Important contemporary innovations in regulatory theory

Much contemporary regulatory scholarship in Europe, North America, and Australia focuses on the challenges of eliciting compliance with a standard or protocol and, with that, the ways in which human beings and organisations can be influenced to change their behaviour. The interest in the latter has also been enhanced by advances in behavioural economics. In a developing economy context, however, the foundational issue of regulatory design is still a primary concern for scholars and practitioners and raises the question of effectiveness. Regulatory literature sometimes makes an analytical distinction between design and implementation, and these issues are often considered separately. This study is as much about implementation as it is about design and aims to achieve a coherent reading of these two processes and how they interact. Chapter 7 on deliberation, highlights how, for the problem of energy efficiency, the two processes are inseparable because design is constantly being updated based on findings from implementation. By focusing on enforcement or compliance—both concepts that are still adversarial in essence—more participative elements such as capacity, willingness, and learning are de-emphasised.

Baldwin et al. (2012, pp. 26–28) provide some points of reference with their construct of five criteria for evaluating quality and credibility of regulation: legislative authority, scheme of accountability, fair and accessible procedures, expertise of regulators, and efficiency. As explored earlier, responsive regulation (Ayers & Braithwaite 1992), smart regulation (Gunningham & Grabosky 1999), problem-centred regulation (Sparrow 2000) and risk-based regulation (Hutter 2005) have all contributed to enriching the discourse about organising and thinking about regulation.

Haines (2011) reminds us that the response of regulated entities serves as a defining test of whether and to what extent regulation really works. For this reason, this study focuses on the responses of regulated entities, those within them, and the experience of the local regulators closest to them—who themselves are regulated by more senior government authorities.

We define regulatory effectiveness here quite simply as enhancing the ability to achieve policy aims in energy efficiency. When considering this simple definition of regulatory effectiveness, there are several theoretical developments that are particularly useful in their applications to this project.

a. Effectiveness in terms of reflexive law

Western regulatory scholarship points to a range of factors that drive regulatory effectiveness. Building on the work of scholars such as Ayers and Braithwaite, and Gunningham and Grabosky, Daniel Fiorino (2006) provides a useful framework for thinking about regulation more holistically, in terms of reflexive law²⁹ (Teubner 1983), social-political governance (Kooiman 1993b), and policy learning (Hecl 1974; Glasbergen 1996). He has criticised the

²⁹ ‘Reflexive law affects the quality of outcomes without determining that the agreements will be reached. Unlike formal law, it does not take prior distributions as given. Unlike Substantive law it does not hold that certain contractual outcomes are desirable’ (Teubner 1983).

tendency to design solutions to regulatory challenges that are legalistic, formal, adversarial, centralised, and make certain assumptions about the actors, because such approaches cause waste and lead to poor outcomes. His work starts to explore factors such as capacity-building, social forces, and awareness. In terms of reflexivity, the idea is that outcomes are not necessarily fixed; processes and principles exist that guide an environment in which outcomes can be generated and evolve.

b. Effectiveness within the framework of 'New Regulation'

Fiorino's ideas on 'new regulation' (Fiorino 2006; Fiorino & Ahluwalia 2020) are important to this study. He traces the development of regulatory approaches across several stages: command and control, beyond compliance, win-win, and reinvention. Fiorino suggests that what is necessary for the US environmental regulatory system is a transformation that will allow it to be more outcome-oriented, more empowering, flexible, and adaptive. He argues that older regulatory systems tend to be adversarial, bureaucratic and, thus, prescriptive, zero-sum, and based on questionable assumptions about industry actors. Other criticisms include that the traditional approach stifles innovation and removes decision-making from the places where it can be most effective—close to the problem and the people who are best-placed to make those decisions. According to Fiorino (who was a US-based regulator in the Environmental Protection Agency), these criticisms became increasingly common in the 1990s and were bolstered by calls for change that pointed to Europe and other regions, where alternative models of regulation were already being applied. The US backdrop against which Fiorino was writing was one of litigation and adversarialism as a core part of the regulatory dynamics.

Critical to Fiorino's project is a reexamination of assumptions about (i) industry, (ii) government, and (iii) relationships—particularly power and influence. While his work, and the work of other scholars, summarily discusses some of the assumptions about industry (for instance, whether industry should be viewed as an amoral actor), less consideration is given to assumptions about government and power. This matters for the China context because the presence of government is so pervasive in industry and private life. Here, institutional theory helps to address some of those gaps.

At the core of Fiorino's arguments are several suggestions for characteristics that 'new regulation' must take on. These include a plurality of regulatory instruments beyond just rules and punishments; more collaborative relationships that promote learning; decentralisation of influence, decision-making and learning; a richer conceptualisation of regulated actors; and a focus on adaptation and continuous improvement of the vision or goals of regulation. These characteristics are somewhat visionary in that, while inspiring, they are not supported by much empirical data. Fiorino himself notes the scarcity of empirical data. For example, he refers to capacity-building as an important element of regulatory effectiveness, but comments that the work done by Martin Janicke in this field also lacks empirical testing (Fiorino 2006, p. 67).

Fiorino invites a thoroughgoing reconceptualisation of regulatory thinking and practice. This study of China can contribute to stimulating that reconceptualisation, by providing a rich

empirical account of multiple regulatory techniques being tested in the specific setting of refining SOEs working to improve energy efficiency.

Fiorino's critics might argue that his indictments of environmental regulation are US-centric and that other jurisdictions—Australia, for example³⁰—have been applying these principles for some time; however, his invitation to reconceptualise regulatory thinking and practice is a bold one that offers an opportunity to reconsider assumptions about how we think regulatory systems should look. It is also supported by other scholars attempting to explain compliance-related behaviour of businesses. Park and Nielson (2011) comment that, to gain a textured understanding of business responses to regulation, one must consider, first, what motivates firms to comply with regulation; second, how firms' internal characteristics and capacities affect their responses to regulation; third, how different regulatory enforcement styles and approaches influence firms' responses to regulation; and, fourth, how firms' compliance-related behaviour originates in their interaction with the economic, social, and political contexts.

c. Legitimacy, participation, and effectiveness

Gunningham and Grabosky's work on designing environmental policy (1998) provides a helpful analysis and discussion of the concept of evaluation criteria and regulatory effectiveness. They refer to Opschoor's definition of effectiveness as 'the degree to which the determined environmental objectives are achieved through the use of certain instruments' but note that other factors, such as community participation (participative democracy), are 'crucial to the credibility, legitimacy and success' (Turner & Opschoor 1994, p. 29) of the process, thus highlighting that effectiveness is more than merely compliance.

This provides a useful reference point as we endeavour to develop a working definition of the concept of regulatory effectiveness.³¹ Importantly, Gunningham and Grabosky also acknowledge the normative aspect of defining effectiveness and provide some principles to consider in this regard. Finally, they provide a way out, by suggesting that the normative dimension can be avoided if we see ourselves as advisors rather than policy-makers and, thus, remain focused on simply discussing how best to achieve whatever policy goals are set. I do not tackle the normative dimensions of this aspect of participation in this study.

Chapter 7, on deliberation, has some corollaries with the normative dimensions of participation in policy-setting. Dryzek's (2013, pp. 99–121) work explores the politics of participation in solving environmental problems and suggests that democratic pragmatism is no panacea to looming environmental threats.

³⁰ For example, see the 'Earned Autonomy Pilot Program' in Victoria (<http://www.epa.vic.gov.au/our-work/current-issues/landfills/hallam-road-landfill>).

³¹ Recall that we have defined 'regulatory effectiveness' above, simply as 'enhancing the ability to achieve policy aims in energy efficiency'.

2.3.3. *Regulatory discourse relating to China*

The previous section has outlined some advances in Western regulatory theory, very little of which has been applied by English-speaking scholars, or by Chinese policy-makers and regulators, to the Chinese context. For Chinese regulators, this means there are multiple discourses. One is an older discourse about modernising legislation and the institutions that enforce rules (Zhang 2019; Yang 2004; Wang 2006; Fang & Zeng 2007; Sinton et al. 1998). Another is a smaller but significant discourse involving Chinese scholars who are reading Western regulatory literature and struggling to apply it to their social and political context. Many of the studies on regulatory compliance in China focus on the reasons why firms choose to ignore or defy, rather than comply with, regulation (Ma & Ortolano, 2000; van Rooij, 2006; Pringle & Frost, 2003; Nyland et al, 2006). They tend to focus on the influence of economic considerations and lack of regulatory enforcement (Ma & Ortolano, 2000; van Rooij, 2006; Wang, 2006). Among Chinese scholars occupied with these challenges are lawyers, social scientists, economists, political scientists, and energy and resource management experts. Recent literature from Chinese scholars clearly indicates familiarity with Western theories on actors and instruments.

Fang and Zeng's work (2007) outlines the instruments perceived to be in use at the time of their study. Notably, their work pays little attention to factors beyond traditional formal instruments such as laws and financial incentives of various sorts. It pays less attention to the broader discourses about energy and the effects of those discourses. This is understandable, as their work does not claim to be a comprehensive review of factors affecting energy efficiency but, rather, an assessment of how to balance energy and environment with some of the most prominent formal instruments. Fang and Zeng conclude that '[m]ost of the policies have not achieved the desired objectives. Still there are a lot of barriers and severe challenges such as operability in terms of laws and regulations, government structure, market equality, capacity-building, price mechanism, investment incentives for energy efficiency and renewable energy, SO₂ control in energy-related environmental management' (p. 2256). They suggest that

[i]n order to balance energy and environment, it was crucial for China to implement a strategy of priorities for energy and energy-related environmental management. The priority strategy mainly was composed of energy saving, optimization of energy structure, promulgation of environmental standards, advance in energy-related environmental technologies, internalization of environmental costs, establishment of a public benefit fund and adoption of a Renewable Portfolio System. (p. 2258)

Other scholars, such as Wang (2007), emphasise economic and market-related factors, particularly the price of coal in the power sector, as one of the main reasons for the failure of a stable and reasonable transaction and cost savings relationship.

Another scholar, Zhang, notes the importance of investment returns and regulated pricing for power generation, but also highlights that law alone has 'failed to resolve the energy

trilemma'³² (2019, p. 168). Although Zhang concludes that, 'there is a need to establish a well functioning legal system', he also acknowledges that 'in the long term and under the fragmented authoritarianism framework, the top down process of law making requires improved coordination between ministerial agencies at central government level, as well as between different levels of government' (p. 168). However, as his study is related to power generation, he does not examine deeply the role that central state-owned enterprises can play in driving energy efficiency goals in their own massive organisations. This study considers this additional dimension.

There is an interesting body of literature about regulatory failure in fields like coal mine safety and food safety. Domains such as these, where the consequences of failure are catastrophic and public, are handled with risk-based regulation models that focus on strict compliance. Thus, this literature appropriately critiques the absence of adequate punitive measures and legal mechanisms required for effectiveness. However, more granular analysis is needed in these fields to shed light on how actors are influenced all the way up to the occurrence of catastrophic occurrences.

One of the salient scholars in this area is Dali Yang. In one of his works, he examines the milk powder scandals that resulted in toxic substances being used as fillers for baby milk powders, leading to infant deaths. A failure to regulate the proper manufacturing of milk powder was seen to have resulted in serious harm and death to a vulnerable population, but his work is a meta-level review of the politics, rather than the process, of regulation (Yang 2009). Yang refers to the relevance of sociopolitical (p. 20) factors in passing, by making some interesting observations about one of the leaders of the Chinese Safety of Food and Drug Administration (SFDA). However, this issue is passed over briefly, leaving a cue perhaps for other scholars to consider it further. He comments: 'One could argue that the problems with the SFDA reforms were over-determined because of the socio-political context in which Zheng and his colleagues had to function...' (p. 20) After providing a brief factual analysis, Yang concludes that, '[t]he socio-political structure was a major influence, but Zheng was a key agent who could have chosen to act differently, even though doing so would have exposed him to tremendous pressure (but, in retrospect, would have saved him from the death penalty)' (p. 20) The issue of food safety, and particularly milk powder, is interesting but perhaps somewhat sensationalised and skewed in its outcomes because of the massive amount of public attention it received in China and abroad. But Yang's comments point to the importance of socio-political factors, which this study really aims to probe more deeply. These examples of food contamination or worker safety are hot-button issues, much like air transport or train safety, that receive close public attention and, hence, swift government response. Energy efficiency, on the other hand, is more typical of most regulatory challenges, which are technical and invisible to most of the population.

Another prominent Chinese scholar who has written about regulation, governance and 'new government' in China is Wang Shaoguang. In his well-known article, also about coal mine safety, Wang (2006) argues 'that China's transition from state socialism has not resulted in

³² The energy trilemma refers to the concept of the Energy Policy Triangle (Hefron et al. 2015). The trilemma occurs in an effort to balance energy security; energy equity; and environmental sustainability.

a Hayekian night-watchman state but in a new regulatory state, which exerts controls over a wide range of economic and social affairs via standard-setting, supervision, monitoring, and enforcement'. Wang suggests that, rather than witnessing the 'hollowing out' or withering away of the state in China, we are seeing a 'change in the mode of state control'. Wang refers to Hood et al.'s work (1999) in summarising a series of indirect means of exercising control as 'regulation'. He concludes that China has transitioned from a socialist state in the direction of becoming a 'regulatory' state in the Hood, Scott, and Braithwaite sense of the word (p. 2). Wang's work is notable because it is positioned explicitly at the intersection of two discourses relevant to this study—the discourse among China scholars, particularly political scientists, and the discourse among regulatory scholars and those studying the implementation and design of policy and law. The findings in Chapter 3 relating to 'shadow regulation' are supported by Wang's observations about a 'change in the mode of state control', insofar as regulation is effectively being managed indirectly by the headquarters of the major SOEs acting as proxy for the relevant government bureaus.³³

By looking only at formal regulatory factors and the structures that support them, and not taking account of non-formal regulatory factors as defined above, Wang (2006) describes only a portion of the context in which coal mine safety regulation occurs. Accurately, he finds certain formal dimensions of the context wanting and prescribes development that follows the path of most developed nations that have mature and well-established command-and-control systems. Wang's recommendations around strengthening the legal and enforcement mechanisms around coal mine safety are certainly sound, but are part of a lengthy and costly process of developing the formal legal system in China. There may be much that could be achieved in promoting coal mine safety that can draw on non-formal factors and need not wait for the enactment of better rules, better enforcers, and rationalisation of small mines. Each approach has its limitations, but it is worth exploring how both approaches can be worked on simultaneously.

China scholars, at the prompting of the government, have also debated the basic issues of regulation in an effort to map out the various implications of the emerging regulatory state (China Infrastructure Industries Government Regulatory System Reform Task Force 2002, pp. 69–87; Estache, Laffont & Zhang 2002). Although formal, and even institutional, changes have taken place, bureaucratic reality is still a long way from what has been envisioned by policy designers in their efforts to reduce the role of the state in some parts of the economy. In some cases, central institutions are even stronger than they were previously (Lin 2003; Mertha 2008; Yang 2004).

The challenge faced by Chinese practitioners and scholars is well summarised by Li:

³³ Wang describes that 'via standard-setting, supervision, monitoring, and enforcement' (p. 2) a regulatory environment began to be introduced to coal-mining. Over time, larger state-owned mines also experienced a shift. He describes how 'conversion from traditional SOEs into 'modern' (western-style) companies, and several of them were listed on domestic or international stock exchanges' (p. 9). Wang's study is not an examination of how these SOEs react to the regulatory environment or to the conversion from traditional SOEs to more modern enterprises. Hence the mode of state control has changed but the details of how that change affects enterprises is not well understood.

In a nutshell, we confront two major obstacles in our attempt to understand a law's practical effects in China. First, we have not uncovered solid empirical evidence showing whether a formal Chinese law has any significant independent effect on the behaviour of implicated parties. Second, even if evidence is found that a formal law lacks any practical effect, as suggested by some scholars, we are still left ignorant as to why and how to improve, or whether it is at all possible to make meaningful improvement in the current political context. (2012, p. 7)

Thus, it is necessary to look at contextual factors and their impact on regulatory outcomes.

2.4. Non-formal factors—critical to regulatory outcomes

2.4.1. Non-formal regulatory factors in regulatory theory

An emerging awareness in Western regulatory scholarship of informal arrangements and forces outside the state is contributing to a better understanding of regulatory effectiveness. Burris, Drahos and Shearing (2005, p. 31) challenge the notion that governance is simply the domain of the state and its agencies operating through 'formally established, universal and reasonably stable legal modes'. They argue that such a model is 'plainly insufficient to deal with the practical and conceptual tasks associated with good governance'. Instead they offer the schema of nodal governance which allows a more holistic evaluation of nodes and networks and their influences, while still permitting disaggregation at different levels of granularity as required. This sort of zoom-in/zoom-out ability allows the researcher a convenient way of seeing both the woods and the trees.

Nodal governance recognises and gives much credence to the enormous influence of factors that are not necessarily embedded in traditional legal or regulatory institutions but, rather, are often to be found in thickly networked relationships that are difficult to study and make hard scientific observations about. This is important because, as this study has found, in emerging systems or countries where traditional legal institutions are nascent, less reliable, or prone to heavy government or corporate interference, other factors affect the behaviour of actors and duty-holders.

A node is conceived as having four essential characteristics: a way of thinking, a set of methods, resources, and a structure. Indeed, the findings that emerge from fieldwork for this study indicate that these characteristics affect the ability of various nodes to influence each other. These relationships are examined in Chapters 4 and 5 in particular, but the theme is present throughout.

Gunningham and Grabosky (1998, Ch. 6) also provide a solid foundation for exploring issues of design that can have a potentially significant bearing on regulatory outcomes. In their analyses, they highlight the relevance of public participation and consultation—both typically thought of as *non-formal* regulatory factors—in the process of design. These are not the only non-formal regulatory factors I encountered in my field work, but these two factors certainly feature significantly in the findings of this study. Participation and consultation (or deliberation) in China take on forms that may appear unfamiliar or unusual compared to what is expected in the Western context. This is discussed extensively in the coming chapters.

In a later work, Gunningham (2009) expands the idea of going beyond regulation, referring to governance as an approach to be differentiated from regulation, as though on a spectrum. He quotes Rhodes in describing the nature of interactions as shifting from formal and government-centric interactions towards non-centric or poly-centric interactions based on socio-political interrelations that encourage various outcomes that are workable for those involved (Gunningham 2009, p. 4). Similarly to Scott, Gunningham asserts that there is substantial empirical evidence to support the notion that a variety of factors influence regulated actors in their behaviour and, in particular, that informal mechanisms of social control often prove to be more effective than formal ones (Gunningham 2009, p. 23).

Nonetheless, Gunningham's emphasis on the importance of these 'informal mechanisms of social control' should not be seen as a denial of the importance of the role of the state; he cautions that 'less interventionist strategies are far less likely to succeed if they are not underpinned by direct regulation' (2009, p. 29). The sort of direct regulation to which he is referring falls under three broad categories: 'Indeed, research on three very different new environmental governance initiatives in Australia suggests that the state must continue to play three particular roles: definitional guidance, participatory incentives and enforcement capability' (2009, p. 29).

While Gunningham and Grabosky's (1998) research examines the design of environmental policy, and regulatory models, in several sectors, and thus has broad application, it is entirely situated within the setting of Western, neo-liberal, developed nations. This study explores the application of some of the theories and findings of Gunningham and Grabosky in a Chinese setting, particularly the notions of participation, consultation, and other methods of social control. It draws on contributions from several scholars (outlined in the next section) in the fields of regulation and governance concerning the notion of non-formal regulatory factors, and identifies evidence of these factors as well as their influence on outcomes.

2.4.2. Non-formal regulatory factors are relevant for regulatory effectiveness

Colin Scott discusses regulatory effectiveness and outcomes in a manner that makes room for the importance of non-formal, contextual, and social factors (Jordana & Levi-Faur 2004). Questioning the emphasis on law and legal institutions in effecting regulation, Scott looks for explanations for regulatory outcomes that relate to social order, such as modes of cooperation or cohesiveness of communities. Scott questions assumptions about the centrality of the state and the law in regulatory systems and their development—which are highly relevant to large and complex systems.³⁴ He also questions the instrumentality of regulation. Scott's questioning of these assumptions provides a particularly useful space for considering issues where, rather than regulating to prevent undesirable behaviour, such as pollution or crime, regulation is aimed at promoting desirable behaviour, such as energy efficiency or investment in energy management and governance. This idea is discussed

³⁴ Scott comments that he intends his analysis 'to act as a corrective to an influential literature which, because of its neglect of the non-instrumental dimension of regulation, non-state regulation and regulation which deploys non-state law is incomplete in its mapping of regulatory governance arrangements' (Jordana & Levi-Faur 2004, p. 145).

further in Chapters 4, 6, and 7. In his 1994 work *Authority without Power*, on the bureaucracy's use of Japanese law and social norms, Haley argues that non-legal norms are traditional and contemporary modes of regulating. An important idea emerging recently among scholars studying regulation in developing countries (van Rooij 2009; Connor & Haines 2013) is that sometimes, where formal regulatory instruments fail, non-formal (or informal) factors can have an important impact. This distinction will be discussed further below.

Several World Bank working papers (Huq & Wheeler 1993; Pargal & Wheeler 1997; Chege Kamau 2005; Stern and Cubbin 2005) also support the notion that non-formal regulatory factors are highly relevant to regulatory effectiveness and to the effectiveness of formal regulatory instruments in achieving their intended goals. These works point to community involvement, social forces, or both.

It is important to make one further distinction. The notion of informal regulatory factors should not be confused with the decentralisation and responsabilisation of industry observed by theories of regulatory capitalism (Levi-Faur 2005b). While the latter relates to an increase in delegation to enterprises and formalisation of regulation, the former refers to acknowledging a very localised and contextualised perception of the circumstances of regulated actors when describing the social reality. It often comprises combinations of fuzzy factors that exist in the spaces around laws and regulations, and even incentives and penalties. It implies an appreciation of the role that individuals and communities (be they epistemic communities, professional communities, neighbourhood communities, or others which are found and discussed in examples in the following chapters) play in institutional dynamics, and attempts to identify several specific factors that influence willingness and capacity to effect change towards regulatory aims.

2.4.3. Non-formal regulatory factors—institutional theory aids a broader conception of regulatory instruments

Non-formal regulatory factors that can affect regulatory compliance are also discussed in the institutionalist literature. Several analyses of energy governance in China have made use of elements of the new institutional economics framework to analyse institutions of governance (Harrison 1977; Hardy 1978; Constantin 2007; Andrews-Speed 2004; Woodard 1980). This interdisciplinary framework, 'when integrated with an appreciation of the role of ideas on policy', can provide 'a powerful framework to understand the forces that drive or constrain policy changes and economic development' (Andrews-Speed 2010 p. 3).

An institutionalist analysis of energy governance would need to be constructed on existing definitions of institutions. Many definitions and typologies have been put forward, some that conceive institutions as humanly devised (North 1990, p. 3), and others that see them as a shared set of beliefs and expectations manifested in different rules and governing structures (Aoki 2001, p. 10; Greif 2006, p. 33). A categorisation that seems apt for the purposes of this study that of Williamson (2000), which combines existing definitions into a schema for conceptualising institutions in an integrated manner. According to this schema, institutions exist at three levels. The first level is defined by Andrews-Speed as follows.

At the highest level are informal institutions which characterize the society in question. These include traditions, norms, customs, beliefs, and expectations, or, in other words, the prevailing culture. Far from being consciously devised by humans, these characteristics are deeply embedded in the society and are likely to have a long history. (2010, p. 6)

Since the highest level of institution consists of embedded institutions—which are made of ideas and influenced by discourses—any examination of actors and the structures within which they exist and interrelate must, of necessity, also refer to the discursive context within which such actors function. Andrews-Speed acknowledges this idea explicitly.

The importance of ideas in the evolution of institutions and policies is explicitly recognized by new institutional economics through its inclusion in the embedded informal institutions which provide the framework for formal institutions and which underpin societal behaviors. But ideas also play a significant role in the policy-making process, in the operation of the institutions of governance and in the behavior of actors ... This role may constrain change or may stimulate change. (2010, p. 7)

The process whereby policy failures lead to the questioning of elements of existing mental models or ways of thinking, often referred to as ‘paradigms’, or of the paradigms themselves, or even, in some cases, the fundamental assumptions underlying those paradigms, is one that relies on the introduction of new ideas and is affected by the social spaces available for the introduction and deliberation about such ideas (Lieberman 2002; Schellenbach 2007). In instances of minor failure, it may only involve questioning of an element of a paradigm and may result only in a paradigm or policy adjustment; however, in cases of repeated or severe policy or implementation failures the result may be more substantial, and may cause reexamination of whole paradigms or even underlying assumptions.

When this happens, the implications are far-reaching. First, the emergence of a new paradigm is not a mechanical process. It requires gradual development and gradual buy-in from various stakeholders. Second, once a new paradigm emerges and gains in popularity, its new features will have impact on other related systems that are no longer compatible with the paradigm (Lieberman 2002; Schellenbach 2007; Cox 2004; Hall 1993; Beland 2005). It takes time and growing pains for the implications of the new paradigm to filter through.

The process which occurs for the adjustment of institutions and paradigms involves a sort of learning (some describe this as social learning) and adaptation. Several catalysts can assist this learning process. Policy entrepreneurs (Mertha 2008, 2009; Wilson 2000) are considered to play an important role in championing new ideas while they take root. Major events or crises often play a role in moving certain issues up on the agenda of governments (Wilson 2000). Deliberation or participation in discourses relating to key issues is another major catalyst. The extent to which communication is authentic, inclusive, and consequential (Dryzek 2010) will impact the level of public engagement in a particular policy or paradigm change. Andrews-Speed (2010) discusses some of these concepts within a more instrumental framework, referring to two types of discourse: ‘communicative’ and ‘coordinative’ (Schmidt 2002b), drawing further on the work of new institutionalism scholars. However, the literature on deliberative discourse (Dryzek 2010), including recent work on authoritarian

deliberation (He & Warren 2011), is more compatible with the shifting of embedded institutions and, thus, provides a more nuanced perspective.

The formulation and implementation of policy is significantly affected by the embedded institutions—such as ideas and beliefs—in any given social context. As Andrews-Speed notes, '[t]he process of implementation will be eased if the new policy has been framed in a way which is consistent with wider beliefs and norms and with the institutional framework, and if there is widespread understanding and agreement with the policy' (2010, p. 9). The fieldwork for this study reveals that there is more to it than merely easing policy.

Thus, considering the role of embedded institutions, particularly in the form of ideas and discourses, forms an important part of any institutional analysis. The effects of these embedded institutions on China's policy environment have begun to be noted and considered by scholars in Asia.

Toke's (2000) work on policy network creation in the field of energy efficiency provides a useful example of how ideas affect institutions and outcomes. Although he criticises the economic institutionalist framework, he adopts a historical institutionalist perspective that still emphasises ideas and path dependencies, as discussed above in relation to Williamson. Toke attempts what he calls a 'discursive construction of energy efficiency' and its related cognitive structures. What is edifying about his construction of the storyline of energy efficiency is the way he traces the reconstruction of the energy discourse (and hence the institutions related to management of the issue) over a period of several decades. He shows how, in the early 1980s, the discourse was framed as an issue of resource depletion and, thus, energy conservation is the theme. Therefore, the corresponding institution primarily involved is the Association for Conservation of Energy. A few years later, within the context of the privatisation of the UK gas industry and the marketisation of energy management, the discourse of resource depletion receded. It was replaced by the notion of 'energy efficiency', which was to be managed by the newly dubbed Energy Efficiency Office and focused on efficiency for economic purposes. Towards the late 1980s, the discourse was again reshaped by the threat of global warming. The focus of energy efficiency shifted to the achievement of environmental goals associated with reducing carbon emissions and meeting environmental goals. The Energy Savings Trust (EST) published figures relating to investments for achieving energy efficiency goals. Thus, it could be seen that the dominant discourse in the 1970s was aimed at keeping prices for energy down, while the discourse in the 1990s was aimed at raising prices to drive efficiency. Toke's conclusion is that it is simplistic to look at institutions without due regard for the effect of cognitive structures and their reconstruction on actors, their interests, and their bargaining power.

Theories of nodal governance (Buris, Drahos & Shearing 2005) also emphasise the importance of ideas and ways of thinking—which they refer to as mentalities—in constituting the characteristics of nodes. They also refer to institutions or structures, which are necessary for the flow of influence and resources, while noting that such institutions may take all kinds of forms and even be temporary (2005, p. 38).

There is some literature that explores the formulation and implementation of policy in China insofar as it is affected by ideas and discourses flowing in from abroad. They observe that Chinese scholars and policy-makers are situated within international norms and norm-making bodies and dialogue with epistemic communities that influence them (Pearson 2004). Pearson suggests that, for example, the global wave of regulatory reform that occurred under the banner of ‘New Public Management’ in the 1980s (Aberbach & Christensen 2003; Kamarck 2002) also significantly influenced Chinese reformers and regulatory practices. Interactions with global norm-making bodies such as the OECD, World Bank, Asian Development Bank, World Trade Organization, International Energy Agency, and a host of other epistemic communities contributed significantly to ideas and policies adopted by Chinese planners in the reform process (Hasnie 2002; OECD 2002; World Bank 1982, 2002; IEA 2010). Pearson points out that ‘both the institutional context and the normative preferences of the top leadership’ play a role in the emergence of China’s regulatory patterns. She highlights the importance of the Chinese leadership’s normative goals, or ‘metavision’, in their decisions to maintain state control of key sectors and foster strategic sectors of the economy (Pearson 2005). The influences of these normative factors are discussed in Chapters 5 and 6 (where evidence of political factors and careerism is examined).

In addition to the effects of norms and ideas, environmental and formal institutions also influence regulatory patterns: ‘Institutionally, the continued influence of ministries and comprehensive commissions, insufficient status, and the fragmentation of the regulatory mandate limit the effective authority of new regulators. State ownership of strategic firms also remains highly salient’ (Pearson 2005).

Thus, as demonstrated by the literature traversed above, China scholars, energy experts, and institutional theorists converge and agree on the importance of remaining sensitive to the impact of discourses on the structures and behaviour of political apparatus. This, in turn, has a direct bearing on regulation.

One of the key insights to emerge from this application to the Chinese context is the importance of non-formal regulatory factors, such as social and political dynamics and pressures brought to bear by the regulators and SOEs on plants, as well as norm- and capacity-building through deliberation and learning conducted mostly by SOE headquarters, driving regulatory outcomes. These factors are examined in depth in Chapters 4 to 8 and evidence clearly emerges that the combination of these factors in different mixes contributes significantly to the advances achieved in energy efficiency in these enterprises by increasing the willingness and capacity of the enterprises to achieve policy aims. These factors are more than mere contexts where regulation occurs. Interviewees frequently describe adjustments in the political apparatus to change perceptions of functionality around specific regulatory aims. Similarly, interviewees directly reference recurring meetings scheduled to change normative orientations or adjust thinking and priorities. The details of who is doing what to whom to influence the course of events is explored in the next few chapters. Specifically, Chapter 4 looks at socially constructed influence; Chapters 5 and 6 look at politically constructed influence; Chapter 7 looks at deliberation and its influence; and Chapter 8 looks at capacity-building.

2.5. Conclusion

This chapter has discussed why traditional regulatory models fail to address the challenges of energy efficiency regulation in large SOEs in China's refinery and petrochemical sector. It has discussed how SOEs, despite government ownership, cannot be simply managed through command and control. The chapter argued that legal tools and emphasis on formal regulatory models are insufficient to navigate the social, political, and normative obstacles to driving energy efficiency in these SOEs; and that immature legislature and ambiguous authority further complicate these challenges. It has also explained why risk-based regulation is not an effective tool for issues, like energy efficiency, that do not pose immediate risks.

The problem that China has faced with energy efficiency is that conventional ways of viewing regulatory problems does not work for this issue, especially for SOEs. Formal regulatory models have limited traction in massive SOEs, at least for energy efficiency.

This chapter has touched on theoretical insights from regulatory scholars such as Braithwaite, Gunningham, Drahos, van Rooij, Scott, Fiorino, and many others who have provided ways of looking at regulation that go beyond laws and regulations, beyond simple command and control and beyond responsive regulation towards more nuanced and textured conceptions of regulatory activity that allow social scientists to consider factors that affect regulatory outcomes.

The chapter has summarised important insights from Western regulatory theorists who criticise approaches to regulatory issues that are legalistic, formal, adversarial, centralised, and make certain assumptions about the actors, noting that such approaches are often inefficient or ineffective. These scholars instead explore other factors such as capacity-building, social forces, and awareness. Literature has been explored to allow for a plurality of regulatory instruments beyond rules and punishments; more collaborative relationships that promote learning; decentralisation of influence, decision-making, and learning; a richer conceptualisation of regulated actors; and a focus on adaptation and continuous improvement of the vision or goals of regulation.

This chapter has also summarised literature from several scholars from different disciplines that shows the importance of discourses and norm-building to the work of driving willingness and improving regulatory outcomes.

Yet, even with wholehearted willingness, complying with tough energy efficiency goals while under constant pressure to maintain production and growth requires a great deal of capacity—of various sorts, managerial, technical, organisational, and planning. This chapter touches on existing literature from regulatory and China scholars on ways that capacity is built in SOEs in China (Chapter 8 looks more deeply at this literature). I chose to look at studies that highlight learning and experimentation, adaptivity, and deliberation as means of capacity-building. I did so because it became apparent from the fieldwork that these were particularly significant methods of capacity-building.

However, while scholarship encourages the exploration of a plurality of regulatory instruments and reconceptualisation of actors and relationships, there are huge empirical gaps

relating to such factors, especially in China, even more so in massive SOEs and acutely so in the refining and petrochemical sector. We do not know enough about the appropriate regulatory mixes (Gunningham & Grabosky 1998) for driving energy efficiency outcomes in these settings. The empirical findings presented in the following chapters present some data that suggests that non-formal factors really matter and deserve serious attention and study.

The next chapter will look at legal instruments and how they affect energy efficiency regulation. It shows that laws are important in anchoring regulatory authority but are not really the forum where regulatory activity occurs. It also explores the importance of signalling, not only through laws and related legislative proclamations but also through other means. Chapter 3, together with Chapters 4 and 5, shows that social and political factors intermesh with laws and rules to drive outcomes.

Chapter 3. Legal instruments (the law) and regulatory signalling

Good people do not need laws to tell them to act responsibly, while bad people will find a way around the laws.

– Plato

Signs and symbols rule the world, not words or laws.

– Confucius

3.1. Overview

A socio-legal study of this sort would not be complete without some reference to the actual laws, regulations, and penalties intended to govern energy efficiency in China. The weight of evidence in interviews and government actions indicates that penalties and enforcement of laws are not really the forum in which energy efficiency regulation takes place; rather, they provide a reference point or lend legitimacy to other factors (social, political, normative, deliberative, and capacity-related) that influence behaviours. But of course, the laws are relevant and so are discussed in the first part of this chapter.

Interviewees often referred to the way in which changes in structures or laws, or even practices, beyond their own immediate or obvious impact, had a pronounced effect on people's thinking and expectations. Thus, changes in laws signal new attention to a theme like energy efficiency, but only when combined with other signals—such as organisational changes, detailed targets, or increased audits and reviews—are they interpreted and internalised by firms and firm members as strong indications of political intent that cannot be ignored, and thus need to be adapted to.

Hence, this chapter has two themes broken out into two parts. The first part briefly describes the laws and legal mechanisms currently in place for energy efficiency in refineries and how they are applied. The second part examines the implications of these laws and legal mechanisms and how actors receive and interpret signals from these mechanisms. It also presents evidence from interviewees about a concept that I describe as a 'regulatory maturity curve'; simply put, the idea is that issues are introduced as laws with strict standards but enforcement only gradually ratchets up as capacity to understand and comply rises; along the curve towards strict enforcement, a range of other factors (discussed in Chapters 4 through 9) are used to increase the capacity of firms to respond to the regulations.

In the language of new economic institutionalists³⁵ (Williamson 2000), this chapter acknowledges the formal structures designed to address energy efficiency, but it focuses on the implications for normative structures, one of which is growing the base of the regulatory

³⁵ See Chapter 2 for a treatment of Williamson's three levels: normative, structural, formal.

pyramid through signals. I argue below that tools and structures serve to reinforce normative changes, such as organisational changes, laws, signalling, and audits or inspections (*kaohē*³⁶).

Most of the formal instruments referred to in interviews for this study related to rational regulatory factors. We recall from Chapters 1 and 2 that energy efficiency as the subject of regulation is a positive sum subject. That is to say, the enterprise also directly benefits from compliance and achievements in energy efficiency; it leads to savings and increased profitability. Thus, it is easy for regulators to achieve basic levels of motivation, or at least alignment, about energy efficiency as a positive goal. The most rational motivation is profitability, as described by an energy efficiency division manager in a small plant in the West of China.

We feel it's hard but it's not just a government requirement, we also want to be more efficient. It improves our profitability or operations. [XSIN-WC]

Notwithstanding that energy efficiency usually means greater profitability for the enterprise, enterprises have competing interests to weigh up in decision-making and resource allocation. Often, energy efficiency is neglected while the focus is on production, environment, and safety. In this regard, signalling is often used as an instrument to influence behaviour. So, regulators are faced with the challenge of needing to build the base of the regulatory pyramid, and to do this they need to drive new awareness and norms, which can be done partially through regulatory signalling and agenda-setting.

3.2. Energy efficiency laws and how they are applied in China

3.2.1. History of energy efficiency laws

Price et al. (2001) provide a quick and useful reading into the history of energy efficiency laws and policies. They map out three stages that Chinese industrial-sector energy efficiency policy has gone through since the founding of the People's Republic of China in 1949. The earliest or first stages are characterised by 'Soviet-style' energy policies from 1949–1980, where the focus was on energy supply growth, energy prices were subsidised, and usage was allocated. At the end of this period, a meeting of experts from around the country acknowledged that China's energy policy was in a state of crisis and required radical reform (p. 2).

The second stage was a period of initial reforms between 1981–1992, when the government committed to placing equal emphasis on supply and conservation of energy and created formal institutions throughout government for the management of energy throughout the industrial sector. This period can be characterised as a command-and-control period of energy regulation. It involved the use of standards, imposition of quotas, and dissemination of technology for use as well as incentive schemes to help fund energy conservation-related investment. During this time, energy conservation centres were established around the

³⁶ *Kaohē* (考核) is a term which does not have an exact counterpart in English. It refers to evaluation that can be carried out by audit or inspection.

country to provide services related to energy monitoring, analysis, and technology promotion.

The third stage can be marked from 1993 until 2001 and began with reforms in various areas, including finance, state ownership, and economic policy, steering China towards a transition to a market-based economy. In 1997, the Energy Conservation Law was enacted and some provinces or major cities enacted implementing regulations to localise and bring much-needed specifics to the very general laws. Yet even the implementing regulations enacted locally to bring more specifics were quite loose (Wang 1999).

Since Price et al.'s work in 2001, China can be described as entering a fourth stage. In their paper, they anticipated somewhat what the fourth stage would look like, based on the content of the Tenth Five-Year Plan. Price et al. (2001, p. 240), referring to the Tenth Five-Year Plan, described the situation.

Proposed policies include a renewed focus on energy end-use efficiency and productivity improvement, development of supporting regulations for the Energy Conservation Law at the local and sectoral levels, formulation of annual energy conservation plans to improve energy utilization efficiency and productivity, formulation of preferential economic policies to support energy conservation demonstration and dissemination projects, enhanced energy management of key energy-using enterprises, and harnessing of grass-roots social forces to save energy.

As this study describes, the fourth stage increasingly resembles a modern regulatory-state model of energy efficiency regulation, with 'Chinese characteristics'. It is notable that in the passage above, several of the key factors are aimed at: (a) planning and target-setting processes; (b) sharing knowledge through efforts aimed at deliberation and capacity-building; and (c) social forces (all themes in various chapters of this study).

A fifth stage can be foreseen in the not-too-distant future, enabled by artificial intelligence, the 'Industrial Internet of Things', and an ecosystem of private and public networks and service providers that interact to connect big data with sophisticated algorithms and bring real-time adjustments. Such innovations already exist in nascent forms, such as 'SmartGrids', demand-side management technologies, and connected devices and plants. However, the next wave of disruptive technologies that promises to usher in 'Smart Cities' and 'Smart Plants' is likely to have a profound effect on the legal and regulatory landscape we see today.³⁷

3.2.2. *Current energy efficiency laws*

Current energy efficiency laws that apply to state-owned refineries are the 2016 Law of the People's Republic of China on Conserving Energy and the 2009 Circular Economy Promotion Law of the Peoples Republic of China. These laws are broad and vague; they basically say factories are supposed to cut consumption of energy (coal, crude oil etc.), as well as the emission of carbon dioxide, by upgrading equipment, reforming extracting

³⁷ See Li, Lin and Geertman (2015) for a primer on smart cities in China.

technologies etc. Appendix 3 contains a list of energy efficiency-related laws in China since 1989.³⁸

These laws are applied through regulations such as the Basic Management System, Energy Management, Juristic Responsivities and the even-more detailed implementing measures Notice on Special Administration of serious violations and dishonesty in oil refining (newly released), Energy Policy and Standards of China's Petroleum and Chemical Industry, and Plan and Layout of Petrochemical Industry.³⁹

These laws provide for enforcement measures mainly in the form of penalties and fines. A factory violating the Energy Conservation Law whose capacity is under 2 million tons per year can be summarily shut down. For refineries with capacity over 2 million tons per year, the punishment is based 'upon the circumstances', options being fines, production limits, orders to cease production and renovate, shut-downs, and revocation of business licences. Simultaneously they are required to complete rectification within a specified time.⁴⁰

Searches quickly reveal that application and enforcement of these laws for energy conservation rarely, if ever, result in this sort of legal action—in contrast to action in response to environmental failures, which is gaining popularity. Thus, litigation, criminal sanctions, even fines and penalties, are not used in this space for instrumental policy purposes in the way that they are in other spaces, such as environmental enforcement or safety.⁴¹

There are, however, a few outliers of evidence of fines or penalties being applied to sites that completely failed to plan for their energy needs, or failed to seek appropriate approvals for new projects that would impact the overall energy planning of their city. One such example is described in Chapter 4.

3.3.3. Laws matter but they are not what people at the plant level think about

Instead of referring to the policies, laws and regulations, interviewees in the plants refer to other factors that they look at in making decisions about energy efficiency. They refer to social, political, and career pressures that are exerted in a variety of ways. They also read signals emanating from changes in laws, formal institutions, and actions taken by authorities. The next three chapters review evidence of these other factors affecting plant behaviour.

In interviews with the legal department at the headquarters of the refineries, interviewees were quite explicit that they do not regard energy efficiency as legal work or as a matter of legal risk. My questions related to energy efficiency risk were repeatedly referred to the operations department or, in the case of new investments, to the Planning and Development Department within the plant or headquarters.

³⁸Generated from <https://www.iea.org/policies>

³⁹ See National Development and Reform Commission official website for details. <http://www.ndrc.gov.cn/>

⁴⁰ China Petrol and Chemical Industry Association, www.cs.com.cn/xwzx/201801/t20180126_5685947.html

⁴¹ See Van Rooij (2006; 2006), Stern (2013), Lo, Fryxell and Van Rooij (2009) and Lo and Fryxell (2005) for discussions of enforcement and litigation of environmental laws in China.

Laws, the organs they create, and the penalties they threaten do not seem to be the major or direct cause of legal compliance for plants. However, they do still perform important functions. One of the key functions is a form of signalling, discussed in the next section.

3.4 Regulatory signalling

Party affiliated or not, employees of SOEs are deferential, and highly sensitised, to the wishes and the will of the government and Party. This sensitivity causes most SOE employees to have a heightened attunement to signals from various sources. Some of these sources have been described above—the obvious ones include messages in media, communiques (often from leadership), meetings, and training, but such signals also take place through regulatory measures designed not only for their own immediate and obvious purpose, but for a secondary function of signalling leadership intent.

Thus, multiple factors are used concomitantly to amplify results. The importance of awareness of issues and attention to certain themes as reflected in all forms of signalling is explicitly described by one manager at one of the sites.

In the last two years, since environmental awareness increased it feels like there's more attention to energy efficiency. It has definitely flowed down to us that we have to be a little more energy efficient, but it's a question of execution. Now that they've formed an office for managing energy efficiency under the NDRC [National Development and Reform Commission], it seems they are serious about getting things done. [JSIN-ZZ]

Here, energy efficiency is being cognitively linked to environmental factors more generally. This may be because in nearly all government rhetoric the two concepts are coupled together—albeit handled by separate regulators and governed by different laws. The phrase ‘energy efficiency and emission reductions’ (*jienerg jianpai*) has become a part of the lexicon of almost all citizens and features prominently in the discourses of government and SOE employees. More importantly, though, from the passage above one can see the nexus between the creation of formal regulatory structures and the effect they have on awareness, culture and implementation.

3.4.1. Policies and laws as a form of signalling

The legal story from the enterprise perspective is one of a symphony of measures. Policies (discussed in more detail in chapter 5 under Political Mandates) provide broad indications of political intent and direction, they are usually the harbingers of a series of laws, regulations and implementing rules that increase in granularity and details for enforcement over time. Basic laws are enacted in general terms; they often lack the specificity to be reliably interpreted or applied. However, the fact of policies and laws signal intent from the central government and are thus important for local regulators and enterprises alike in making an issue like energy efficiency more prominent on everyone's agenda. Over time, as capacity is increased and energy efficiency knowledge improves, more detailed regulations are released that allow for better interpretation and application. Yet, the release of detailed regulations does not necessarily mean immediate enforcement. When enforcement is seriously intended, for some issues (such as environmental protection), other avenues are opened, such as

allowing civil litigation and even administrative action by the public. Another prong of enforcement is driving down targets that have to be met and promoting incentives. By rolling out these enforcement measures, agency for enforcement is localised. With each new suite of instruments that joins the symphony, the perception among elites in the SOEs and among local regulators becomes more widespread—that this issue matters now.

Often when interviewees spoke, they referred to the law; but when discussing the law, people did not always speak in terms of its detailed rules, application of regulations, penalties, or other aspects of the law that are usually operative. Rather, the reference to law was often as an explanation that increasing laws and more detailed regulations and targets are an indication that energy efficiency is gaining attention from regulators and government as a real issue. This ‘state-led’ attention, or attention that has the legitimacy of legislation, corresponds to increased attention from individual leaders, which, in turn, flows down into more discrete forms of action.

*Shuangkong*⁴² has been a big deal. A lot of laws have come out related to this. These promote energy efficient behaviour. The second is: government leaders, particularly top leaders’ performance being linked to energy efficiency performance. [ZHSIN-CZ]

Another interesting perspective was offered spontaneously by an American lawyer who is a partner in a top-tier US law firm with offices in China. He articulated the same phenomenon that had emerged from the interviews and was being formulated as a pattern in regulation and norm-building in the theories of this study. He commented about recent regulations added to the environmental laws, saying:

Recent regulations have breathed life into the [environmental] law. There are two kinds of laws, aspirational and actual-enforced. Environmental laws have been in place for twenty-five years, now we are seeing them be enforced ... through the release of new regulations and measures. [JD-MV]

This interviewee provided extensive analysis of the measures laid out by the new regulations. In summary, the new regulations are clear evidence of regulatory pluralism, with a suite of different avenues being created to support enforcement, including creating rights for civil litigation even against SOEs. Important to his argument was the notion that after laws or regulations are established, they set a standard of what the new norms are. Then there is a ‘grace period’ when new laws come out, before they are enforced. During this time circumstances have to be created to allow compliance [JD-MV].

The leader of the design institute spoke quite candidly about the softer nature of requirements currently enforced around energy efficiency. Again, what is being focused on is the signal that is picked up regarding the regulation of energy efficiency at this stage. The theme he highlights is one of creating awareness and respect for the issue of energy efficiency by requiring evaluation and reports prepared as part of the approval process for new projects.

We are not aware of very stringently enforced requirement against enterprises. We haven’t yet seen clear numerical targets entering the lives of the enterprise. We haven’t

⁴² This refers to the monitoring of two targets or indices for judging performance: energy intensity and total energy consumption.

yet seen any projects be refused because of energy efficiency targets. They [the state] will kill a project for environmental failure, but for energy efficiency, they just want to see that you've respected the effort of energy efficiency ... Energy efficiency is win-win for enterprise. Environmental work is win-lose for the enterprise so the government is also required to push harder. [LPEC-JSW]

It remains to be seen whether energy efficiency will eventually be subject to the same level of strictures as environmental controls. There are many similarities in the pattern; however, as the interviewee describes, there are also some fundamental differences between environmental and energy issues, in that energy is win-win for business. However, since the investment required for some energy projects can be disruptive, there is likely to still be a need for regulatory involvement for optimal outcomes.

One of the regulators also echoed the sentiment that what is really important at this stage is the signalling and transforming of attention/focus and behaviour. He indicates that although requirements are tough, there is a tacit understanding that not every enterprise will be able to achieve compliance. So, while much attention is paid to making sure that overall numbers are met, the name of the game is progress along the curve. This progress cannot be just notional, of course; it must be tracked and improvement should be ongoing and real.

Our requirements are very tough against them [enterprises], but we also know in our hearts the real situation of many enterprises. So as long as we can make our annual total in terms of our quota, then we are ok. Some enterprises really cannot meet the numbers—and we cannot go around shutting everyone down. Old enterprises cannot do as much as new ones, so we can adjust and juggle to meet the numbers overall and the process is what matters really. It drives everyone towards improvement. [LNDRC-WK]

Thus, when Joe Citizen (or Zhou Citizen) from a refinery sees reams of new legislation coming out about an issue, he/she receives signals that this issue is gaining importance as a priority. If those reams of new legislation are combined with organisational changes, regular meetings, and notices, then the signalling is reinforced further. However, one key ingredient of the cocktail that improves uptake for Joe Citizen is the extent to which he/she is directly affected by the new priorities. Thus, we see in the passage above, and in some of the following passages, references to targets and metrics and what they signal.

3.4.2. Targets and metrics as a form of signalling

A system of individual reward and punishment for leaders and employees is generally a part of any regulatory toolkit. Linking individual evaluation to performance on specific factors incentivises ownership and accountability. For government and SOE employees, evaluation is based on a point system with different issues correlating to points on an overall score.

These metrics can be effective, especially since energy efficiency is one of the 'veto factors'—meaning that failing on energy efficiency means an overall fail regardless of scores in other categories. But, as described by one of the representatives of the NDRC, there are now so many elements to the evaluation of a leader that they are 'all important and all unimportant'. Impressionistically speaking, from the level of attention and consciousness of the factors of evaluation for leaders, this process is effective. What I mean by this is that

many⁴³ respondents from regulators and SOEs referred to it and see it as having an impact on their careers. For an issue to be part of the 100-point system for a leader means that that issue has ‘arrived’ and is real. This has certainly been true for environmental issues, which now carry a significant weighting in the point system (more points are accredited to environmental issues than energy efficiency) and carry an overall veto power. The point system is discussed in more detail in the next section.

Regarding targets, the senior leaders of a private company that supplies to refineries and petrochemical plants and has been in existence for several decades commented about the issue of regulatory signalling.

We do not have that much to do with environment or energy efficiency because in the past no one really paid much attention to environment or energy efficiency. Because these were just things that people talked about or didn’t care that much about. But we feel that from this year, pressure on environment has really grown. Two factors have contributed to this: One is that people care more about it at the grass roots; and the other is that leaders seem to pay a lot more attention to it. Look at Yunnan for example ... Now they are paying serious attention and there are firm and hard targets that without them, projects are not being approved. Last week we went to Yanshan. They specifically set out environmental requirement for this project. In my heart, I wonder if the thunder sounds big but rain is small⁴⁴ or will we really be held to the targets? [LRC-YZ CZ]

These comments are interesting because they lack some of the insider perspective of those working in the SOEs. With regard to this issue they are more like interested observers/stakeholders speculating about the inner workings. Of course, theirs is well informed speculation—educated guessing. Their bread-and-butter is maintaining good relationships and having strong information streams from the managers inside the SOEs so that they can be responsive to business opportunities.

While the two factors highlighted here—grassroots attention and leaders’ attention—are interesting, the example cited is more revealing. The project in Yunnan was heavily scrutinised and the targets were strictly applied in evaluating that project. Other testimony on energy efficiency has been different. According to others, regulators go through the motions of evaluating energy efficiency factors to various degrees but they have not been mission-critical for the approval of new plants, particularly refineries. Rather, it has been a case of going through the motions and showing general deference to the process and principles. Here it is the combination of targets and rules for the approval of new plants, combined with the heightened sensitivity to pollution and industry behaviour, from the grassroots because of Yunnan’s local population and the province’s reliance on tourism and agriculture as core industries. This juxtaposition of factors intensifies the effectiveness or impact on regulatees.

The conclusion drawn from these explanations is that setting targets and rules is not just about achieving the targets. While they are important, at this stage of the energy efficiency regime

⁴³ Over a third of government and SOE respondents referred, unprompted, to energy efficiency or environmental factors as being part of their formal evaluation.

⁴⁴ ‘Loud thunder, small rain’ is a Chinese idiom.

it is also about creating awareness, culture, and capacity to implement and evolve infrastructure (hard and soft) for compliance. This is not to say that the targets are merely hortatory or symbolic. Clearly they perform a traditional managerial function, as discussed here. But there is another important dynamic—referred to here as signalling—that, when understood in conjunction with the traditional use of goals and targets, enriches the picture. It is important to constantly remember that it is not just compliance that is being sought but also the development of an inherent and evolving ability to improve and respond to energy efficiency needs locally.

3.4.3. ‘Kaohe’ and enforcement behaviour as a form of signalling

Kaohe refers to inspection. That which is inspected can be said to receive attention. This is somewhat true, because if something is inspected then it will make its way into a report somewhere; it will be visible to leadership and will reflect the performance of a site or team or individual. But there is a process for inspection that requires and involves *setting metrics*, having requirements that are *measurable and objective* (at least somewhat), having reliable *inspectors* who are both competent and impartial etc. Challenges can be encountered with each of these elements. However, as the discussion below unpacks, the underlying theme of this section is that the ‘theatre’ of these processes is often as important and impactful as the actual consequences of the processes themselves.⁴⁵ The following section is not merely about audits and enforcement. There is an abundance of fine work related to that (McAllister, Van Rooij & Kagan 2010; Gunningham et al. 2004; Hunt & Wilkins 1992; Kagan 1981). Here, audits matter because the signals sent by inspecting things intensifies awareness and attention given to those issues, not just for the aim of compliance but for the longer-term gains of driving normative and cultural change.

a. Setting metrics

Setting metrics has traditionally been easy. For standards, they are often borrowed or formed from an amalgam of several ‘best-practice’ countries. So, in some cases metrics will be borrowed from the US or Germany, or sometimes with reference to international treaties. This is the case with certain emissions standards. The other method (grossly oversimplified) is to baseline a site against its own numbers for performance on a given year. Then the process is to set a further metric (this is the one that many interviewees refer to as being somewhat arbitrary and firm—set by the government) for a percentage of improvement year-on-year against that original baseline. For the patient, the approach is replicable and cheat-proof to the extent that, however much you game your baseline, over time you must achieve demanding improvements year-on-year and so, eventually, significant improvements can be achieved. This works provided the baseline is not off by an order of magnitude and provided there is some reliability about the incremental periodic improvements.

⁴⁵ There are parallels for ‘regulation as theatre’ in early regulatory studies of police work such as Manning (1977). Manning refers to the way that police must ‘dramatize the appearance of control’ (p. 17). Also see Fleming and Grabosky (2009).

A senior manager of one of the refineries described clearly how the establishment of clear metrics caused a shift in their behaviour—not because of its effective implementation or consequences, but simply because of the signalling that this issue was now becoming a priority.

For example, with pollution, when we used to over-exhaust in the past we didn't care. Now in the last five years they [the state] have set a standard. We must filter our output so now we do. Previously we had targets but we weren't bothered that we were over the standards. Now it's the rules are clear, which means that it's much firmer and so we have to meet the rules. [JSIN-JZ]

His comment is about pollution and emissions, partly because the metrics in energy efficiency remain less clear and concrete. However, energy efficiency is also beginning to move along the 'maturity curve' of regulation referred to earlier in this section.

One particular use of metrics set for the plants and departments within the plants is to post them in forums where they can be seen by peers and certain elites. Tracking performance against goals is almost constant and serves as a constant form of signalling to the whole group about how the plant is doing. The posting of 'grades' drives a competitive spirit and avoidance of the shame of missing goals/targets.⁴⁶ One energy efficiency director described how metrics are publicly tracked.⁴⁷

Participation in our target-setting is seasonal as I told you, August to Oct[ober] is the main time. But we review monthly internally and you can see that board on the wall—it carries our targets from headquarters and then tracks our monthly performance against those targets you see. We will engage in detailed reviews with folks whenever they are behind which does not happen often now. [LSIN-CKZ ZKZ]

Speaking from the perspective of a design institute, one director level respondent explained the position that energy efficiency currently occupies along the 'regulatory maturity curve'.

In the past energy efficiency didn't receive any respect; everyone would sacrifice efficiency or safety for growth. In the last two years, they've introduced an 'energy evaluation' (*nenping*). If you cannot pass it, then you cannot get approved. [LPEC-JSW]

Thus, energy efficiency is receiving more attention and the setting of concrete metrics signals the increased seriousness of regulators.

The same theme was captured by a supplier who sells heavy duty equipment that provides energy efficiency to large refineries and petrochemical facilities. He correlates the change in procurement behaviour to the increased intensity of inspection metrics—*kaohe zhibiao*. Because things are being tracked, and because leaders must report up regularly on certain metrics, they are now paying attention to these themes. But the strength of these signals may

⁴⁶ See also Chapter 4 on the social dimension of face and shaming.

⁴⁷ This process of taking each plant wherever they are on the maturity curve and moving them along is somewhat (though of course not entirely) less prone to local fraud and corruption because whatever sandbagging or gaming is done in the numbers gradually is eroded away as each wave of improvement is followed by further ratcheting up. Thus, wherever you start, you're expected to keep improving and accelerating.

come from the risk of the government dealing harshly down the track with those who have not improved their bench strength during the ‘grace periods’ earlier in the curve.

The change in procurement behaviour has occurred in the last year clearly because there are more ‘inspection metrics’ (*kaohé zhibiao*) and so it’s clear that they [the enterprises] care. Because it affects the performance of their equipment in a noticeable way ... And every department and leader now has monthly responsibility to report energy improvements and so it is becoming part of their consciousness. And headquarters is pushing more emphasis on this. To reduce energy consumption is something that the Sinopec Group as a whole has been pushing more and more. [LRC-YZ CZ]

Another kind of metric is the metrics set for evaluating leaders. These play a perhaps even more significant role signalling priorities and driving behaviours.

One NDRC leader responsible for energy efficiency lamented—from his perspective as a regulator—the challenge of being managed as a regulator and government leader. He has regional responsibility for thousands of enterprises. He reports directly (‘solid-line’) to the city leadership and has a sort of functional (‘dotted-line’) reporting relationship to NDRC at higher levels—provincial and national. He explained how he is evaluated against five main measures and how government and SOE leaders are evaluated along 22 factors. Notably, energy efficiency is among the five factors on which the NDRC leader is evaluated. This is a big deal for him and shows that energy efficiency is clearly part of his portfolio and one of his key priorities.

At NDRC, we have five measures for our responsibility: GDP, fixed asset investment, farmer income, proportion of service industry (*fuwuyè bili*), and energy efficiency. There are altogether 22 factors by which a leader is evaluated, particularly for promotion and anyone of them can be a veto issue. In other words—there are too many. They are all important and all not important. We need improvement of these evaluation and audit (*kaohé*) things. [XNDRC-CH]

What is interesting about the comments from this NDRC leader is his reference to the 22 veto factors as all being ‘important and not important’. Because there are so many, and all have been made potential veto issues, it is difficult for a leader to determine what to direct attention to—where to place priority and emphasis. His conclusion is that these 22 *kaohé* items need to be evaluated and improved.

What is really achieved by this form of signalling through metrics is not just the immediate gains in energy efficiency achieved by meeting metrics. Although short-term compliance with goals of a particular month or year certainly matters and is driven by headquarters, the overarching focus is on creating a pattern of improving energy efficiency—changing the slope of the ‘regulatory maturity curve’: signalling to the plants and local regulators alike that this issue is starting to be taken seriously.

b. Requirements (measurable and objective)

Not only is energy efficiency in refineries and petrochemical plants highly complex, with many plants having their own built-in (‘inside the fence’) power plants and power generation

capabilities, but reliable figures are also very hard to come by and can be tweaked at several points throughout the system by those who prepare reports.

As part of an effort to focus attention and increase motivation in groups, there is also an overall scoring system to which each department and enterprise is subjected in their periodic evaluations. Notably, energy efficiency is one of the issues that affect this overall score, but it does not carry a huge portion of the weighting. This becomes strikingly clear when energy efficiency is contrasted with emissions reduction or with safety, which carry major weight in the evaluations. A manager at a mid-sized plant in East China commented:

Planning, execution, inspection. Our department has authority to audit others (*kaohequan*). When evaluating a department, there are 100 points. Of 100 points, energy efficiency only occupies about two points if that. At most you might deduct 0.2 or 0.5 per issue when evaluating. By contrast, the emission reduction (*jianpai*) standard holds about 25 points. Or maybe emission reduction holds about 23 out of 25. By further comparison, for safety: there are more points: 5–10 points and if you have a significant failure, they will veto all our safety points.

Every month, there is an Economic Activity and Performance Review (*jingji huodong fenxi*) and every department is reviewed and evaluated for all these target points. These points are a very important part of management of departments. We are held to yearly improvement in these metrics. It's impossible to make sudden improvements. [JSIN-ZZ]

A decade ago, environmental protection did not occupy one-quarter of the weight of a cadre's overall evaluation. Whether energy efficiency ever will occupy such a significant weight is difficult to predict and depends on many exogenous factors, including global energy supply and geopolitics. Either way, energy efficiency is still in its infancy.

One can postulate that either energy efficiency is not afforded the priority of some of these other issues, or that efforts to achieve regulatory outcomes in energy efficiency rely on other methods of norm- and culture-building more suited to this issue, and rely less on the direct results of inspections or audits. Interviews suggests that it is a little of both. Shifting the will of the enterprises and their employees to drive change is an important lever. Some of the alternative methods of norm- and culture-building are further explored below.

c. Inspections

Inspections have limits in terms of changing behaviour. But this section is not an evaluation of inspection methods and their effectiveness at finding compliance failures. This section is about how a pattern of inspections signals regulatory intent and drives behavioural change over time. Studies in deterrence have concluded that '[s]ingle treatment strategies ... have minimal-to-no deterrent impact at the individual and company levels. However, studies examining multiple treatments produce a significant deterrent effect on individual—and corporate-level offending' (Schell-Busey et al., 2016, p. 4).

Inspections can be used as one treatment to create an environment where individuals and enterprises are forced to gather evidence of year-on-year improvements in energy efficiency. Similar practices have been adopted in the aged care industry in Australia (Braithwaite 2007). For inspections in refineries in China, there are very few people who have the expertise to

make meaningful assessments of the energy utilisation and intensity of a facility other than those within the facility. And even a competent outsider would need to rely heavily on the resident engineers for data and access to historical information. Coupled with the sparse human resources generally allocated to the regulators, any in-depth inspection is limited. The most technically probing and reliable inspections are those conducted by headquarters from time to time. Of course, when the inspector is the parent company, questions of impartiality must be considered.

Often in the case of energy efficiency inspections, it is the local branch of the NDRC or one of its affiliated organisations that carries out the inspections. When probed about how the inspection process works, one local NDRC official gave the following account.

When we do an energy efficiency inspection, there are two parts. If they get 80 points, they pass. 60 is a basic pass. 90 or more is an excellent pass. So, targets make up 40 points and 'other factors' make up 60 points. The other sixty points looks at a bunch of effort and process related factors [he showed me a document with a set of factors and tables that are part of the assessment process for these 60 points] hence there is a lot of regulatory autonomy/subjectivity at the very local level in this matter, I can apply ... You can see that these other 60 points are basically bogus, so it's up to the local person conducting the inspection. [LNDRC-WK]

One senior design institute director described the limits of inspection in energy efficiency, echoing the sentiment of other respondents that energy efficiency is still in its infancy and will mature gradually as norms and capacity develop.

But the 'energy evaluation' and the 'environmental evaluation' are somehow different. They feel different to us. Energy efficiency is not detailed enough; hard to audit/inspect and hard to evaluate. I believe it's a process. We cannot expect the government to immediately have detailed rules as soon as they introduce an idea. Actually when 'environment evaluation' first appeared, it was similar. In recent years it has become more impactful. [LPEC-JSW]

The same leader goes on to describe in more detail the nuanced difficulties with energy efficiency as contrasted with 'environmental protection' (pollution/emissions), which is subject to firmer inspections with clearer metrics and requirements. But what is telling for the purposes here is the connections he draws directly between perceived importance and the imposition of standards. Once a pattern of serious enforcement is observed at the enterprise level, then behaviour starts to change.

We can see the importance of environmental regulation now. We can see it in the fact that it is imposed. For example, one of the Sinopec sites in Guangzhou didn't achieve local environmental bureau standards. Local regulators went through formal administrative action and stopped their production. Whether they coordinated with Sinopec headquarters before taking such action, I do not know. Then they require them to fix within a period ... it's much harder to say whether a unit is functioning within a certain energy standard. Although standards exist internationally but in general it is very difficult to set meaningful standards. So, it's hard to be very harsh in penalising. [LPEC-JSW]

Thus, it is difficult for inspectors to enforce harsh penalties for energy efficiency failures, because metrics can be hard to set very clearly and it is hard for inspectors to hand out

penalties that can halt the production of a refinery or raise the ire of senior officials with other economic targets. It is also noteworthy that there is a certain amount of expected coordination with the headquarters, partially because of the importance of continuity of production. The process is thus aimed at gaining ground. The idea is to keep each site moving up the regulatory maturity curve in terms of capacities and performance. As the sites move up the curve, a regulatory base is grown.

Another way that headquarters signals its expectations is through goals and initiatives aimed at a certain policy goal.

3.5. Goals, initiatives and peer pressure created by headquarters

It is perhaps not saying much to say that by communicating goals to their subsidiaries within a state-owned conglomerate, and by communicating goals to subordinates within a plant, management is signalling down the ranks about its expectations. One might question whether goals are a form of signalling or just a direct management tool. Of course, it does not have to be one or the other. However, goals feature here as a form of signalling for several reasons.

1. Goals are a form of digested policy and law that are fed ‘down the waterfall’. In a sense, the headquarters—or, in the case of larger, more mature plants, divisions within the plant—are responsible for taking the policy/law signals and translating them into practical goals for different parts of the organisation.
2. Goals, particularly aspirational goals (goals set at the upper limits of what is realistically achievable) set signals of where things need to eventually be—regardless of whether they are achieved, they set an expectation.
3. In some instances where goals cannot be met consistently, there is also the implication of major reform being required, as with the *guan bing ting zhuan* (close, merge, cease/shut-down, transfer/divest) reforms.
4. By setting common or interrelated goals around energy efficiency, the organisation can be united around a shared purpose, and this contributes in a real way to the formation of a culture and norms related to that theme.
5. Achieving a given goal requires a level of capacity commensurate with that goal. There is therefore a relationship between the goals that can be set and where people (and the organisation) are at in terms of delivering on those goals. Thus, goals also signal where capacity needs to be built.
6. Finally, and importantly, goal-setting is not merely a top-down process. It is a participative process that involves some dialogue and exchange. In the process of that communication and dialogue signals are exchanged that help to set expectations on both sides about where the organisation is headed. This process is discursive, as discussed in the previous chapter on discourses and norm-building, and also involves deliberation, which is discussed in the next chapter.

Most of these elements can be gleaned from the passage below from one of the older sites in one of the poorest regions of China.

Capacity-building is an important issue—but you have to identify an issue and then build people’s capacity around something specific. Prior to that the work is one of raising

awareness and culture. During Energy Efficiency Year, every person was trained to realise that energy efficiency is work that belongs to all facets of operation. It is everyone's responsibility. Awards were given, training was carried out. Our direction does not come from policies or treaties or things so much. It comes from what is digested by headquarters and fed to us as our goals. [LSIN-CKZ ZKZ]

The respondent explains in a few sentences a chain of factors that link together to allow for gains in energy efficiency. He starts with raising awareness and the importance of creating norms and culture (building the base of the pyramid), gives an example of new goals and initiatives that were set by the organisation, references training and individual accountability, mentions awards and individual recognition, and concludes by describing the strong role of headquarters in signalling legislative and policy intent.

3.6. Conclusion

This chapter began with a review of the history of energy efficiency laws, highlighting the distinct periods that have been traversed by China's industrial sector as it moved from a centrally planned economy, where energy was rationed, towards a market economy, where energy was planned and eventually regulated through laws and agencies.

A brief look at the past and current laws and their application has shown that the laws, and strict enforcement of the law, are not the locus of regulatory activity. Rather, the laws provide legitimacy for certain actions or signal priorities that are to be focused on by SOEs.

In this chapter, we have focused on instruments and agenda-setting as a means of signalling that energy efficiency is gaining importance and will start to receive increasing regulatory attention. The issue of energy efficiency is advancing along the regulatory curve, to have stronger organisations for supervision, more detailed rules for implementation, and clearer targets and metrics to be met. Likewise, it is expected that each enterprise will move along its own energy efficiency curve, gaining awareness of the importance of the issue, localising accountability and systems for improvements, setting goals, participating in initiatives, and developing its capacity to improve and make energy gains.

In the coming chapters we will see that, to the people working in SOEs, headquarters is the most influential regulator. Headquarters regulates through a combination of target-setting, social and political pressures, capacity-building, and deliberations. These factors work within a framework of constant norm- and discourse-building that is heavily influenced by economic and political agendas set by the Communist Party and individual leaders, often people who occupy a double role—industrial leaders who also seek political recognition or advancement. Hierarchical influence (top-down) bears heavily on setting priorities, but this occurs through a kind of democratic centralism (Keping 2010; Waller 1981; Tsang 2009; Angle 2005). This democratic centralism is a novel innovation that has evolved in several Asian countries in different forms. The next chapter looks at structural relationship and social factors and how they affect regulation.

Chapter 4. Structural and social dynamics

Regulator:

We don't want to have negative consequences for enterprises and make them look backward. We don't use penalties because it's too risky. [TX JXW]

Enterprise:

The government doesn't govern us. Our headquarters governs us. [JSIN YZ]

4.1. Overview

This chapter examines structural and social factors that affect energy efficiency regulation at the plant level. In China, formal legal processes are relatively weak and regulators lack the resources, authority and expertise to regulate meaningfully, especially in a space like energy efficiency and even more so against huge and powerful central-level SOEs. Challenges such as local resistance, gaming and opacity of data, curb the ability of government and administrative agencies to enforce policy goals. This is even more true for agencies that have relatively limited resources.

The following sections look at relationships and how they are structured into webs of influence; these webs of influence and how they affect energy efficiency regulation are referred to as structural factors. This chapter then considers asymmetries in information, power, and resources and how they affect regulatory outcomes and processes. It also identifies the relationship of enterprises with their headquarters as a key relationship and terms the dynamic where headquarters regulate subsidiaries as a form of 'shadow regulation'. Then the chapter turns to social factors that affect energy efficiency regulation and explores two broad categories of social factors. The first is a form of peer esteem or social licence from an elite population that interviewees frequently associated with face and with *danwei*⁴⁸ culture. The second is social licence from the public, which is discussed summarily but found to have less bearing on energy efficiency regulation. We end with some preliminary conclusions about structural and social dynamics and how they relate closely to political factors, which are discussed in the next chapter.

Some China scholars argue that stronger institutional and legal factors are required to improve the ability to enforce laws (Yang 2004; Wang 2006; Fang & Zeng 2007; Sinton et al. 1998). This is certainly true, but this work is slow and involves a broader transformation

⁴⁸ Work-unit (*danwei*), is a term that refers to one's place of employment. Although the term is still used in contemporary parlance, it refers more to the 'pre-reform' era of China's economy when state-owned enterprises dominated the economic landscape and most aspects of individual welfare were handled by the work-unit. This included: accommodation, children's education, health and other aspects of personal life. For example, permission was required from the work-unit to travel, marry or have children.

of the legal system, which is something that does not solve the near-term challenge for regulators.⁴⁹

Existing legal and regulatory options have little traction with energy efficiency, particularly with giant SOEs in China. Several features of China's petrochemical and refining SOEs are distinctive. They are massive and thus they are hard to influence. Moreover, they are spread throughout the country and require domain-specific knowledge to regulate.

Several non-formal factors have emerged from the interviews in this study as relevant to achieving regulatory outcomes. Among these are what I have termed structural and social factors, which affect the ability to achieve compliance and gain engagement towards policy goals. 'Structure' refers to a network of actors and their relationships. 'Social factors' refers to relations with peers or with the public and how those relations affect the tendency to engage in regulatory priorities.

The sections below will traverse a few themes. The first is how the structural factors described above help or hinder energy efficiency regulation, particularly examining asymmetries of knowledge and power; then the role of corporate headquarters as proxy or shadow regulator; and, finally, an examination of the notion of social licence/peer esteem as an informal mechanism of social control in this setting.

4.2. Structural factors

This chapter begins with structural factors, which are important in understanding regulation in China. Regulators do much of the core work of regulation through the corporate headquarters of the SOEs, which function as de facto ministries in many cases. In interviewing senior managers from headquarters, it was clear that they act as proxy regulators to coordinate and drive much of the work of the government agencies, making up for the lack of resources and expertise of those government agencies. Issues to avoid are regulatory capture and effective self-regulation, as well as coordination with the government. Given that regulation occurs largely in-house, relationships among employees and between plants and HQ are hugely important and influential.

'Structural factors' refers to the network of regulatory actors and their relationships insofar as those relationships bear directly on regulatory outcomes. So, in this industry, this would include field engineers, senior engineers, managers, directors, and general managers in the plant; inspectors, analysts, low-ranking officials, and more senior officials in the municipal regulatory offices; energy efficiency managers, production managers, planning and budgeting managers, and technical managers in headquarters; and various other individuals and groups as well. Among almost all these groups, there will be cadres and Party officials who also affect the dynamic; however, political influence is discussed in more detail in Chapters 5 and 6.

⁴⁹ For a deeper discussion of the theory in these areas of Chinese regulation, regulatory theory generally and the application of regulatory theory to China, see Chapter 2.

In looking at structural factors, it is relevant to understand how people in the refineries are affected by regulators in several spaces—internal regulators within the plant, local regulators in different government organs, and specialist regulators from their parent company or headquarters. So, for example, local engineers in a plant are polite and a little afraid of municipal inspectors, but deep down they know that the municipal inspectors do not have the knowledge, time or human resources to make sense of their data. If the inspectors feel like they are being ignored, they can create irritations for the local plant, but the inspectors are also cautious because the plant is part of a national SOE—headquartered in Beijing with strong ties to almost all government bureaus. The experts from SOE headquarters have a stronger technical understand and insight into the data of the plants, but they have a different set of priorities from the municipal regulators. In the interviews, discussions about these relationships brought to light three groups of asymmetries: informational asymmetries, resource asymmetries and political asymmetries. These asymmetries contribute to regulatory capture and reliance of local and central regulators on the plant and headquarters for achieving policy objectives.

Most notable among structural factors is the importance of the role of headquarters in regulation of energy efficiency (discussed below under the heading ‘Shadow regulation’). Government regulators, lacking the ability to directly influence enterprises on energy efficiency, have created proxy regulators by engaging corporate headquarters to carry out much of the regulatory work. Government regulatory processes and targets remain in place, but often corporate headquarters are more relevant to the plant and its requirements, leading to a ‘shadow regulatory system’ that is in many ways more relevant and effective than that visible when looking at government targets and legislation.

Social licence from the public is currently less of an issue for SOEs because energy efficiency is not highly visible or sensitive. Rather, a series of elite relationships and the social implications of those relationships has the greatest influence in this space.

4.3. Relationships and how they are structured—webs of influence

Who the key actors are and how they influence each other is important not just as an informational question but also from a theoretical perspective in terms of defining the relations between corporate power, state power, and civil society, as well as international actors and norms.

Regulatory pluralism and the relationships that result from the approaches adopted represent a key way in which these relationships are institutionalised. Research that uncovers whether and how the regulation of corporate capitalism ‘works’, and uncovers the power relations, values and goals represented in the way that compliance is constructed should be a core concern of social science theory-building. (Parker & Neilsen 2009, p. 11)

In many ways, the nitty-gritty of how these relations are managed is opaque, partly because of resistance to access and transparency in policy design and implementation and partly due simply to a lack of empirical work done in the field. It is exactly because of this opacity and its relevance to power relations that social scientists and lawyers should take responsibility

for uncovering what is happening (Parker & Neilsen 2009) through a close examination of structural and social factors.

4.3.1. Webs of influence

Nee and Ingram (1998, p. 19) state that ‘[s]pecifying the mechanisms through which institutions shape the parameters of choice is important to an adequate sociological understanding of economic action’. In developing a theory of social norms that explains the relationship between institutions and networks, they argue that ‘the key to understanding ... is revealed at the level of face-to-face social interaction. An institution is a web of interrelated norms—formal and informal—governing social relationships’.

Recalling Chapter 2 of this study, Burris, Drahos and Shearing (2005), in their work on nodal governance, effectively bring together the approaches of network analysis and institutional theory, providing a very practical and thick approach to thinking about networks and their importance in social control and regulation. Insights from Braithwaite and Drahos (2000) guide us to look for strands of influence that are interconnected and add up to strong webs of influence.

For this project, which is concerned with energy governance in Chinese SOEs, the ability to influence regulatory outcomes is affected by the relationships between plants and local regulators, local regulators and SOE headquarters, and SOE headquarters and central regulators.

4.4. Asymmetries and regulatory capture

Several structurally embedded asymmetries exist historically between regulators, plants, and headquarters. These asymmetries, noteworthy because they pose a threat to regulatory independence, include informational asymmetries, resource asymmetries, and political asymmetries. The three are closely interwoven. Informational asymmetries occur because the enterprise knows its actual circumstances better than the local regulators and has more expertise in almost every aspect of the technology and the plant. This means the regulator is heavily reliant on the plant for information and has little means to generate its own.⁵⁰ Resource asymmetries occur because the plants and plant leaders have significant budgets, staff, and economic power and contacts within and outside the city or province where they reside. Political asymmetries occur because these plants provide essential fossil fuels, create jobs, pay taxes (usually), and are led by general managers who are often ranked at a level of seniority within the Party equivalent to a senior director in the government. Some of them may go on to be mayor- or governor-level officials as their careers develop; some have already spent time somewhere in such a capacity. Regulators are, understandably, apprehensive about taking harsh measures that would sour relations with these enterprises or

⁵⁰ The regulator in each locality (and in different localities, there are sometimes different regulators) has in total, just a few people to manage often tens of thousands of enterprises. They rely almost entirely on enterprises for their numbers and information—even more so in the refining and petrochemical sector, where plants are so complex and even have their own power capabilities.

individuals. An NDRC official, in discussing the powers at officials' disposal and when asked about how often harsh measures are taken against the local enterprise, responded:

Peer criticism⁵¹ [*tongbao piping*]. We try not to use this method. We use rewards and incentives. We don't want to have negative consequences for enterprises and make them look backward. We don't use penalties because it's too risky. [LNDRC-WK]

One consequence of regulators being cautious about imposing harsh measures or tough penalties on energy efficiency issues is that they are forced to rely on other constructive instruments and factors to drive regulatory outcomes. When occasion demands tough measures be taken because of flagrant violations on sensitive issues, it is often done apologetically and after ample communication and with the blessing of more senior leaders. One observer who lobbies for energy policy commented:

A fellow from Alcatel was talking about the power dynamics and how they've shifted when SOEs get together with regulators. It's moved in favour of the SOEs. They have such power against the regulators that they effectively tell them how they should be regulated. [EU-PC]

These comments from the interviewees help explain the emergence of the system of shadow regulation, whereby SOE headquarters act as proxy regulators for the state (discussed further below). Central government places pressure on the SOE at its headquarters to drive the policy outcomes and local regulators then act as monitors or facilitators.

4.5. Shadow regulation

The role of headquarters in regulating energy efficiency is pervasive. One significant finding of this study is that the SOE headquarters function as proxy or surrogate regulators in many ways.

Because of the nature of the hard targets set by central governments and cascaded down to provincial and city level governments, actors—including local government regulators—tend to game the numbers. This is done mainly by 'sandbagging',⁵² but also through other subtle means. The result is that the government targets are almost always met and, therefore, somewhat hollow.

A manager of a plant in Xi'an commented on the way government targets are set locally, stating that 'the government figures are not arrived at scientifically. They are simply concerned with meting out their quotas to the various enterprises' [XSIN-WC].

Notably, the NDRC regulator in the same city lamented similarly that the targets his office hands down are not always scientifically set by the government, nor does the NDRC have much flexibility to change them. He did comment, however, that the situation was improving

⁵¹ *Tongbao piping* translates literally to 'circulating notice of criticism' and refers to 'naming and shaming' or a formal process of peer criticism.

⁵² 'Sandbagging' refers to giving indicators that will allow low targets to be set, making them more achievable.

over time. He also made specific reference to some of the structural and policy improvements that are to be made in this regard.

Take Xi'an Sinopec, for example. We cannot directly manage them in their operations. We typically endeavour to encourage or reward plants. We can report their shortcomings to their headquarters and that will result in promotion problems or reductions in their incentives and recognition. But we don't really have hard penalties we can deploy like those available for environmental violations. To deploy those kinds of tough penalties you need to have very mature regulations and ability to implement. And as you know public management has become increasingly democratised and so the government must act wisely. [XNDRC-CH]

The more genuine targets and requirements that actually stretch the enterprise occur in a 'shadow regulatory regime' within the state-owned group—coordinated by headquarters. The key factors shaping the shadow regulatory regime are the three asymmetries referred to in the section on political factors above. Because the SOE is better positioned than the government in terms of information, resources, and influence over the plants, headquarters is better positioned to steward change. The government's regulatory work then involves both directly regulating and using levers to stimulate self-regulation throughout the SOE group.

Several managers representing different plants discussed this shadow regulatory regime. One was an energy efficiency manager at a plant in Shanghai.

The government doesn't govern us. Our headquarters governs us. All our energy mix can be a mess but if we meet our overall target, they [local government] don't care about us at all. I can say with certainty that in the last ten years the attention to energy efficiency has increased dramatically. Previously we basically didn't care about this issue. Now the entrepreneurial spirit and market economics pervades everything. It used to be planned economy but now it is market economics so everything has to improve. If you don't improve and keep up it's your own doom. [JSIN-JZ]

The perception that the plant is governed by headquarters more than by local authorities, even in a municipality as powerful as Shanghai, comes through in the above excerpt. Another manager in the same plant commented along similar lines.

It would be difficult for the Shanghai government to govern us in our energy efficiency failings. So far, we haven't had such failings. If we did, then for local government, their only recourse would be to report us to our higher ups. For environmental things, they have very harsh penalties but for energy efficiency, it's currently softer. One outcome might be that the next time we seek approval for a new project, we are reviewed much more strictly. So there is a sort of pyramid of regulation. [JSIN-ZZ]

This perception was held not only by individuals within the plants—although more than half of the interviewees in the plants made a similar point about the role of headquarters—but also by government officials at the municipal level. A senior NDRC official in a city in western China where a research site was located made similar comments.

Energy efficiency is tracked along lines and clusters (*tiao he kuai fenge*) so it occurs in two forms: along lines, it is tracked down administrative lines from province to city and so on; in clusters, it is tracked across industries. When looking at industries, we are obviously most interested in the big energy users. For example, 70% of our coal is

currently used for electricity. Big users of energy include construction materials and refineries and petrochemical facilities. The big national SOEs are managed by SASAC [State-owned Assets Supervision and Administration Council] directly. Local government really just does agency management. We support inspections and checks. [XNDRC-CH]

The NDRC official's comments provide useful colour to the regulatory process. According to him, local authorities mostly act as the central government's eyes and ears on the ground.

a. Headquarters mediating solutions for enterprises

Another example of headquarters' ability to negotiate or dictate to local authorities was provided by a manager in a plant in eastern China in relation to a neighbouring plant, where headquarters had to intervene to make up for the non-compliance of one of its subsidiaries. In the example, the manager describes a sort of informal carbon-trading process that takes place with the authorities and is coordinated by the headquarters, with the 'gap' resolved by offsetting a surplus elsewhere in the SOE group.

Last year in Zhejiang there was a new plant (ethylene plant), that was to be built by the Zhenhai refinery. The entire province missed its target because the refinery left something out of their application. It was a huge gap and so if they missed it, they'd have to shut down three thousand (3,000) other enterprises to make up the difference.

In the end, Sinopec headquarters used a transaction to make up the gap by using two other plants' surplus. Sort of like carbon trading—but without a proper exchange. They balanced the overall use by trading off the surplus of two other plants who had over-achieved their energy quota which the refinery Zhenhai bought to make up the difference. [JSIN-JZ]

This example demonstrates the almost paternalistic nature of the relationship with headquarters and the strength of headquarters in mediating on behalf of their subsidiaries, even on massive failings in energy targets.

Other examples referred to restrictions from headquarters on how to engage in various energy management efforts, such as energy management contracting (EMC).

Headquarters only allows two companies to participate in EMC—they are both somehow owned or have equity participation by Sinopec Group. Thus, the benefit of tax savings accruing for these sorts of projects comes back into our pockets. These companies may actually subcontract out the work to a third party, but they will be the main contractor from a corporate perspective. [ZHSIN-CZ]

The common theme in the above passages is the dominant role played by headquarters in driving regulatory outcomes. The government often is seen by these participants from both industry and local regulators as setting the policy direction and giving macro targets; the corporation—or 'mother-ship'—is then responsible for translating them into plans and actions that they can keep ratcheting up over time. The conclusion from this section is that any effort at driving regulatory outcomes, particularly 'beyond compliance' outcomes, must engage the corporate headquarters and work constructively with them.

b. Headquarters dwarf other ancillary institutions in influence on enterprises

Another emerging phenomenon, which Chinese regulators are particularly well positioned to draw on, is the use of ancillary institutions and processes in the regulatory process. We know that surrogate regulation (Gunningham & Grabosky 1998) can take place through banks, design institutes, national standard-setting bodies, and universities, which in China are nearly all state-run. Purchasing power is also a powerful instrument for influencing behaviour (Vandenbergh 2006). Large state-owned enterprises, and government bodies, influence their supply chains. Understanding how these surrogates and processes are influenced and managed in China forms a part of understanding the factors that contribute to regulatory effectiveness. However, surrogates did not feature prominently in the findings of this study for several reasons peculiar to the industry: the SOEs have money, and therefore do not need banks; the design institutes are preoccupied with big new projects; and universities do not really have the industry and technical expertise. So while ancillary organs have roles to play, headquarters remains the primary lever for the purposes of energy efficiency in these big SOEs.

Given this nuanced understanding of the role of corporate headquarters in regulating, attention must turn to decision-makers at the plant level to understand who they are influenced by and to whom they are beholden. Thinking about who headquarters exercises influence through necessitates a discussion of matrix organisations.

c. Matrix organisations

It is typical for a mid-level (tier 2 or 3) manager to be beholden to three levels of regulatory pressure: local government, a functional leader in headquarters, and a general manager or line manager in the enterprise. A neat summary of this was provided by two mid-level managers in a small old plant in western China, when discussing their leader.

He pays my salary so he's the most influential, then headquarters, then the government. But we fear the government because if we miss their targets, they will carry out compatriot criticism (*tongbao piping*). That is unacceptable. It's too embarrassing. Inconceivable. And they embarrass the whole group not just our plant. [LSIN-CKZ ZKZ]

Although interviewees from NDRC indicated that they would be very cautious about shutting down or even embarrassing a central SOE, clearly from the above a plant employee still has the perception that he could be embarrassed in this way.

Another implication of matrix organisations is that often work is duplicated or triplicated in different ways to satisfy the requirements of each of these regulators. This creates additional work and some redundancy but, since each regulator is focused on different outcomes, the efforts are not identical. In terms of driving regulatory outcomes, the fact that this work is being done at all is a good start, but if all the actors were working from one set of numbers it would contribute to higher levels of transparency and close-knit collaboration. In other domains in China, such as tax regulation, evolution has already occurred from having

multiple sets of books to one common set of books.⁵³ The manager of a plant in western China was one of several leaders to comment on this problem.

Workers have to replicate their work several times to fill in reports for information to be more accessible. [XSIN-DKZ]

In addition to the inefficiencies of matrix organisations, some of the structural defects of the way decisions are organised can lead to uncoordinated decisions. In the passage below, the manager of operations at a major plant describes how he cannot get the equipment desired for efficient running because procurement is handled by a separate department with its own priority of saving cost, whereas he needs quality.

For us, investment is separated from revenue. We have an investment department. Their motto is to spend less money, not to look for good investments. We've done a project before for compressors. There was an imported one and a domestic one. The imported one was 50% more expensive but reliable quality. The domestic one had recurring problems so we didn't want that one. But for investment department, they don't care about this issue, they just want to make their investment budget look good.

So there are separations of authority that create problems like this; disconnects that make irrational decisions more possible and there is an absence of connectivity occurring even though they ultimately report to the same president. [JSIN-YZ]

For major initiatives and investments in energy efficiency, it is the headquarters and central government in Beijing that are the ultimate approvers. Local regulators do not have the necessary authority, as described by a manager in a large refinery in China's east.

The 2007 Energy Efficiency Law did make some improvements but not enough. Let's talk about fixed assets first. For example, when you want to make an investment you need an evaluation (*pinggu*) before and after the investment ... For example, any new project, as we are a state government company Sinopec, Shanghai government cannot manage us (*guanbudao women*). So we haven't seen these evaluation reports come out for any of our investment projects. Local government may usually do this but not for us, since we are a central SOE (*yangqi*). So, for us, major projects will be approved by national NDRC. [JSIN-ZZ]

Usually an application to Beijing will be coordinated through headquarters; thus, coordination is forced between the plant, headquarters, and central government through the NDRC.

Another interesting aspect of shadow regulation is that the structure of government departments will typically be mirrored in SOEs and in the plants. So, for each department or bureau that manages a regulated activity, there will usually be a corresponding internal department. This was described by an operations manager at a large plant in eastern China who did not have direct responsibility for energy efficiency.

Environmental protection, workplace safety, Bureau of Work Safety (*anjianju*) etc., they will each interact with corresponding groups within our plant. So if there are energy

⁵³ Some plants may still operate with multiple books but in large SOEs this would be less common now.

efficiency authorities, they will work with their counterparts in our energy efficiency department. [JSIN-YZ]

Given the significant role of headquarters of large central SOEs as proxy regulators, further study focusing on the designs and activities of headquarters is merited. Empirical study with key leaders in the headquarters of one or more of the SOEs studied here would help extend the data collected in this study from the enterprise level. Although six interviews were carried out with leaders at headquarters, they were not the focus of this study. Clearly, however, from the enterprise level headquarters is the primary forum wherein detailed and technically robust regulatory activity occurs. While government regulators are feared in extreme cases, energy efficiency—which is not yet an extreme issue—is mainly regulated through interactions with headquarters.

4.6. Social factors

Analysis of the social factors that play a role in shaping regulatory outcomes in this study draws on the concepts of social licence (Gunningham, Kagan & Thornton 2003) and peer esteem (Homans 1950, 1961, 1974). Social licence is conceived as executives or corporations feeling ‘that they are constrained to meet the expectations of society and to avoid activities that societies (or influential elements within them) deem unacceptable’ (Gunningham, Kagan & Thornton 2003 p. 2) In the Chinese setting, certain social and political institutions wield power in ways that are particularly influential and, thus, deserve to be considered apart.

Social factors, such as licence from peers, face, *danwei* culture, and licence from the public—discussed further below—operate in two social circles. The first, smaller circle is that of the industry and includes peers within the plant and the enterprise in general, including headquarters and local regulators.⁵⁴ The larger circle includes the public,⁵⁵ but this circle is ad hoc, arising when public attention converges on an issue that affects the plant. Social factors play into the desire of enterprises and their employees to be compliant with energy efficiency goals. While there are incentives (at individual and enterprise levels) for compliance with energy efficiency targets, actors by their own admission are prompted more by the optics of being seen as ‘failing’ to meet the plant’s targets. Failure means embarrassment for the plant, which creates pressure for the leader of the plant and, in turn, the SOE at the corporate level. This sort of pressure makes its way down the chain and resonates personally for the individual responsible. Not only does it affect the esteem in which they are held by peers, but it also has implications for the individual’s career development opportunities. This highly personal aspect of social licence, which is a form of peer esteem granted by an elite population in the web of actors affecting an enterprise or the individuals in it, finds expression through the phenomenon of ‘face’ and *danwei* culture, which are examined in detail in the corresponding sections below. Another form of social

⁵⁴ For a thorough treatment of theories on peer esteem or controls over social behaviour in firms, see Nee and Ingram (1998).

⁵⁵ This refers mainly to theories relating to social licence in regulatory literature (such as Gunningham and Grabosky (1998)), which has been reviewed in Chapter 2.

licence is that granted by the public, which can mobilise around an issue if it is harmful to its interests.

Social licence, as traditionally defined in Western regulatory literature, has limited traction—at least with respect to the approval of the public—in energy efficiency in refineries in China since this is not an issue the public sees or monitors. Public social licence is briefly addressed below. The social factors that serve to regulate energy efficiency behaviours identified through field research and explored here include the extension or withholding of social licence by peers, strengthened through the operation of cultural and historical forces such as face and the remnants of ‘*danwei* culture’.

4.6.1. Social licence—public

Organisations and the individuals that constitute them are motivated to comply with regulations because of social pressures of various kinds. These social pressures or factors can be thought of as falling into two broad categories: social licence from peers and social licence from the public. Each of these will be examined below.

The way in which an individual’s peers perceive his or her accomplishments—or failure to achieve targets—can have a powerful effect on the individual’s desire to comply with regulations. Similarly, public perception of an organisation or its managers can also spur compliance. The reason for the division of social pressures into these two categories has to do with informational discrepancies between organisations and each of these two groups. Peers within an enterprise have much greater access to information than does the public. Transparency and availability of information increase as headquarters strive to implement greater controls and standardisation throughout enterprises. Thus, peer-social licence has relatively strong influence on regulatory outcomes, and is on the rise due to initiatives to improve access to information. What can interfere with the effectiveness of peer-social licence is if there is a wholesale or collective ‘culture of dissent/group think’ whereby a sufficient mass of the peers do not view the regulatory goals as appropriate—thereby reducing the stigma or shaming element.

Public social licence becomes a significant regulatory factor only to the extent that information is accessible to the public and the issues under consideration are sensitive to public opinion and scrutiny. Thus, social licence from the public affects enterprises’ functioning to the extent that social groups or the wider public exert pressure on, or draw attention to, specific matters.

Public social licence arises as a significant factor affecting regulatory outcomes when two elements are present simultaneously: information about an issue that somehow becomes accessible to or reaches the public; and the issue being sensitive to public opinion and scrutiny. Examples of such sensitive issues include environmental damage, labour and employment issues, food safety, and corruption scandals. When these two elements combine, they become a powerful force that quickly drives regulatory outcomes and often prompts action to be taken at all levels to direct attention, energy, and resources towards resolving, or at least creating a public perception of the resolution of, the issue. Perhaps such pressure is

what Chinese policy-makers had in mind when drafting the Tenth Five-Year Plan, referring to ‘harnessing of grass roots social forces to conserve energy’ (Price et al. 2001).

The form that public social licence takes in China is different to the sort of public advocacy or NGO sector pressure often seen in Western democracies. It is less institutionalised and mostly the result of people getting ‘fed up’ and uniting around an issue. In the past, people used to resort to public displays or assemblies to protest—these have sometimes been met with significant repercussions and government force, the most iconic being the Tiananmen protests and government response. However, they are a way for the public to draw central government attention to issues. This method is still used, but it has become more common recently to use the internet or media to generate similar public outcry virtually. The term ‘netizens’ is used to refer to the people on the web who represent the body politic.

In recent years, social licence from the public is primarily exercised through the media and, especially, the internet. There are few institutional spaces that allow for public participation and under the Xi administration, even fewer. (Li et al. 2012; Wang et al. 2020)

There has been a movement from brute political power and command to economic and media power. In Chairman Mao’s time, it was brute power. But now the influence of media and the will of the people is one of the most significant factors because it can cause a government employee to be dismissed (*xia gang*). [JSIN-YZ]

While there is general evidence of pressure from the public affecting enterprise behaviour, there is little evidence of this being a strong factor in connection with energy efficiency. A government official from the NDRC commented on the difference in regulatory attention on energy efficiency as compared to environmental regulation in recent years.

The gap between respect for energy efficiency compared to environmental issues exists mainly because energy efficiency does not have as direct an impact on people and their lives. For example, structurally, within the administration in government, there is a whole bureau [*ju*] to do environmental work, but for those of us in energy efficiency, it is just a division [*ke*] ... Environment is a hard-core issue. Because it affects the people. It affects the lives of citizenry and they may react or it could generate unrest. But energy efficiency doesn’t have a large and direct or immediate impact. If you miss emission or environmental metrics, on the other hand, you really will be shut down. [LNDRC-WK]

Another interviewee from one of the major design institutes made a similar comment.

With environmental regulation—because it affects the people, the government is careful. Energy efficiency affects enterprises, so they are less anxious about it. [LPEC-JSW]

Given that energy efficiency is not as pressing or publicly supported a cause as environmental regulation, it is reasonable to ask why the issue of energy efficiency has managed to become a policy priority. One lawyer who specialises in energy efficiency law explained why energy efficiency now appears to be receiving more attention and traction in regulation.

It is because of law and policy but they’re pushing those because the economic environment can now tolerate attention to energy efficiency. And it’s not just that the economy can stand it but also that people are less likely to tolerate pollution and other environmental problems now. And so, energy efficiency is relevant to their [the government’s] survival. [DW-KM&RW]

There exists an interesting interplay between law, policy, and the expectations of—and licence afforded by—the public. Another interviewee with close ties to the municipal government in the central Chinese city in which one of the plants was located commented on the pressure to address environmental and energy issues rising with a growing middle class.

The pressure is coming from the people because they've reached a level of middle income where they want certain standards. [XCG-CL]

Thus, public social licence can have a significant impact on regulatory outcomes when public information and public concern are combined. However, the interviewees in this study indicated that, with regard to energy efficiency, public information is not readily available, nor is public concern strong. While the public seems to care deeply about issues of emissions and pollution, energy efficiency per se does not register as a high priority. To the extent that failures in efficiency are seen as directly tied to emissions or pollution, and as current public perception becomes more nuanced, this could occur over time. According to the interviewee above, and in accordance with a view that has become increasingly common in academic discourse about China (Zhang 2012), people are concerned with certain standards of life associated with a growing middle class. Those standards do not yet include views that are as strong about energy efficiency as they are about, say, pollution.

4.6.2. Social licence—peer esteem

Social licence as conceived here is a variation on social licence as defined above (Gunningham et al. 2002) that blends Gunningham et al.'s concept with ideas about social exchange theory, which posits that order emerges through ongoing human interactions and that individuals establish, monitor, and enforce norms upon each other (Homans 1950, 1961, 1974).

Peer-social licence finds its influence in China through shaming and such local cultural dynamics as 'face' and the residual effects of *danwei* culture. These two dynamics are also closely interrelated with other factors, such as careerism. But social licence from peers is distinct from careerism in that although peer perception affects one's career, it also has inherent value.

Many interviewees discussed their colleagues' perception of them as having inherent and significant value for them. New institutional theorists, conducting research on social factors, acknowledge that '[c]ognitive constraints make information imperfect and force decision makers to use heuristic devices. Moreover, cultural beliefs and cognitive processes embedded in institutions are key to understanding actors' perceptions of self-interest' (Nee & Ingram 1998, p. 30). Interviewees in this study referred frequently to heuristic devices and cultural beliefs.

In describing social exchange theory, Homans (1974) posits that more frequent interactions among individuals result in more effective monitoring as an informal method of social control. Hence, special attention is given in this chapter to references in interviews to the impact of work unit culture, which effectively binds the lives of most plant employees together, inside and outside their work. An individual's 'face' with peers and colleagues is

augmented by the residual work unit culture that continues to permeate many of the enterprises in this sector. After all, aside from being one's colleagues, often such individuals also make up the bulk of one's social network and neighbourhood.

4.6.3. Social licence from peers

Social licence refers to the extent to which an enterprise is constrained or affected to meet expectations and avoid activities that societies (or influential elements within them) deem unacceptable, whether or not those expectations are embodied in law (Gunningham, Kagan & Thornton 2004). In the context of this study, 'societies' takes on two dimensions. One is commonly seen and discussed in Western literature and refers to the public or parts of it generally. The other refers to smaller social elites in Chinese SOEs that are somehow related to the enterprise through peer-type relationships, often within the enterprise but sometimes slightly beyond. In China, the influence of peers has a greater impact on energy efficiency outcomes than that of public social licence because energy efficiency is not an issue that currently rates highly on the public agenda.

Interviews for this study revealed that the use of competitive spirit through activities like 'naming and shaming' to drive behaviours was a very common method of regulation for enterprises—this method being a familiar one to most of the population and fundamentally ingrained in the education system and cultural landscape. Several managers referred specifically to this method as a standard practice. It was also seen as highly effective.

One of the biggest motivators is competition between various refineries. [ZHSIN-CZ]

At the plant level, 'naming and shaming' is carried out through publicly displayed lists and town hall-type meetings.

We are very proactive about how to reduce our inefficiencies and costs. Even if the state didn't impose restrictions, we would look for ways. The most direct influence is targets, as in Sun Zong's [a colleague from the same plant who is responsible for efficiency targets] arena. And every month they list who is first, last and in the middle. [ZHSIN-CZ]

At group level or between enterprises, progress is publicised periodically in conferences, but is now also becoming instantly available through advances in technology as management systems modernise.

From time to time, they will call together all the plants in the region and ask us why we are not meeting our figures—publicly. Local government does this activity around December each year. We also report to them through the internet, through the Bureau of Statistics. Everyone [within the system—this is not referring to the public] can access these figures all the way up to state level. [XSIN-WC]

If peers are defined as including peers throughout the SOE group as well as nearby regulators, then this pressure takes on quite a serious dimension. Indeed, many of the managers in the plants do see their counterparts in government as peers. But although they are seen as peers, they are not seen as equals. Enterprise managers clearly exhibit a sense of caution and deference to government officials. Their disapproval is to be avoided. Mere disapproval is as

a penalty unto itself. Embarrassment in front of the government cadres who have social access to other important players in one's social network is to be avoided.

[O]ther penalties, they will publicly broadcast you as missing your figures. There is an example in 2005 of a plant that missed its figures. The local government reported them. That's definitely bad. There will definitely be repercussions. There were three Sinopec companies who missed their numbers. They were in a lot of trouble and received a lot of negative attention. It was reported all the way to the national level. This is not acceptable. You have to do what the government says. [XSIN-WC]

At the enterprise level, social licence from peers accumulates over time and leads to a certain perception or reputation. A negative reputation can lead to direct regulatory action, as well as having career and economic consequences.

Those who don't meet firm targets—new projects, for which they seek approval will not be approved. Further development will be stalled for the plant and the individual. This is a big disincentive. [XNDRC-CH]

At the individual level, failure to meet energy efficiency targets results in failure of the group to meet its collective goals. This results in embarrassment and pressure for the leader of the plant and direct penalties or reduction of bonuses for the individuals as well.

The biggest penalty is that if you miss your energy efficiency targets, you have a failure recorded or a black mark against your energy efficiency goals in your overall personal evaluation. This looks bad for the boss and your bonus is impacted. In many cases, your peers will also suffer as a result of this failure. [JSIN-ZZ]

a. Face

The impact of face (Hwang 1987, 1998; Hu 1944; Ho 1976) is complex and usually understated. It exists in many, if not all, cultures to varying degrees and it would be naïve to claim exceptionalism for its application to Chinese cultures. Much has been written about it and this is not intended to be a detailed examination of the phenomenon. But face was directly referenced numerous times by various interviewees, from enterprise, government, and in advisory roles.

One interviewee described how sometimes face can get in the way of an otherwise rational decision being made. The interviewee, an Australian lawyer who was acting as interlocutor for a foreign corporation seeking certain energy-related regulatory approvals, recounted a story about how a preoccupation with face interfered with what could have otherwise been a straightforward meeting. Instead, a 'social theatre' had to play out.

Certainly nothing in my Western legal training and the understanding of the rule of law in a common law system helped me understand what was going on ... We had a meeting. There was very little of substance discussed. When the government official started to speak, what was going on was this social theatre. Establishing the hierarchy, that's the first consideration. She was making it clear that the relationship was not close and to indicate that she had a job to do and part of her job was to find fault with what we've prepared and submitted. So, she was objecting to something silly. She was objecting to the definition of PRC in the deal documents. She objected that the definition didn't include Taiwan and HK. That's how PRC is always defined in deal documents. Her point

was that she could hold things up and she wanted us to know that. Where multiple stakeholders are involved then it becomes a game of *mianzi* [Mandarin for ‘face’] and hierarchy. [DW-KM&RW]

Interestingly, however, the process of drawing the meeting out had some additional value. By drawing the process out and sparring with the applicant, it allowed more information to be elicited and gave the regulator a chance to feel out the applicant. As the same interviewee explained:

Thus, a process of frustration and pushing back is important to airing out details and showing that there is push back. [DW-KM&RW]

This phenomenon of face was described by the same interviewee as being integral to the way that the entire country is governed.

The country is huge and the way that it’s governed by units. So, you allow local ruling. One of the reasons that China has been able to prosper is that it has been run by a bunch of families. Look at Xi Jinping’s career and Wen Jiabao. They were princelings. They’ve been in very local communities, very grassroots. So everyone has wanted to protect their *mianzi*. Look at Deng Xiaoping. He emerged after the disasters of ‘66. There was him and a few hundred families that had respect within the Party. Those are the guys who have taken economic reform to create economic and political power. [DW-KM&RW]

Although the above statement sounds somewhat sweeping, the theme of face as influential was echoed by several enterprise managers. Below is an example that combines the issue of face with loss of social licence from the public. This blend of factors creates a powerful force that drives almost immediate compliance in seemingly every arena of regulated activity. An engineering manager in a plant in the east of China described the influence of face and embarrassment as being of paramount influence.

Influences [include, for example,] face. This refers to the leader’s face and the company’s face. In China, face is a big deal. Take, for example, Guangshihua [plant]. A few years ago, they had a problem with their water treatment and pollution of dirty water. One of the top leaders from the SOE headquarters had to appear on television and apologise publicly. No leader wants to be embarrassed like that. They were always pumping dirty water for a long time and the provincial Bureau of Work Safety (*anjianju*) had inspected them many times and issued remediation orders but they ignored the authorities. In the end, the media reported their pollution nationally, word got to the central authorities and the plant immediately complied ... It will be similar with energy efficiency. Although energy efficiency is currently important, but it is more an issue of efficiency and hence an economic question. It doesn’t result in the kinds of pressure like environmental issues. Priorities are first, safety, second, stability and third, efficiency and operations. So, things that have to do with efficiency take a back seat to stability or safety which are most visible. [JSIN-YZ]

Although the example relates to plant emissions, it is telling about the factors that drive regulatory outcomes. The takeaway from this comment by a manager at the plant level who is responsible for efficiency and operations is important because it contextualises the influence of face on the issue of energy efficiency. It is less likely that one is going to be embarrassed or lose face severely over an issue of energy efficiency because it is an ‘upside

issue' more than a 'downside' issue like pollution or safety. Nonetheless, through instruments such as competition and ranking, the dynamics of face can be used to drive certain behaviours.

Another instrument employed by regulators is reports and criticism, which can sometimes be coupled with penalties. But embarrassment or loss of face was described as quite a penalty in itself.

The biggest sticks are compatriot criticism (*tongbao piping*). There is huge pressure from headquarters. Chinese are most afraid of losing face and if we were to miss our targets, we would have to explain before everyone why we missed them. They would also dock our salary. Even if they dock us by one percent, think about it—what that means. If they penalise you one thousand RMB—that's a big impact on our lives ... If we are unsuccessful in our targets then we will be told to reflect and plan carefully for our next year. This basically means we failed and is embarrassing. [LSIN-CKZ ZKZ]

Yet another space where face comes into play is in conferences attended by industry peers. (These conferences are discussed in Chapter 5 for their effect on norms and culture.) The public nature of these large meetings also provides a forum for naming and shaming, which draws on the individual attachment to face and similar social factors to drive norms and culture around energy efficiency.

About once or twice a year there will be meetings about energy efficiency for exchange and learning. They bring out the high performers and low performers and everyone sees. [XCQPTRCH-SUO]

Thus, the effectiveness of social licence from peers is augmented where there is a strong sensitivity to 'face' or where 'face' is highly valued, either inherently or as a form of social capital (Bourdieu 1986). As for media affecting face and social licence more broadly, it was effective in the Guangshihua example above because water pollution is a 'downside issue'; as noted earlier, the same dynamics do not (yet) apply to energy efficiency.

One observable pattern from the fieldwork was that older cadres and managers indicated greater concern over the issue of face and how they and their plant are perceived by others. This may be because they are more rooted in a post-reform (post-Cultural Revolution) era culture, which still values face. If so, then one of the important factors for driving compliance will be watered down as that culture continues to fade. It may also be because they see themselves as having few career options outside the SOE, meaning how they are viewed by others is important for survival. In this case as well, with current government pressures for SOEs to reform and modernise and as labour mobility increases, these factors may weaken. Other factors will need to be strengthened in their place. The impact of this traditional culture is explored further in the brief section on *danwei* culture or work unit culture below.

b. Danwei culture

Most refineries, given their state-owned histories, still have a great deal of *danwei* cultural heritage. Often from the general manager down (though general managers are sometimes sent in from other places, especially where reform is needed), but almost invariably from tier two and below, the employees are 'lifers' who have grown up together, living in

neighbouring compounds and apartments. Thus, the organisational culture is characterised by a high level of integration and connectedness. In most cases, there is also a sense of organisational pride and loyalty, which is stronger among the older generation who have been with the SOE since before, or during, the early days of reform and opening. This sense of loyalty often extends to the region, the regional government, and its priorities, sometimes giving local or regional interests precedence over national ones, reaffirming the saying that ‘Heaven is high and the emperor is far’.⁵⁶ One interviewee discusses how a work unit handles its cadres and leaders.

If you’re just an ordinary Joe Blogs, then the real control or potential oppression is from the people directly above you in your work unit—*danwei*, not from the central government, ‘heaven is high and the emperor is far’. The people above you in your *danwei* control basically everything in your life—kid’s schooling, medical, housing etc. To some extent this is breaking down because of freedoms of employment and stuff. But twenty years ago, you were completely stuck. [DW-KM&RW]

This connectedness among SOE employees facilitates flow of information, learning, collaboration, and a reciprocity that is distinctive among corporate ecosystems.⁵⁷ However, as elaborated further in the section on careerism, the dynamic that exists in some of these large Chinese SOEs goes deeper due to historical factors, which have endured over the past few decades despite reform.

A fieldwork anecdote illustrating this interconnectedness occurred when I was chatting informally with an interviewee, Mr Lin. He asked me who else I had been speaking with and I mentioned another interviewee who had agreed to talk with me (Mr Wang). My companion said, ‘Oh, Old Wang (*lao wang*), let’s call him and say hi. At this hour, he should be going for his evening walk. We live nearby and have known each other our whole lives.’ Mr Lin went on to describe how most of the management and engineers live in housing provided by the enterprise, send their children to the neighbourhood school, and are closely intertwined and involved in each other’s lives.

As other scholars (Jenner 1992) have documented, the interconnectedness Mr Lin describes was an order of magnitude greater than the sort of corporate cliques that exist and have been studied in some banks or in other Asian countries where a group of managers attended the same school or hail from the same region (Burns 2004; Guthrie 1998; Guo 2001 Horowitz & Marsh 2002; Hsu 2005; Krug & Hendrichke 2008; McNally 2008; Yang 2002; Pye 1992, p. 21; Sapio 2009). China’s *danwei* reality certainly encompasses elements found in parallel phenomena in other national contexts, but also includes features unique to the post-Cultural Revolution restructuring of society and communist social order and reform lobby over the past twenty or thirty years.

⁵⁶ An old Chinese saying with uncertain origins.

⁵⁷ There are some similarities with other Asian phenomena, such as those found in Japanese industrial histories—Toyota, for example, which began as a Nagoya-focused enterprise—and even studies of elite networks within Asian and Anglo-European enterprises—banks where senior management all went to school together

4.7. Conclusion

Asymmetries in information, resources, and power make the role of corporate headquarters very significant, acting as proxy regulators for central government in rolling out energy efficiency policies in SOEs. Within the network of political elites in the SOE and government regulators, relationships and reputation matter; as a form of currency and for deeper personal reasons, and even inherently as a cultural value. Factors that affect how an individual or enterprise is viewed by peers or by the public can exert great influence.

However, in energy efficiency, public social licence has less traction and it is social licence from peers and from a web of other elites that is brought to bear. Still, these factors, even in combination, drive only a general willingness to comply. Absent other pressures, these factors have two failings. The first is that social licence, within the SOE and within elite circles, is still prone to gaming and risk-based calculations. If an actor believes the risk of exposure is manageable, they may not comply. Second, the capacity to comply is not at all addressed by these regulatory strategies. These issues are discussed further in the following chapters, particularly Chapters 5 to 7.

Chapter 5. Political dynamics

When someone gets sent from Beijing they are here supposedly to help with enforcement and transparency. But they are human. It's not that we corrupt them. They need to get along with the locals. What happens to your career if you offend all the local cadres? How will you implement your work in terms of working with your underlings?

– Interviewee from mayor's office

In some places, whereas previously we needed ten people, now with digital control systems, we only need two. But the leaders can't get their heads around it and more importantly, they can't make big reforms that put a lot of people out of work. Our order of priorities is: stability, safety, and then efficiency. Remember that.

– Interviewee from local plant

5.1. Overview

The previous chapter discussed social factors that impact on regulation of energy efficiency and which can be harnessed by different stakeholders as regulatory tools. These are closely related to political factors impacting regulatory options, discussed in this chapter. As we noted in Chapters 1 and 2, China is a party-state. It is ultimately ruled by the Chinese Communist Party and the presence of party influence and other forms of political influence throughout the core apparatus of governance and regulation cannot be ignored.

Regulatory factors operate at the level of the individual as well as the organisational level within a political context. In other words, these regulatory tools can drive individual behaviour as well as motivate organisations as collective wholes.

Gunningham and Kagan's work on industry behaviour (2003, 2004, 2009) identifies three forms of licence—economic, social, and regulatory—that affect firm behaviour. We looked at the forms that social licence may take in Chapter 4. These three forms of licence provide an excellent framework for conceptualising influence and decision-making for firms. They also allude to a typology of regulatory factors that include both *formal* and *non-formal* influences. However, there is less focus on the effect of a 'political licence', a construct that may have great significance, particularly in settings where there is strong state, such as China, and where SOEs have distinctive political and economic status.

At the firm level in China, enterprises strive for political licence from higher-ups in ways that shape regulatory behaviour in energy efficiency. Plants and their managers are motivated to meet the expectations of managers in headquarters and authorities in government to maintain and extend their political licence, locally, regionally, and, in some cases, also with the central government. Individuals, as well as firms, respond to other political factors such as political mandates that seek to exact behaviour, central–local tensions that play out in realising or resisting such mandates, organisational politics shaped by relationships with higher-ups, and macro-political factors such as energy security and political clout and resources. Individual

behaviour to advance or hinder regulatory goals is shaped by the motivation of individuals within an organisation to act in ways that maximise their career interests by pursuing career survival, career advancement ambitions, and reward and recognition. These factors are discussed in the next chapter.

Political factors can be loosely defined as factors intentionally driven by a political elite towards policy aims. They include political licence, political mandates, central–local tensions, and other factors. Political factors operate at many levels and are difficult to track. There are political factors that directly act on the individual by, for example, having the potential to affect one’s career (Chapter 6 discusses and analyses this issue). There are also political factors that influence the political licence of the plant and of the entire SOE group as a corporation. If a plant is seen by regulators or headquarters as underperforming in energy efficiency goals, it will suffer limitations in its ability to seek funding and start new projects and may lose out on other favourable treatment from those in authority. If the magnitude of the failure is great enough, it can affect the overall energy efficiency performance of a city, prompting even broader political attention and consequences. Overall, political factors weigh heavily in the attention and resources given to energy efficiency work. This is not surprising given that the enterprises in question are state-owned and operate in a highly politically complex environment.

Several other political factors emerged repeatedly in the interviews. For this study, these were: the influence of political mandates often communicated through official documents; the extent of harmony or struggle between local and central actors; agency exercised by leaders; the paradoxically helpful and disruptive effects of national priorities; and the significance of political clout on how well regulatory priorities are taken up.

Among the political regulatory factors explored in this study, the influence of leadership is of special significance. One of the most commonly cited recurring themes in interviews was the influence of leaders. The notion of ‘leader’ discussed by interviewees in this context is a somewhat broad one. It includes one’s immediate manager or supervisor, the leader of a group or department, and the plant leader. More broadly, it can also include the attention of municipal, party or central government leaders, depending on the context in which it is used. For example, a low-level manager may refer to the State Premier as, ‘our leader’ or ‘big leader’. He may also refer to his line manager in the same way.

First, let us define and explore political licence, and then look at other political factors such as mandates and management influences.

5.2. Political licence

5.2.1. Political licence defined

The concept of social licence discussed in Chapter 4 can be borrowed and reconceived to create the notion of political licence. In this conception, as it appears in China, quite simply, actors (individuals and organizations) are constrained to meet the expectations of the political machinery and leaders within it and to avoid action that would cause their displeasure.

The significance of political licence in the Chinese setting can be better understood in light of the *nomenklatura* system that is a legacy of Soviet influence in the communist ruling elite. Voslensky (1984) describes how an elite group of functionaries exist, interact, and gain and maintain power. Volensky is refining the arguments of Đjilas (1966), who called out the ruling class in the Soviet communist system in 1966. Volensky's account of the *nomenklatura* system is seen as a critical part of the story of the downfall of the Soviet system. This study finds that the Chinese version of this system has adapted in ways that increase rather than decrease its governance capability.

This study posits that political licence in the form of increased trust (Braithwaite 1998; Braithwaite & Makkai 1994; Murphy 2004) and esteem or pride (Ahmed & Braithwaite 2011) among a political elite within one's web of influence is an effective and influential factor in driving regulatory outcomes and exacting certain kinds of behaviour. I explore this in the Chinese context. However, there is a dark side to political licence; it can take the form of clientelism, favouritism, or manipulation and deceit in the trading of political capital, and this study illustrates how this happens in China.

In the regulation of energy efficiency, political licence plays an important and distinct role because societal actors lack access to information about and cognisance of the impact of the issue on their lives, as described in previous chapters. Thus, traditional social licence is unable to operate in the way it generally does for other issues or in other political contexts. Instead, the concept of political licence, as used here, allows for observation of how a subset of society, or an elite population of party cadres, SOE leaders and regulators focused on energy efficiency, exert influence over the lives of the plants and individuals. Findings in this regard are set out in the next chapter.

Interviews in this study revealed several manifestations of political licence, at both the organisational and individual levels. The granting or withdrawal of political licence seems to occur in three main spaces—through encouraging competition, favourable exercise of bureaucratic discretion, and increased allowance of self-regulation.

Political licence could be seen affecting regulatory effectiveness at the plant level through the attention and focus given by managers at all levels to achieving status for themselves as individuals as measured against their peers; in achieving status for their plant as measured against peer/sister sites; and in the pursuit of credibility and autonomy vis-à-vis relationships with regulators and government authorities of all kinds who exercise influence of some sort over the the plant. Such status or political licence allows, or is believed in the plant to allow, favourable treatment from headquarters in allocation of funding and approvals. Similarly, political licence from regulators casts a favourable hue on any issues where discretion is to be applied by them in interpreting the performance of the plant. Also, strong political licence is likely to mean less involvement or attention from senior officials on negative matters—thus maintaining credibility for the plant and its leadership.

At the firm level, organisations also respond to the provision or withdrawal of political licence as they operate in a publicly competitive environment, benefit from bureaucratic discretion, and are motivated to strengthen self-regulation. Political factors exist and shape

regulatory outcomes at the level of individual employees as they pursue careerism by responding to political signals, striving to survive and advance their career ambitions.

The motivation of an individual plant or enterprise to achieve political licence is a regulatory force that finds expression in several ways. These enhance an environment of competition among firms and the publicising of competitive outcomes, a significant scope for bureaucratic discretion, and the resultant flourishing of self-regulation. How these three dimensions of political licence drive individuals to avoid activities which their peers, superiors, or others in their web may deem unacceptable is explored below.

5.2.2. Elements of political licence

a. Competition

The pursuit of political licence is given impetus by a framework in which firms within the larger corporate group of the SOE compete. We noted the use of competition in Chapter 3 in the form of public announcements of results against targets. In its simplest form this phenomenon may be viewed as benchmarking or as exchanging achievements and experience among sister firms. But there is an additional subtle yet powerful dynamic within this framework of competition. The competition for political licence is honed and amplified when the results of each plant are ranked in a transparent and objective manner in terms of their performance along various metrics, and then published. The awareness created by these rankings is further increased by regular conferences and seminars in which the lists are displayed and awards granted to those who have performed well. In granting awards, specific individuals are also recognised for championing certain successes. Achieving becomes a matter of pride and reputation for the plant and the individuals involved. Beyond pride and prestige, there are practical benefits to having a good reputation, as elaborated below.

In the petrochemical industry, fostering well-publicised competition among plants creates the opportunity for individuals responsible for regulatory decisions within these plants to accrue political licence for themselves and their organisations. The competition extends beyond the corporate group of the SOE. The manager of a small and old facility that had a very strong and well-reputed energy efficiency department described one of the approaches that has been adopted, called the ‘Three Comparisons’. In this approach, each plant compares itself with other Sinopec plants, with other plants in China, and with other plants internationally. This method of benchmarking provides a richer and somewhat more forgiving dataset. If Chinese plants compare their energy efficiency only with international players, the results would be discouraging and they could be accused of disregarding local nuances. If plants were to compare themselves only with other local plants, then there would be little incentive to raise the bar. By including a more diverse set of firms in a competitive group, evaluation can be contextually rich, allowing for evaluation against several standards, each of which is relevant in different ways and all of which motivate better performance.

A senior leader of a plant in Eastern China saw competition and political licence this way.

There is also competition with PetroChina. Earlier this year we invested 100 million RMB in energy efficiency. Of course, the improvements didn’t just affect energy efficiency,

they also improved safety and emissions. The biggest motivation for energy efficiency is that it improves efficiency and reduces cost. This is the biggest motivator. Then we also have operational metrics that we compare with others; including with international refineries. Headquarters circulates information comparing various Sinopec plants monthly; competition is fierce and we all want to be recognised as being successful and efficient. This has been happening for about four–five years ... They used to hire an external group to do the benchmarking. Now it's internal. [JSIN-JZ]

The leader describes how benchmarking and the management of competition have become indigenous capabilities that can be managed by the corporate group. Competition among plants belonging to the same group also helps to stimulate innovation and activity. Thus, the rewards for performing well in these competitions are multifaceted. There are immediate and explicit rewards for the individual, the enterprise, and the managers. But for most managers, it was the political licence gained from these successes as well as a sense of personal pride that seemed to matter most. The licence thus earned translates into benefit for the plants through increase in credibility, attention, and trust from headquarters. The *actual* rewards did not seem to be the focus of discussions with interviewees about competition and rewards. Although the financial rewards were acknowledged and seemed important to very low-level employees who had low incomes, more emphasis was placed on a sense of personal pride and satisfaction, or recognition from peers and leaders, without a direct link to instrumental gain. Some referred to a sort of social capital earned through being perceived as a worthy member of the unit, or career benefits of having such rewards listed in one's professional dossier.

b. Bureaucratic discretion

A second contextual feature that encourages the pursuit of political licence is an environment characterised by the positive exercise of bureaucratic discretion. This feature is closely related to the publicised competitive environment among firms described above. When an enterprise is seen in a positive light or enjoys a good reputation in the context of this competitive environment, it is more likely that it will receive positive treatment under from the considerable discretionary power wielded by local officials.

Regarding targets, as discussed in Chapter 3, one official from the NDRC described how points are allocated for energy efficiency; although 40 or so points out of 100 are allocated to hard targets, the remaining points relate to other, softer factors and are allocated in ways that are subject to discretionary application. Thus, a regulator who wishes to give a plant a pass on their targets can find ways to do so. One mid-level manager at a plant describes this discretionary interpretation of targets:

So they have hard targets and soft targets and if they see you are doing well then they will help you pass. [XSIN-WC]

One immediate reaction would be to see this sort of bureaucratic flexibility as weakened regulatory effectiveness due to its vulnerability to abuse and corruption. Such a risk indeed exists and is, at times, exploited through bribery and corruption, a fact acknowledged by several interviewees although not explicitly by anyone from within the enterprises. At the same time, because regulators have such authority, enterprises invest in maintaining a

positive relationship and good reputation for being compliant and proactive, especially as it is becoming increasingly risky to bribe officials.

The key issue in the implementation of the policies is the issue of discretion. It's not rule of law or rule by law. Law is there but it's kind of a framework for the application of discretion. So the discretion of the local officials at the local energy management centre tells you if you can. [DW-KM&RW]

Referring to the example of a situation in which they were seeking approval from an energy regulator on an acquisition in a province, the interviewee went on to give some details about an experience where discretion was applied in a way that delayed approval.

She objected to the definition of PRC in the deal documents. She objected that the definition didn't include Taiwan and HK ... Then my colleague stepped in and provided a viable reason—that they have different legal systems and this is a common definition in legal documents, but she rejected it. She was exercising her discretion. [DW-KM&RW]

His conjecture, though only partly credible given that he had an agenda at the time and was somewhat frustrated by delays, was that much of the discretion was being exercised against them because of face and 'politics'. The interviewee went on to describe how the government official withheld the exercise of favourable regulatory discretion not only to show her authority, but also because the enterprise she was dealing with had not earned political licence with her.

Another interviewee described how human factors such as discretion are inextricably linked with laws.

It is impossible to separate policy and law, hard and soft or legal and non-legal factors. They are all interconnected. All the so called soft factors find their base in firm legal or policy principles. Otherwise where do they get their impetus from? It's a question of how you enforce the law. For example, if you steal you will be subjected to charges of theft. But how many years, what punishment, is all up to individuals. This is the soft part. [XCG-CL]

Thus, while the mere existence of laws cannot be effective in guaranteeing regulatory outcomes in energy efficiency, their existence provides a base or impetus for exercise of discretion. The exercise of discretion can, in turn, be used as an intangible incentive for the regulatee to be compliant and foster strong relationships based on collaboration with regulators, or, if abused, can result in gaming of the system and inaccurate representations of status locally in the enterprises. This highlights the importance of efforts flowing down from the central government through various agencies aimed at building capacity and developing norms and culture consistent with optimal regulatory outcomes, discussed further in the discussion of capacity-building (Chapter 8).

The interviews with plant-level managers and local regulators certainly indicated strongly that this sort of political licence or political capital is an important currency and a significant factor in achieving regulatory outcomes. If penalties are the low-water mark for inducing behaviour, then political licence is the high-water mark. It is the 'polite' factor that can be used to prompt behaviour. Actors want to earn and store 'credit' for when they need it. For

obvious reasons, this factor works less effectively with plants that are performing so poorly that they are deep in political ‘debt’ or know that they are in line to be shut down and, hence, cannot really see a way towards regaining ‘credit’.

c. Strengthening self-regulation

One implication of the well-publicised competitive environment among plants, coupled with the significant political discretion wielded by authorities and extended to firms, is that most plants are expected to maintain a high level of political licence and thus are expected to regulate themselves. As much of the data has indicated, government regulators have little ability to manage the issue of energy efficiency for the plants. Thus, plants need to develop the motivation and ability to regulate themselves.

Within this environment, the enterprise experiences competitive pressure from other brother and sister plants and scrutiny from headquarters. The ideal is that stimulation is created for employees to be self-driven.

Do some employees come up with creative solutions? Yes. We reward them. There are various awards etc. There’s no handbook because things change too fast. There are energy efficiency requirements in the employee handbook but they are generic. Sinopec employees are generally quite mature when viewed against the general quality of workforce in China. So they don’t need to be micromanaged. Targets are not set at high levels of specificity. Rather the equipment management department will give general targets to each division (refining, petrochemical etc.). They are given general targets and left to compete and compare within their own web (*wangzhuang de fangshi*) within the industry; they do this proactively. [JSIN-JZ]

Thus, competition and public benchmarking, and the accrual of political credit drawing on government discretion, are combined to create a powerful regulatory factor that drives self-regulation, an elusive and desirable regulatory outcome.

5.3. Political mandates

5.3.1. Regulating in an authoritarian landscape—cautious use of command and control

In China, as we saw in Chapter 2, energy efficiency issues are not the subject of much legal enforcement by any parties—public, private, or administrative. How, then, do laws flow down to enterprises, and are they effective forums for regulation? In some settings, public attention or NGO action might fill this gap. But in China, energy efficiency is not receiving public attention the way pollution is. This is probably because inefficient use of energy is not as offensive to Joe Citizen (or Zhou Citizen) the way that a river of toxic sewage running through his village is. There is well-grounded empirical work on the story of people vs pollution in China (Van Rooij 2010).

In the absence of enforcement of energy efficiency through public (meaning communities or civil groups, who are often key actors in bringing suits in environmental cases in other countries) or private action, enterprises are unlikely to take serious remedial action. Regulatory scholars acknowledge the importance of enforcement. What, then, to do where such enforcement is limited?

Although actions from *community* and *private* groups do not really occur around energy efficiency, a series of *government* enforcement measures involving audits and approval requirements for new projects pepper the regulatory landscape. However, much of the policy and legal engagement really occurs through political mandates from local government offices or from headquarters acting as proxy regulators. Through such mandates, targets are set and policy objectives are broken into measurable and digestible chunks. While central SOEs function with considerable autonomy, they are not immune to the influence of these mandates and their influence. How, then, do these mandates work for these powerful SOEs?

A common perception is that, because of China's authoritarian structures and central planning, political mandates carry definitive executive authority. The government owns the state-owned enterprises; surely, then, they do the government's bidding. But as experience and extensive studies have shown, SOEs are difficult to control, especially in the energy sector (Lieberthal 1995; Shirk 1993, pp. 107–115; Andrews-Speed 2004; Kong 2009). This is because they are critical industries that are technically complex and cannot simply be commanded or controlled by government bureaucrats. Hence, a tension exists. On the one hand, central state-owned refineries are under the jurisdiction of local authorities who have the power to inspect them, fine them, and shut them down—although they are reluctant to exercise such authority, especially in matters of energy efficiency. On the other hand, these refineries are effectively governed by their headquarters, far away in Beijing.

One veteran lawyer, working now in private equity in China, told a story about a standoff between Sinopec and the central government in the 1990s. The government launched measures to cap fuel prices, much to the chagrin of Sinopec executives, and Sinopec retaliated with passive-aggression; plants began shutting down for 'maintenance and safety'. The central authorities felt the fall in fuel supply and pressed Sinopec to increase output, but could not risk a safety issue given the threat of a refinery exploding. Hence the central government was in an awkward position. They could not demand output while ignoring safety. The issue of price capping had to be negotiated and resolved between two centres of power in the government [PN-ARES]. This story also reiterates the dynamic of multi-nodal governance and the existence of multiple poles of power, discussed further in the sections on Central-Local Tensions (5.4) and Political Clout and Resources (5.7) below.

In influencing SOEs through political mandates, the central government has a waterfall of instruments that flow down from higher to lower administrative levels and from broad to ever-more specific directives. The waterfall starts with policies, which flow down into laws. Laws in turn are translated into implementation measures and regulations. These are all still quite generic and apply often nation-wide or industry-wide. Eventually, each SOE group takes these regulations and measures with reference to the laws and policies and translates them into specific directives contained in red-headed documents.

For example, the manager for the energy efficiency department of a small refinery and petrochemical plant in central China exhibited a stack of documents that provided mandates. He referred to them as being what sets his agenda. He then described how, upon receiving these mandates, he begins from there and plans, discusses, negotiates internally and then with

government regulators, to translate them into more specific directives and working-level documents and operating procedures [XSIN-WC].

While it might be assumed, then, that regulation occurs primarily through laws and regulations, as they carry executive authority, direct regulatory mandating actually occurs primarily through such red-headed documents.

5.3.2. *Red-headed documents*

Red-headed documents are official authoritative government communiques that bear the title of the bureau in red ink at the top of the document. They are used by nearly all agencies of government at all levels. But red-headed documents themselves are not effective as regulatory instruments; they need to be combined with other elements—incentives, audits, and leadership attention—to change behaviour.

For energy efficiency regulation in China, laws and rules act as a broad framework or provide a general indication for local regulatory activity. Laws are seldom, if ever, encountered as venues of compliance. However, they are critical to providing a basis for any action.⁵⁸ Laws can serve as a source of moral authority, but laws and regulations in themselves are rarely detailed enough, or are too difficult to properly enforce, to effectively regulate. This is particularly true with powerful SOEs, who are unlikely to be punished by local governments for energy efficiency failures.

Detailed regulation by political mandate happens instead through ‘documents’ that are sent down from headquarters or from one’s immediate manager detailing how to achieve goals that have been set through a combination of government targets and enterprise goals.

Interviews with industry and government insiders were replete with references to documents or red-headed documents. An official from the NDRC charged with supervising local refineries and guiding them in energy efficiency stated very simply that documents are the tool for managing the enterprises. However, he also highlighted that real influence occurs through ‘partnership’. This theme—of partnership, who defines ‘partnership’, and how it work—is explored in the chapters on deliberation and capacity-building.

We give them red-headed (*hongtou*) documents to manage them, but our relationship is one of partnership. [LNDRC-WKZ]

A senior leader of a leading design institute in this field also described red-headed documents not solely in terms of their value in transmitting political mandates, but also as an instrument for discursive and normative signalling to management or for agenda-setting.

It is easy to set up a team and tell them they are responsible for energy efficiency but it’s a challenge to get everyone to make it a priority and have energy efficiency permeate their design and thinking around equipment and technology selection.

⁵⁸ A list of some of the current laws and regulations relating to energy efficiency is provided in Appendix 3.

So, energy efficiency is about reorienting thinking and attention. How do we reorient thinking? At the management level our thinking is oriented and we are made aware because of policies and documents from headquarters. [LPEC-SJW]

The above comment highlights that as the central government or headquarters regulates plants, priorities and terms of reference are being constantly defined and updated through documents that communicate the thinking throughout the industrio-political organisation. Another manager referred to the abundance of documents to define energy efficiency work: ‘The Energy Efficiency Division (*jienerg ban*) have a lot of processes. They have handbooks and documents’ [JSIN-YZ].

While red-headed documents play an important role in transmitting orders and expectations, these documents alone seem to lack regulatory effectiveness. Thus, they are invariably coupled with additional elements to increase impact and drive behavioural change. The result is a sort of regulatory cocktail that combines political mandates with incentivising and monitoring instruments.

5.3.3. Incentives to exact behaviour

Political mandates such as red-headed documents are enhanced with incentives to motivate employees to exhibit desired behaviour.

Promotion of ideas or projects from headquarters—this is done through documents; it is usually obligatory but they try to make it palatable. They promote technology with investment. If you use it, they will give us funds. This way, the site will choose to do it because there is no cost and it cements better relations with headquarters. [XSIN-DKZ]

Thus, the effectiveness of a red-headed document can be enhanced by not only communicating the mandate but also tying compliance to incentives.

5.3.4. Audits to exact behaviour

Another tool by which the efficacy of political mandates such as red-headed documents is increased is the use of audits. Audits take place when a team from headquarters, or from the government regulator, visits the plant to inspect performance. A manager, responsible for technology and equipment, at one of the well-established petrochemical plants in Xian emphasised the significance of the combination.

The biggest influence comes from the documents they send us—*wenjian*. For example—Shanxi province during 12/5, sent us an energy efficiency scheme document. Recently they also sent another document. Within the documents, their requests are laid out clearly. Around March, they come to us to inspect. And at that time, they are seeing if we have done what is requested in the documents. [XPETCQ-SUO]

This excerpt highlights another important and widely accepted notion in regulatory theory—that mandates alone are not sufficient to exact action. It is necessary to couple them with audits to confirm that the mandates are being complied with.

5.4. Central–local tensions

In addition to being influenced by political mandates, individuals and firms are affected by the fact that the balance of effective executive power is situated locally. Andrews-Speed (2010) summarises the seeming contradictions emerging from the history of these tensions and the importance of path dependencies.

China today is characterized by contradictory juxtapositions of autonomy and clientelism, developmentalism and predation, and control and chaos. Multiple centers of power, institution building and economic development prevail, and political and economic rivalry exists at and between all levels of government.⁸⁴ Indeed, institution building is driven as much from the bottom, at the local level, as from the top, but the nature and development of these local institutions is highly heterogeneous and greatly dependent on the pre-communist and communist economic and political history in each location. (p. 24)

Lorentzen, Landry and Yasuda (2010), in their quantitative review of 113 Chinese cities, make two key observations regarding the ability of cities to implement a set of new government transparency regulations related to environmental protection. The first is that resources are a major factor in implementing the central regulations. A city government needs to have financial resources and stability to be able to implement environmental regulations. Second, the relative strength and independence of the city government from strong local industries is a major factor. In other words, if there is reliance on a local company or industry, the city government's ability to act freely of the considerations of that industry will be curbed. Lorentzen et al.'s interpretation of this data is that local governments are primarily swayed by economic reliance on strong local industries. Because of the absence of in-depth interviews, Lorentzen et al. were unable to determine the extent to which the political prowess or relative seniority of major industrial leaders may also be a factor. The findings from this research go some small way towards filling some of the gaps in their work.

During interviews, it was hinted by several government officials and SOE employees that local leaders, while very cautious and deferential to central leadership, mostly feel confident acting with subtle defiance towards Beijing. This is not because central government does not have ultimate authority to intervene, or even control a situation in almost any way it might deem necessary under extreme conditions. Rather, local actors often resist central command because such intervention rarely occurs and is a last resort. In fact, because of the negative repercussions and blow-back that results from such interventions, central authorities are loath to do so. In some cases, especially for relatively mundane matters—such as energy efficiency—versus higher political priorities—such as, say, security or stability—central authorities are even afraid to take such measures.

Central efforts to regulate locally, particularly within the government administrative system, often encounter resistance. A common idiom among provincial and local authorities is: 'the centre has policies, the local has counter-policies' (*zhongyang you zhengce, difang you duice*). Evidence from interviews in the energy sector suggests that these challenges occur at several levels. One area of contention is where adverse or competing interests potentially exist between central and local authorities. Another arena for resistance is where interests or wills may be—even partly—aligned but capacity for implementation is lacking in some way.

Yet another is where, even in the absence of any conflicting interest in the agenda of central authorities, there is general apathy or a lack of understanding that results in the issue being neglected. Difficulties with local policy uptake are gradually overcome through the slow process of laws and regulations becoming stricter, and through deliberation and capacity-building, which aim to dissolve tensions by aligning normative agendas, discussed in Chapters 7 and 8.

A senior municipal official with close ties to the mayor's office in a major city was unusually frank during a formal interview and provided several insights,

Western society has its own principles. Our principle is that brothers look after each other.

Also, local government and central are at conflict with each other on a lot of these things. They are pushing for economic growth and at the same time also pressing for environmental and energy protection. But which do you think is the first priority? Of course, it's the economy. You must keep business running. Then you worry about other things. They are secondary at best. [XCG-CL]

The unusual degree of openness from this respondent was the result of several repeated interactions, which led to a gradual accrual of trust and rapport. Several things are highlighted in his comments. First, the tension between central and local is palpable, at least for this local cadre. Additionally, his stance towards the tension is that *local* solidarity will prevail. The theme of solidarity and its ultimate triumph is emphasised later in the same interview, as quoted below. Finally, the official mentions an important theme that was referenced by many interviewees as common knowledge: environmental protection and energy efficiency issues are still secondary to economic growth; or, in other words, the central government values energy and environmental goals, but these goals should be pursued in a way that does not detract from growth.

One important implication for regulatory effectiveness is that if wider conditions change such that growth becomes less of a priority—for example, if global economic growth slows so much that there is less pressure for China to maintain high growth—then more pressure can be exerted on these other priorities, which currently compete with growth for attention.

Interviews with senior central leaders also indicated that efforts are underway to shift away from this mindset towards a more holistic one in which enterprises/localities are required to achieve several seemingly contradictory things at once. This holistic mindset did not appear to have yet established itself at the enterprise or local level, based on my observations. It is in this regard that much of the work being done at the level of discourse and normative or cultural change deserves attention.

5.5. Cooption (regulatory capture)

Regarding solidarity and local interests prevailing in the struggle between central mandates and local discretion, further insights were provided by the same senior cadre connected to the municipal mayor's office. The unusual candour with which these issues were being

discussed by an official at this level makes reproducing the excerpt in some length worthwhile.

There is a very strong sense of solidarity at the local level. Central government relies on information provided by us, so we will be sure to load the deck so that we can make our targets.

When someone gets sent from Beijing they are here supposedly to help with enforcement and transparency. But they are human. It's not that we corrupt them. They need to get along with the locals. What happens to your career if you offend all the local cadres? How will you implement your work in terms of working with your underlings?

If you're a leader, you need to rely on the workers below you to get the data. You need to rely on others. It's a deeply linked society. Post-feudal, post-revolution.

We have an expression that says *shibuguanji gaogaoguaqi*. It means if you interfere with things too much, you will mess things up. Don't get involved in things that aren't your scope and aren't your field. [XCG-CL]

The almost natural or inevitable coopting of those charged with regulatory responsibility is a troubling theme, but is to be expected to some extent. Western scholars have discussed the issue of regulatory capture for decades. Levine and Forrence (1990) provide a philosophical contextualisation of the question of capture, asking what motivates a regulator when making decisions about industry? Are they promoting special interests (including their own)? Looking for a 'best result'? Promoting public policy? The passage above suggests that regulators in China, as elsewhere, are reliant on the enterprises to discharge their basic duties.

Is there evidence in China of the sort of revolving-door relationships between government and industry (Makkai & Braithwaite 1992) seen in other settings? There is clearly movement of cadres between industry and government roles, but often this movement is not from industry to regulator and back. Rather, the party apparatus moves employees to a variety of different roles to round out and prove leaders and to strengthen the party's influence in various spheres (Pieke 2009; Borgonjon & Vanhonacker 1994).

The passage above describes the power of local solidarity, a subject that has received attention from scholars of Chinese politics for decades (Lieberthal & Oksenberg 1988; Chung 1995, 2000, 2016). However, when observed over a longer time horizon, certain factors render local solidarity ultimately impotent against central mandate. In the case of energy efficiency, this occurs through a process of socialisation, 'politicalisation' and norm-building that is discussed by Andrews-Speed (2010). This process is such that, over time, actors become engaged in the priorities of the centre as believers. Obviously, this is easier when central priorities are not at odds with local interests, as in the case of energy efficiency.

5.5.1. Positive implications of cooption—capacity-building and normative change

Another observer who works closely with several provincial and national-level government agencies in the promotion of energy policies and goals commented on the relationship between industry and government, local and central. His observations provide valuable tempering of some of the observations above.

You need to meet Zhou. He is the former head of energy office at NDRC. While there is a combination of national and local pressures, local is very significant. The thrust of energy efficiency is to reduce the carbon footprint. To the extent that companies cannot reduce their footprint, they have to find a way to capture their emissions.

According to Professor Zhou, SOEs are under huge pressure from central government but I'm sure that flows through local governments, to reduce carbon footprint. And to back that up, they've been given access to capital to invest in carbon reduction technology ... larger SOEs are looking for as many good solutions as they can. It is also wrapped up with China's sense of its position in the world politically. They cannot be the world's largest emitter because they will lose credibility. [EU-PC]

The first paragraph of the quote above refers to local and central governments, describing both central and local pressures for compliance as significant, but with central pressures needing to be filtered down through local government. The second paragraph describes how some of those pressures are filtered through local government to the SOEs and how local government encourages SOEs to take up the pressure for compliance through access to capital and technologies.

Part of the pressure referenced in the last sentence above is cultural or normative. But what are some other ways in which policy pressure is transferred down the administrative hierarchy? The observer went further, discussing the relationship between government and industry and how influence is exerted. Interestingly, the below excerpt suggests that influence is exerted in both directions, from regulators to industry and vice versa.

SOEs, particularly larger ones, have a collaborative relationship with regulators. Certain industry associations also have a large voice in the contriving of regulation. When you get to the nitty-gritty, CNPC and PetroChina, probably a very hand in glove relationship. This industry is a little bit of exception because it is an oligopoly that is so state dominated. That is the case in sectors that are close to national security. [EU-PC]

The above could be rightly interpreted as saying that industry is powerful in lobbying and setting standards through its associations and relationships with government. At the same time, over time, the process of industry exerting influence on government and working to set standards moves the entire energy efficiency agenda forward for the industry and its regulators. Industry may be trying to influence where policies go but, over time, they have also been coopted into the process of working on the policies, thinking about them, creating departments that digest and implement them, and so on. Through such intimate interaction, government ends up gradually pulling industry up the curve of improving compliance.

Ultimately, this interviewee concludes that the relationship between central and local authorities is a part of the formula. Both influences matter and they are ratified or galvanised by incentives.

You can never say its central or local, it's a triangle. It's a matter of pressures and then they are backed up by incentives. [EU-PC]

5.6. Attention of management

Having discussed the ubiquity of political mandates and the complexities in executing mandates locally, the role of local leaders comes into sharp focus. The importance of leaders in the perception of interviewees and the regulatory process has been discussed throughout this chapter. This section is mainly focused on the influence of direct leaders on plant activity; how policy implementers in the plants are affected by their leaders; and how this correlates with compliance. The key takeaway of this section is the description of these environments as ‘vertically driven’.

The leader with the most direct and immediate ability to effect regulatory outcomes in energy efficiency is the general manager of the plant, sometimes also referred to as the president. One of the key levers available to the authorities is the ability to appoint or replace a general manager, thus nudging the plant to align with their objectives. This is obviously a big lever to pull, and it is used with care. Installing a new leader is a complicated task and good leaders are not easily dispensed with. Nonetheless, there is some mobility among the higher echelons of plant leadership. A leader, once established, exerts significant influence over the plant.

Based on interviews, some structure emerged around the notion of ‘leaders’ as a factor in affecting regulatory outcomes. There seem to be two dimensions to how this factor affects energy efficiency regulation. One is the credibility of the leader; the other is the interest of the leader in an issue and the leader’s willingness to mobilise resources towards that issue.

The head of energy efficiency at one of the plants emphasised several times during his interview the importance of ‘management’, by which he mostly meant the plant general manager. He commented on two dimensions of management: the credibility of the general manager and the level of interest a general manager took in an issue.

The main work of energy efficiency is management and technology. The most decisive factor is management. A strong leader with influence, confidence and an interest in an issue [like energy efficiency] can drive big change.

Our general manager Mr Li was previously at Jingmen in Hubei province. That is a 500-ton plant, bigger than here. Because he came from a bigger plant, so in some ways, he has more credibility here. He’s viewed by many as a heavyweight. [XSIN-DKZ]

Several other interviewees also described how projects require support from leaders before they can really be considered at any level. Major projects that either require significant investment or will have a temporary impact on production must have the support of enterprise managers.

The energy efficiency manager of a significant refinery and petrochemical facility commented:

In 2007 we did a big retrofit of a bitumen (*liqing*) project. The total value was 240 million RMB. The core of this project was to reduce the furnace heat loss reduction (*jiarelu, sangxinglu*) to be more efficient. This was a project promoted by the headquarters. A lot of the successful projects come about after pressure from the leaders actually. [JSIN-ZZ]

A senior VP at the same facility indicated that finances are rarely an obstacle to change, although there is often a lot of attention paid to finances from top leaders and headquarters.

Large projects rarely happen because the money is not there. Investment requires approval and seniors are reluctant to approve.

It's not an absence of money. But if you look at the whole picture, then you don't have the approval from leaders to use the money.

Money is being spent to buy oilfields and energy resources abroad so there isn't much surplus to buy equipment to upgrade existing facilities. Spending reflects our immediate energy priorities.

Some projects, I know I can make the money back in three years, but still to make the investment is a challenge for us. Currently the top two priorities at a central level are that: first, money is used to buy resources abroad; and then to prevent pollution and for safety. [JSIN-JZ]

The above manager indicates that leaders are reluctant to approve spending for large energy efficiency projects because they are allocating resources to higher national priorities or are prioritising higher return-on-investment over policy goals. This shows leaders are constantly processing competing priorities when they make investment and approval decisions at the plant level and that, ultimately, large projects that can have a significant impact are being sidelined because of financial performance metrics and expectations that are at odds with policy objectives.

Another manager described the same frustration with being unable to carry forward his work in energy efficiency. In this manager's account, the most significant resource at his disposal is the support of the leader. The possession of this resource unlocks access to other resources.

We have the will to do things but sometimes you need support from leaders. Without leadership support, you cannot achieve results ... The main resource and support we need is in management's attention. It is important to have awareness and concern for this. For Chinese, in whatever they do, they care most about what the leader thinks. If you have the leader's support or confidence, then you can be bold. 'The extent of a man's boldness is the extent of his wealth' (*renyou duo dadan, diyou duo dachan*). [JSIN-ZZ]

This manager agrees that to get things done in achieving energy goals (which usually means needing resources—human and financial) the leader's support is key. If a leader is willing to make the investment, then anything is possible. Hence, to increase the effectiveness of leadership influence as a regulatory factor, special treatment could be given to investment in energy efficiency so that it is treated differently on the 'ledger', allowing the leader leeway when making such investments. In some cases this does occur when headquarters provides funding, because the funds are coming from outside the budget and the profit-and-loss statement is not directly affected.

What is it, then, that affects the more senior leaders and the attention they give to energy efficiency? One respondent [SASS-YKJ], who was a very senior cadre at one of the academies of social sciences, explained that SOE leaders can be rewarded in several ways that are legitimate under the party discipline rules. Another respondent, who is a professor at

one of the party schools [CELA-ZLS], explained that an SOE leader often receives a subsistence salary but can significantly augment their income through other sources such as rewards, grants, payment for speeches, and other emoluments and honorariums. So, when leaders focus on an issue that is receiving a lot of political attention, there are often rewards and resources that accompany that attention and can draw managers towards that priority.

As a factor that shapes regulatory outcomes, the attitude, attention, support or posture of leaders towards a given issue can manifest in many, often complex, ways. Interviewees frequently cited the need for leadership attention as a key condition of any investment in energy efficiency. One observer described the organisational structure and habits of large SOEs to explain why the support and approval of leaders are such important factors.

The issue of capacity-building and human resources is a huge issue. The greater issue is for leaders to give you enough attention and then to direct their subordinates. They are so vertically driven that every decision has to be made at the top. One issue is technical or engineering capacity. But a bigger issue has been getting the attention of decision-makers. Holding their attention long enough for them to make a decision and mobilise their resources. [EU-PC]

The influence of leaders can operate as a positive or a negative factor. One of the regulatory challenges perceived by key protagonists within a plant is reluctance on the part of leaders to accept technological or operational advances and to take risks—particularly those that may affect the continuity of supply, given that what they supply is considered part of critical infrastructure. One energy efficiency manager commented:

In the last two years, since environmental awareness increased, it feels like there's more attention to energy efficiency. It has definitely flowed down from our leaders and headquarters to be a little more energy efficiency, but it's a question of execution. For example, using the middle buffer process. You lose a lot of heat and pressure by building buffer, it's not energy efficient. These days we don't need the buffer but still use it because old leaders feel like production is unstable so they must have buffer. But in fact, with modern automation technology it isn't necessary. [JSIN-ZZ]

Some of the older leaders are described as having a preoccupation with maintaining production stability. This is because continuity of supply is considered part of national security and stability. Although technological advances mean buffering is no longer required to maintain stability, old leaders do not want to take any chances and subordinates defer to their decisions. The importance of national security and stability, as well as other macro political factors, affects how enterprises understand policy priorities. This is discussed further in the following section.

In conclusion, motivating and enabling plant leaders to focus on energy efficiency is very important both to achieving basic regulatory outcomes and to driving 'beyond compliance' outcomes. This has a positive trickle-down effect throughout the organisation and facilitates the allocation of resources and attention to regulatory priorities. Where there is a lack of engagement from top leaders they could be replaced, but such extreme measures are not taken lightly and would require extreme circumstances.

5.6.1. *Explaining adaptivity within a centrally managed context*

The need for decisions to be made at the top is often cited as a precondition for action being taken at the operational level. It is a little confounding that within organisations that are seemingly quite centrally controlled, so many traits of adaptability exist. This contradicts the thesis that adaptability and nimbleness are achieved by decentralising authority so that it is closer to where decisions need to be made. How, then, are these SOEs surviving and remaining adaptive? Are they adaptive? Or are they relics being propped up by state support and captured demand because of their oligopoly positions and the endless need for oil and gas and petrochemical products?

Is it that deliberation and quick synapses allow decisions to be made centrally but then quickly and effectively implemented? Or are there are other mechanisms at play—for example, the brilliant description that ‘big things have small meetings, small things have big meetings and medium things get done by one person’.

According to interviewees, two factors enable adaptivity within the existing SOE structures. First, a leader’s attention and will must be lent to something to give it momentum. Once it has that momentum, the way is opened for execution to occur. Effectively, this resembles a form of senior sponsorship of an issue or a path. Once that path is sponsored, then a second ingredient is needed for optimal outcomes: underlings or a population with the ability to implement. The ability to implement develops at the local level through a combination of strengthening a culture of energy efficiency, deliberating and sharing experience, and capacity-building, all discussed in the coming chapters.

Regarding the first factor relating to leaders and their attention and qualities, it is speculated briefly here that three factors (all related to path dependencies) have contributed significantly in this regard.

1. Most of the leaders in China come from engineering backgrounds and so are predisposed to, and fundamentally trained in, the scientific process. Added to that, an even higher proportion of leaders working in refineries and petrochemical plants are engineers and scientists.
2. This generation of leaders is steeped in Marxist-communist philosophy and training. Thus, the notion of praxis translates effectively in this circumstance into some recognition of the need to combine theory with experience/practice.
3. Traditional Chinese philosophy emphasises the ideal but widely acknowledges the gap between ideal and actual, and so inculcates a strong focus on pragmatism and tying experience to theory and learning. Mao’s famous approach of experimental points or *shidian* (discussed further in Chapter 8) is an example of this simple pragmatic method.

Blended with all three of these factors is a propensity to learn and willingness to absorb new ideas. One interviewee I asked about this propensity to learn hazarded that it may be due to the perceived failures and lessons learned from past periods, such as the opium wars or the Cultural Revolution, where ‘great ideas’ were followed blindly and obediently to catastrophic ends [BP-HA]. Another interviewee pointed to elements of traditional Chinese ethics; the

characteristics of a ‘gentleman’ and the idea of humility from Confucianism. ‘Humility is the solid foundation of all the virtues’, and it is a virtue to be always trying to learn.

This section concludes with a quote from a municipal-level director at the NDRC. This NDRC leader is charged with direct policy and strategic responsibility for energy efficiency in the municipality. His comments echo the conclusion that attention from leaders is a key factor, not just within the SOEs being regulated, but also within government itself.

If the leader respects something—then you will be allocated more resources and staff and people respect you. Our group was formed in 2007, previously we didn’t have a platform. But then we were made independent. This marks respect for what we do. They [the government] gave us funds and materials and policies to support our work. So respect of leaders is most important as all these other necessities flow from the will of top leaders.
[XNDRC-CH]

The director’s comments emphasise that attention from leadership is vital in providing access to resources and enabling implementation. It also provide insight into the impact of the way government bodies have evolved historically through decisions made by the top leaders of the country—the elevation of a bureau to a ministry, spinning out an environmental division into an independent body, and so on. Each of these changes signals an increase in status and priority given to certain themes.

5.7. Political clout and resources

We have looked at political licence, political mandates, central–local tensions, cooption, attention of management, and adaptivity and learning as political factors that affect regulatory outcomes. Another political factor that affects how enterprises respond to energy efficiency policies is the political clout and resources of the regulators involved.

The political clout of a governing institution has a significant impact on its ability to drive regulatory outcomes (Pearson 2005, p. 308). For example, where a given institution or agency sits within the bureaucratic pecking order, what budget and resources it commands, its nomenclature, and the career histories of the cadres that occupy its higher ranks are all relevant features. This affects regulatory effectiveness because the importance of an issue to central authorities can be triangulated or verified by local actors and regulatees by looking at whether the government is putting its money/people/clout where its mouth is. Effectively, actors take litmus readings of how committed the authorities are based on these sorts of subtle signals. Tylecote (2010, p. 206) provides a good summary of the issues of agency as well as political hierarchy within SOEs and between SOEs and government. He argues there are equivalency rankings that establish the pecking order of leaders, whether within enterprises or in government. This affects the dynamics of influence.

The impact of this factor is real. To be clear, the actual funding or capacity of a department or the direct powers held by individual leaders, is not being identified as a factor here. Rather, the significant factor is the perception among those being regulated of the regulator’s intent and ability to execute that intent. The perception is affected by the credibility and position that the regulator displays in the form of the sub-elements described in the paragraph above.

These sub-elements each bear their own separate influence as well, of course. The reflections of this energy expert illustrate this point:

Aside from law and regulations you've got other factors. Another reason some of this stuff [energy related laws and regulations] was delayed was because the Ministry of Environmental Protection was not a powerful organisation in Chinese government structure. A lot comes down to who is the person within the CCP in a particular ministry and their clout and that trickles down as a hierarchy issue. [DW-KM&RW]

One clear example of this dynamic is the elevation of the Environmental Affairs Bureau to a ministry in 2000. In the decade that followed, huge leaps occurred in how seriously environmental issues are taken locally. Of course, the elevation of environmental issues, especially pollution, is also closely related to how the public are affected and the way social (and political) stability are linked to public unrest from pollution-related issues.

5.8. Political stability, security and international relations

As with other political and social factors that shape organisational regulatory outcomes, such as political mandates, central–local tensions and the role of leaders, national priorities are closely bound up with regulatory outcomes in energy efficiency. National priorities are macro-political factors that can encompass a range of issues, including national security, energy security, economic growth or hegemony, global perception of China as a rising power, and social stability.

The theme of stability is paramount among the considerations and in the immediate consciousness of nearly all government-related employees, whether working directly for government, in SOEs, or even party members who may not be government employees, and is underscored in Xi Jinping's recent elevation and consolidation of power. Social stability refers to a condition in which there are no disruptions that may affect the ability or legitimacy of the existing government to rule (Miller 2000; Nathan 2003). Leaders have developed highly attuned 'radar' to detect issues or events that may result in social uprising. The notion of authoritarian resilience discussed by Nathan (2003) sets out a framework for the relationship between party survival and social stability. He posits that institutionalisation (as defined by Samuel P. Huntington) has contributed to the legitimacy of the regime. He focuses on four aspects: the increase of norm-bound nature of succession in politics; the increase of meritocratic promotions; differentiation and functional specialisation; and the establishment of institutions for public participation. This last refers to certain 'input institutions', or as Nathan refers to them, 'pressure valves' that allow people to feel that they have a say.

Fewsmith (2007) provides a summary of perceptions of social stability from different parts of Chinese society and in connection with a range of issues. His data are largely drawn from work by scholars at the Chinese Academy of Social Sciences (CASS) and, in particular, the 'Blue Book', a CASS report on this topic. He argues that while people indicate trust and satisfaction with government at broad conceptual levels, dissatisfaction increases as people focus on specifics or on local government. However, his work considers a narrow range of factors and does not focus on environmental or energy-related factors. Economy (2007) focuses a great deal on the environment and posits that grass roots upheaval is needed to

bring environmental policy change. She pithily titles her subsections, ‘Spoiling the Party’ and ‘Problems with the locals’, and describes how regime legitimacy is bound to grassroots stability around core environmental needs, and how expectations around environmental quality rise as standard of living improves. Van Rooij (2006) provides a gritty and locally nuanced perspective of how local interests and political campaigns clash and interact in the arena of environmental regulation at the provincial and city level. His conclusions closely support several the themes of my study and are worth reproducing briefly below.

The experience of China thus teaches us that successful law enforcement requires a balancing of interests. Achieving this is not easy: it requires a knowledge of all the interests and their linkages, finding a balance between them, and finally building law and legal institutions that reflect such a balance. The contemporary scale and differentiation of social interaction means that the linkages of interests are often so complex that even the stakeholders are not fully aware of them (Elias, 1978: 131), let alone policy makers or legislators. Even where linkages are clear, however, problems remain (p. 70).

Van Rooij further discusses the paradox of the certainty and formality of law versus the need for flexibility and adaptability and identifies how these forces affect the legitimacy of law in practice. Regarding the law, he concludes that

[i]t may be able to function well only if it is supported by flexible political methods, such as the Chinese national campaigns, especially if these incorporate a bottom-up design. While such campaigns violate rule of law concepts such as legal certainty, their experimental and adaptive character makes them better able to find a legitimate balance of interests, whilst also achieving effective implementation (p. 71).

Popular resistance (O’Brien & Li 2005, 2006; O’Brien 2013) can take many forms in contemporary China, including virtual activity, social media, media attention, protests, and other forms of collective action. Scholarly observation of such dissent has also noted a range of forms of cloaked resistance as described by Scott’s (1985, 1990) transformative studies on ‘weapons of the weak’, through to open protest in its many forms as explored by Kevin O’Brien (2013) in his work on ‘rightful resistance’. O’Brien and Li first observed in their earlier work (2006) that open protest typically had four main attributes: ‘it operated near the boundary of authorized channels, employed rhetoric and commitments of those in power to curb the exercise of power, hinged on locating and exploiting divisions within the state, and relied on mobilizing support from within the community’ (cited in O’Brien 2013, p. 2).

In the decade since these observations were made, social unrest has occurred around environmental issues and the government has responded swiftly in most cases to address, even if temporarily, that unrest. In Yunnan, for example, where many of Van Rooij’s case studies took place, hundreds of arrests have been made of officials and company representatives responsible for pollution.⁵⁹ Local authorities are exercising their rights to pursue criminal action under the environmental and criminal regulations, sharpening further the point that environmental threats (especially those that correlate with unrest) will not be

⁵⁹ See <https://www.reuters.com/article/us-china-pollution/china-jails-hundreds-of-officials-for-pollution-violations-idUSKBN1JZ2VP>

tolerated. Of course, violations continue and local resistance to enforcement has not been eliminated, but these changes mark a shift.

Another very simple indication of the effect of social stability on SOE operations and managerial decision-making came up in an interview with a manager of one of the older facilities in a city with a relatively advanced economy. The manager explained that technology can enable greater efficiencies for plant operation, but that leaders are constrained in their ability to adapt to some of these changes because they cannot put large numbers of people out of work for fear of disrupting social stability.

Another example is staffing up for automation. In some places, whereas previously we needed ten people, now with digital control systems, we only need two. But the leaders can't get their heads around it and, more importantly, they can't make big reforms that put a lot of people out of work. Our order of priorities is: stability, safety, and then efficiency. Remember that. [JSIN-ZZ]

In fact, there were references in almost every interview to the theme of social stability. These references are often embedded in other factors and taken for granted as an overriding consideration that trumps almost every other factor. An issue that affects stability is certain to receive attention. The dominance of this factor in general decision-making is unequivocal. However, this study finds that considerations of social stability do not usually bear heavily on decisions related to energy efficiency, for reasons already discussed in this chapter. Most energy efficiency-related decisions and investments do not directly, immediately, or perceptibly affect the public. To the extent that they do have popular impact, this impact is not felt in ways that agitate people in the same way as more sensitive issues like environmental health and pollution, food safety, and corruption and abuse of power. People are not rioting—or even complaining in blogs to any great extent—about state-owned refineries not being energy efficient enough—certainly, not the way they do when there is toxic waste in their rivers or farmland. However, over the long term inefficiency can have a real impact on, for example, the cost and availability of electricity. As discussed in Chapter 1, when efficiency begins to affect continuity of supply to citizens, it will immediately start to receive serious enforcement attention. We are just not there yet.

Thus, social stability may currently have an indirect bearing on energy efficiency, as in the above example of avoiding making workers redundant, but not in the way that it affects regulation of issues such as food safety and environmental issues.

5.9. Energy security

Another obvious national priority is energy security, which is of significance even though it did not feature prominently in ground-level discussions of energy efficiency with interviewees. Energy security seems to operate as a macro factor that affects some decisions and certainly appears in policy documents and speeches. It can be dealt with summarily for the purposes of this study as its influence is not particularly nuanced.

Energy security affects energy efficiency in two ways. The first is as a motivation for driving energy efficiency. This has been discussed conceptually in Chapters 1 and 2. Less energy expended means reduced energy needs, which results in decreased reliance on external

sources of energy. The second, less obvious impact relates to the specific industry examined by this study. Refining and petrochemicals, particularly refining, are a channel of energy. Energy is being used to produce oil, petrol, or gas that is then used as a source of energy for activities downstream. Thus, any disruption to production or threat to the continuity of supply can affect overall energy supply and planning in the economy. This is a real issue. The inability of people to obtain fuel to put in their cars, for example, does raise the threat of social instability. So, in this sense the prerogative to increase energy efficiency is carefully weighed against any potential risk of disruption to supply of the planned quantities of fossil fuels. The practical implication for investments and changes in energy efficiency is simple: ‘Small changes are easy. Big ones are nearly impossible.’ (JSIN—JZ). The senior vice-president of a large, long-established facility from whom this succinct summary comes went on to comment that

sixty heat exchangers could make a huge impact on our energy efficiency. However, I have two constraints. First, I don’t have financial resources. Second, I would need to halt production to improve.

One month or two or three of retrofits will cause huge impact to oil supply. Our scale falls; the balance of east coast oil supply changes. So, a small problem becomes a big problem. Then they must find another plant to make up our deficit. It requires our bosses to coordinate the whole project. Thus, small changes are easy; big ones are nearly impossible. In any initiative, we are balancing supply continuity. Anything that takes over a month will have significant impact. [JSIN-JZ]

The findings relating to energy security were surprising; I expected it to weigh more heavily as a factor in driving energy efficiency efforts. After all, energy saved is energy that does not need to be bought or generated or transmitted, as discussed in the introductory chapter. However, at the plant level and in municipal governments there was not much concern about the contribution that could be made to overall national energy security through greater energy efficiency. At these levels, the perception was that energy security was not really their concern.

5.10. Conclusion

Political licence and mandates matter to achieving regulatory outcomes. It works well to have enterprises striving to build political credit so that they can self-regulate. Self-regulation is important because local authorities are often timid about managing central SOEs, and headquarters—who are less timid—are sometimes too far away to manage something as subtle as energy efficiency effectively. People sent from Beijing are unlikely to create tensions with a senior plant leader by raising energy efficiency issues, the way they would with a major pollution or safety problem.

Mandates relating to energy efficiency must be meaningful to be effective. For them to be meaningful, the leaders making mandates must be somehow connected to what is happening on the ground and have credibility and buy-in from local leaders. Buy-in is achieved through participation in a communication process, but participation has another natural effect. Through participation in a communication process around what the mandates and goals should be, data are verified and assumptions are triangulated. This process of deliberation is

discussed in detail in Chapter 7. Where buy-in falls short of providing sufficient motivation, audits and incentives can be used in combination with mandates and leadership attention. When used in combination, these tools are more effective.

Despite China's authoritarian environment, orders from the top do not translate to direct outcomes at the working level. Central–local tensions and competing priorities make the regulatory landscape complex. To be effective in driving progress in energy efficiency, it is helpful to have key leaders and management personnel who give attention to the issue and systematically promulgate its development. These key leaders can catalyse change in a way that enables a sort of local self-regulation. In fact, beyond mere self-regulation, we can see the emergence of sites that take pride in developing excellence in energy efficiency management. This frames the critical need for garnering willingness and capacity to comply. The next few chapters reveal in detail findings from the field about how willingness and capacity evolve.

Chapter 6. Careerism and its relationship to social and political factors

6.1. Overview

Careerism can be viewed as a subset of self-interest, one of the motivations often cited by rational theorists and their critics (Scott 2000; Sen 1977). Most theories in regulatory studies, and in politics more widely, emphasise rational calculation in the behaviour of individuals responding to rules—justifiably so, given the weight of empirical evidence that supports theories of rational behaviour (Friedman 1953; Scott 2009). However, the focus on such theories and the perspective that results from that focus sometimes diverts attention from other important layers of the regulatory picture of how individuals within organisations respond to diverse regulatory (or similar) pressures. It is now more widely accepted in cognitive psychology and behavioural economics that viewing individuals as rational actors can grossly oversimplify behaviours (Thaler 2015, 2008, 1990; Minton & Kahle 2013) and in complex systems it is often difficult for individuals to arrive at simple conclusions about what is most rational (Green & Shapiro 1994; Kahneman 2011).

While careerism is a significant influence for mid- and senior-level SOE managers in China, this chapter argues that energy efficiency as a professional task or domain currently does not evoke strong careerism-related action or self-interested rational behaviour of the sort typically anticipated by economists. That is not to say careerism is of no import. Energy efficiency has its place and receives some attention as a rising organisational priority. However, much of the work and effort that goes towards driving energy efficiency improvements emerges as part of a kind of pride and pursuit of good science and good management—overall improvement and modernisation of Chinese enterprises—rather than because of rationalistic behaviour.

Interviewees in this study offered differing views on the importance of careerism and rational behaviour as a motivator. One energy lawyer working in China commented based on his experience with Chinese SOEs and regulators.

From my experience, I believe most actors are motivated by preservation of self and desire to promote self. Self may sometimes extend a little beyond the individual to include their friends or family. [DW-KM&RW]

The theme of careerism was a common one in interviews. Interviewees raised several dimensions of careerism. These included the imperative of survival in one's role, related to a sense of fear and scarcity and connected to the notion that the work unit or *danwei* is one's lifeline. Another, more universal, dimension of careerism is ambition and professional advancement, which involves political manoeuvring, climbing the corporate ladder, and expanding opportunities and authority. Finally, reward and recognition were important to interviewees because they are tied to financial incentives and status within the organisation. These three dimensions will be considered below based on evidence from the interviews from this study and from literature on Chinese politics (Teets 2020; Thornton 2006; Chien 2010,

2008, 2007; Huang 2014). In a recent review of motivations for government and government related actors, Teets and Hasmath (2020) summarize a thread of scholarship relating to policy experimentation and the ‘prism of varying motivations’⁶⁰. They describe that policy experimentation has been notably reduced under Xi Jinping’s administration, and though there still remain some pockets of local small-scale experimentation, the current moves to centralize control and create a rule-based ‘iron cage’ for local officials will result in the loss of this feature of Chinese governance; a feature that is attributed as contributing to the adaptivity and resilience of the system.

Two distinct protagonists play a role in each dimension of careerism for an individual manager: the ‘boss’ and the ‘peer’. The first represents the central importance of the manager, who has formal responsibility for evaluating employees. The notion of ‘boss’ usually refers to one’s direct superior but also often includes deference to the top leader of the plant or department. One’s own success requires a contribution to the success of the boss and the enterprise. The second protagonist represents consciousness of and sensitivity towards one’s perception by peers. One never knows when a peer will become a boss, or have influence over one’s seniors. Hence, the issue of careerism is linked to structure and hierarchy.

One interviewee with years of experience representing various industry actors and collaborating with government suggested that government actors, in exercising their significant discretionary powers, are primarily motivated by what makes them and their bosses look good.

Discretion is not just about ‘What do I want to do?’, but ‘What do I need to do to be promoted, to look good ... [and] make my boss look good?’ [DW-KM&RW]

By comparing different types of enterprises representing different arrays of career opportunities and mobility for employees, we can see how careerism might promote or hinder regulatory outcomes in energy efficiency. The field research for this study encompassed smaller and older plants as well as larger and newer facilities. In smaller, older or more remote plants, the sense of deference to the boss was palpable. Employees of these vintage refineries and plants did not view themselves as having many options or transferable skills career-wise. For them, the SOE is where they will work their whole lives. It is their lifeline. A seemingly contradictory dynamic was also observed: employees essentially cannot be fired, but remain very conscious of and motivated by their jobs and how they are perceived. Why are people who still have almost an ‘iron rice bowl’ motivated to do things? The reason is that the consequence of being marginalised or slated for possible termination is devastating, and thus inconceivable.

In larger, newer or more cutting-edge facilities there is a different sense among middle and senior managers. Although many employees still view themselves as ‘lifers’ in their enterprise, there are many opportunities for transfer into either foreign enterprises engaged

⁶⁰ Teets and Hasmath (2020, pp. 41–43) provide a useful outline and review of some literature relating to motivation of local officials in experimenting with policy.

in similar fields—who are interested in having well-trained modern Chinese SOE-rooted managers—or for entrepreneurial activity, often in activities adjunct to the plant.

For example, one informant was a senior level manager—a division chief (*chuzhang*)—of one of China’s flagship refineries and petrochemical facilities. He was one of the ‘high-potential’ leaders whose career had advanced very quickly and was quite young for his level of seniority, but had ‘retired’ from the plant in his early forties and started several businesses. Some, though not all, of these businesses, served the petrochemical sector and provided incidentals to the plants. Interestingly, and contrary to expectations, there did not seem to be much direct cronyism or back-door dealing in these entrepreneurial endeavours related to the plants (at least that I was able to observe). Rather, the manager had built on his knowledge of the plants’ inner workings and decision-making processes, and, to some extent, on the mutual trust accrued from his time at the refinery. Also significant was the influence of reputation. Because he was known to nearly everyone in the organisation as a venerated leader and strong executive, he was at the very least assured of the privilege of being granted meetings.⁶¹

Whether inside the enterprise or outside the enterprise in a different career, your colleagues are your network. Every person is a road. One more friend means one more road [of opportunities] (*duole yige pengyou, duole yitiaolu*). [ZHSIN-CZ]

This difference in possibilities for, and tendencies toward, careerism in large-modern versus smaller-dated plants highlights the need for flexibility about which regulatory levers are applied in different settings. Where employees feel little chance of upward mobility (small/remote/old plants) they will be more motivated by factors relating to survival. Where employees feel that their careers can be highly mobile (large/modern plants) they are more affected by factors that appeal to their ambition, such as visibility in the industry, gaining a reputation, and being promoted or rotated for various roles. It would seem, then, that regulatory approaches that can take into account these realities would more ably achieve regulatory outcomes in energy efficiency.

6.2. Survival

One important manifestation of individual careerism which impacts regulatory behaviour is the need to survive within the organisation, which for many also equates with financial survival. Most SOEs employees interviewed conveyed a sense that their work and unit was the centre of their universe. Aside from being a strong part of their identity and community, their jobs are critical to their financial survival. Some of the current managers have first-hand or near knowledge and memories of the Cultural Revolution and Great Leap Forward and periods of scarcity in China’s recent history. The younger ones were raised by parents who shared those experiences. Their jobs provide them with a livelihood and security, so, despite the security afforded by the public employment system, they are very mindful of their careers and survival in their roles. This is especially true in older, more remote plants but applies generally throughout the SOE environment.

⁶¹ In fact, several interviews with high-level managers in other refineries were facilitated by this informant.

Companies typically evaluate employees based on some combination of their results and behaviours. Interviews, however, revealed the critical importance of relationships for SOE employees. Here, ‘relationships’ means how an employee is seen by peers and other stakeholders. Certainly, the importance of relationships is not unique to SOEs or to China; relationships matter in almost all settings to some degree. However, it was apparent from interviews that relationships and behaviours are paramount, though results and performance are far from irrelevant. In the eyes of superiors, seniority, trust, loyalty (including to the Communist Party line), amiability, solidarity, and other similar qualities are highly valued. Relationships factor heavily in how results and behaviours are interpreted.

6.3. Relationships

One very senior city-level government official with ties directly to the office of the mayor commented on the importance to one’s survival of getting along with others locally. His comments were in the context of central–local relations, and so the quote is reproduced in the section on central–local tension in Chapter 5. But he frankly acknowledges that it is difficult for people to accomplish their work without support from local cadres. His comments articulate a mindset prevalent among SOE employees, in which whatever one does must be done in a way that is sensitive, non-adversarial and maintains relationships. Any relationship that is not positive could somehow adversely affect one’s survival. This directly links regulatory outcomes with careerism. Central regulators need to grapple with the challenge of local capture and local implementation of policy goals. This suggests that regulatory instruments that are purely adversarial or punitive may not have much uptake or implantation, because managers and regulators prioritise relationships.

Again, most important among these relationships is the relationship with one’s direct superior. This includes delivering on the superior’s expectations and ensuring that one’s manager is apprised of anything that may be sensitive or may affect the group.

Before they send us targets they give us informal information and let us comment, but if I’m going to disagree, I have to talk to my boss. [LNDRC-WK]

Surprisingly, the above quote comes not from an SOE employee but, rather, from a city-level government official in the NDRC charged with regulating local enterprises in energy efficiency. He was referring to the priorities and targets meted out by the mayor’s office to the local NDRC for fulfilment.

6.4. Public exposure of results increases the chance of punishment

One other factor that combines with survival to make a very influential mix of factors is public exposure of results or failure—enabled by the advent of media and the internet. Netizens,⁶² the press and other actors have assumed a real position as influencers. Given the concern for social stability, it is important to survival that an individual or enterprise not

⁶² A term used to refer to online activists in China.

offend the public. We saw this also in Chapter 4, where a mid-level manager describes how loss of public social licence can lead to being laid off.

It is relevant to issues of survival in that employees believe and fear such consequences. But, while sometimes employees are fired, sometimes they are simply shuffled. As a very senior leader of one of China’s top design institutes for refineries and petrochemical plants commented:

You may have heard of a PetroChina facility—Dalian. Every year they change leaders because every year there is an accident. Sometimes they get hidden for a year or two and they then reappear again in another job. One of them reappeared in Yunnan at another plant; also a 10 million ton plant. So not necessarily such a tough punishment. They can’t afford to permanently bury a good leader. [LPEC-SJW]

If this statement is true, it casts real doubt over the extent to which threats to career survival can be used as an effective tool to enhance regulatory effectiveness. At the same time, for most people the mere belief that one is at risk of being fired may suffice to achieve the desired regulatory outcome.

It helps to think of the risks related to survival along two axes: the severity of risk and the likelihood of that risk. Survival becomes a driving force within careerism because of the severity of the consequences of being fired. For most employees this would be devastating, because there is no alternative employment available to them. Thus, even though the risk may be remote, it is something that looms in the mind of the individual and has a significant effect on behaviour/individual choices. Sub-factors such as relationships and public attention can affect the severity of the consequences. Thus, for example, a good relationship may help to soften a consequence, but if there is public attention it becomes harder for a relationship to help. And yet, if you are deemed a good leader, you may still make a comeback.

The chart below shows a conceptual outline of typical consequences for a range of possible failures. Relationships or public exposure may shift the consequence to the left or right a notch or two through the exercise of bureaucratic discretion.

Individual Consequences Chart

	Withholding rewards	Private reprimand	Shaming	Fines and penalties	Suspension	Termination	Criminal penalties
Poor energy efficiency management	x	x	x				
Missing energy efficiency targets	x	x	x				
Environmental violations	x	x	x	x			
Severe environmental violations that remain unabated	x	x	x	x	x	x	x

Generally, interviews provided evidence that, while individuals are motivated by a drive to survive, insofar as energy efficiency is concerned individuals do not really fear termination. This is because failure to deliver on energy efficiency is not yet regarded as a termination offence. Thus, extreme punitive regulatory methods are not the most suitable instrument for energy efficiency in Chinese SOEs.

What the above extracts about survival also reveal is that the blend of two factors—public social licence (as we saw in Chapter 4) and careerism for survival—can heavily influence regulatory outcomes. But, once again, when it comes to energy efficiency these two factors rarely combine and so cannot ultimately be said to result in significant regulatory outcomes in the current Chinese context. However, this could quickly change as circumstances evolve. If, for example, irresponsible squandering of energy were to result in ordinarily people suffering power outages or higher tariffs for electricity, one might expect to see this blend quickly escalate in terms of impact.

6.5. Ambition

Within careerism, employees' behaviour is driven by a desire not only to survive, but also to advance. As with career survival, career ambition necessitates the support of superiors. Thus, the role of one's manager was almost universally cited as the foremost consideration of employees. A senior member and convener of the energy forum in China for the European Union, with experience working with government and SOEs, framed it clearly, capturing in just a few words the dimensions of 'results', 'relationships', and 'behaviours':

SOEs are still arms of government. So, a record of successful implementation is a feather in the cap. Endorsement equals promotion. It goes without saying that the boss's main requirements are what count the most. [EU-PC]

The above statement that 'SOEs are still arms of government' highlights the significance of path dependencies from the reform era, as discussed in Chapter 3. The key significance of this informant's comment is the assertion that successful implementation is a feather in the cap—a bonus—while endorsement and the boss's main requirements are described as critical factors. This subtle messaging is consistent with indications given by many other interviewees that perception is everything. This emphasis on perception by superiors reaffirms the importance accorded to face and political licence from peers discussed by others and elsewhere in this chapter.

Ambition does not find expression only in the desire of an enterprise employee for promotion, though this is its most obvious manifestation. Ambition can also be identified in pursuit of incentives (financial and recognition) and of opportunities that might afford new experience, exposure, or authority. Ambition prompts regulatees to seek advancement and avoid penalties; these are two sides of the same coin. Penalties in this sense are not associated with risks to survival but, rather, constrain one's credibility or status in the enterprise. One of the managers of a plant commented:

Without direct individual incentives—tying results to expectations, then nothing will happen. So, it's very important how we flow down penalties to individuals. [JSIN-YZ]

The comment suggests that individual performance appraisal needs to be tied to achieving results, and that incentives and penalties need to be felt by individuals.

Incentives can be effective without being individually focused. Sometimes a reward to a group, or even the entire facility, reflects on the team recognised for winning that award. Bringing esteem to the entire plant is in some ways more motivating than being individually recognised. The energy efficiency manager is a small plant in a western province commented:

They also give the site a reward. Which is small money, but people are encouraged by it. These achievements have little practical use but will add points for one's overall career.
[XSIN-WC]

Thus, career advancement is tied to a record of rewards and recognition, and positive incentives are used to realise energy efficiency. One senior leader in a design institute⁶³ described a system of incentives they were working on to encourage creativity in generating new solutions and technology at the middle and lower levels. The leader explained that they are nurturing creativity through encouragement, using deliberate systems of reward and recognition.

We are also in the process of developing a reward system. If you design a system that wins certain accolade because of its success—then we will receive a licence fee and the individuals involved will receive certain rewards. [LPEC-JSW]

What this interviewee describes is, of course, a process that is inherently more complicated than and distinct from merely regulating certain behaviours. Instead, rewards and recognition are regulatory tools that can be used to motivate individuals not only to comply but also to find creative ways to reach regulatory targets.

Providing rewards and recognition also acts as a mechanism for signalling. Its value is both in the inherent credit that the reward provides to the recipient and in the normative message sent. Providing rewards for something signals that that thing is good, and that it has the attention of leaders. However, signalling occurs in several ways; as some of those ways are quite conscious and distinct, it deserves attention as a category of its own and is discussed more fully below.

Finally, to interpret the value of rewards and recognition for the recipient only in terms of their practical utility or the maximisation of self-interest would be to ignore an important register of human motivation, namely altruism or reciprocity (Gintis et al. 2003). This strain of motivation also surfaced in discussions with several interviewees. They provided evidence of the value of reward for its own sake, without direct reference to its implications as tied to obvious pragmatic results, but rather taking the form of a sense of pride or nobility in one's work.

⁶³ As introduced in chapter 2, design institutes are a legacy of Soviet planning and development where certain design and approval expertise is retained in state-owned institutes who function as centers of excellence and regulators for drawings and blueprints of any sort of building. There are design institutes for ordinary construction and specialist institutes for industrial construction.

For SOE employees, the details of every award and penalty, all training, and any major accomplishment of every individual employee, are contained in a personal dossier. These dossiers stay with an employee throughout their lives. While financial reward is one aspect, another, more influential, aspect is reputational, as described here by the manager of an old but large refinery in eastern China.

In the past, one's bonus was a larger part [of one's overall compensation]. Now it's less. Mine is currently 30%. Usually, penalties will at most take out 10%—to penalise by even that much is very unlikely. In truth, for most leaders, to be penalised like this has little effect. The main effect is on the reputation of the individuals and their face and their future. It's a blemish on his record. At the level of workers the impact is higher because they make little. For leaders, it's more a question of their power. For example, impacting their promotions or the possibility of being demoted. Sometimes it is harder to impact the working level. 'When you are barefoot are not afraid of those who wear shoes.' [JSIN-YZ]

The last quote, about those who are barefoot not being afraid of those who wear shoes, again gives insight into some of the remnants of thinking rooted in an awareness of scarcity. Those who have survived hardship or have little to lose (the barefoot) are not afraid; it is those who have had it easier (those who have shoes) who fear more and have more to lose in the event of a confrontation. This comment has implications for ambition and careerism, in that it suggests that, in some ways, it becomes harder to regulate and incentivise when you are dealing with those lower down the line or those who have experienced hardship and have little to lose. Perhaps the implication is that ambition as a factor is more effective for those who have a future and some mobility, while other factors such as survival and rewards are more meaningful to those who have little and are likely to remain in that situation—which probably describes a majority of line workers and low-level managers responsible for implementation. Perhaps the takeaway is that ensuring everyone has shoes makes them easier to regulate. This is, in effect, one aspect of building the base of the regulatory pyramid.

To summarise, several types of ambition were observed. Ambition related to career advancement can be an effective lever for actors who have some runway in their careers. This sort of employee is more prevalent in larger modern facilities and in higher levels of management. Ambition related to financial incentives has a greater impact on those who earn less, for whom the small sums awarded are of value. Ambition related to recognition and reputation appeals broadly to most classes of employees insofar as recognition is a relatively fungible commodity that either appeals to a sense of self-esteem or can result in individual gains of various kinds.

Enterprises that employ a combination of strategies to exploit ambition in its different manifestations are significantly more likely to achieve regulatory outcomes. While the costs associated with employing a mix of such strategies are relatively low, such strategies rely heavily on the extent to which efforts in this vein are supported and emphasised by the direct superiors of each employee.

6.6. Responding to signalling

People try to advance and get rewards: one way to do so is by being attuned to signals and responding to them. Regulators also take advantage of careerist tendencies in individual actors and use ‘signalling’ to prompt certain forms of behaviour. Signalling refers to actions intended to send a message or set a tone about political priorities. This factor is closely related to the regulatory factors that have to do with discourses and with norm- and culture-building. The overall framework devised to transform culture and norms was discussed in Chapter 4. However, signalling deserves a mention here because it represents the dimension that is perceived by the individual and that incentivises individuals to try to please higher-ups. In other words, it highlights how individuals are affected or motivated by the signals they receive from leaders.

An example of signalling initially expected to significantly guide regulatory behaviour was visits by top leaders and cadres to plants to emphasise certain policy priorities, such as energy efficiency. In terms of the weight of their impact, interviewees did not refer to visits by leadership as a key factor in decision-making around energy efficiency, but rather as events that highlight the issue and remind people of its importance. Such events send reverberations throughout an organisation and, in so doing, influence agendas and the attention given to an issue by enterprise leaders and people who want to impress their seniors and receive preferment. This occurs mostly with the top-tier leaders who interact with leadership beyond the local site. But the signals sent by top-tier leaders affect the priorities and agendas of mid-level leaders as well, through a trickle-down effect.

Other forms of political signals that are sought, received, and interpreted by individuals at the enterprise level include speeches by senior plant managers, circulation or publication of newsletters and propaganda related to energy efficiency, and setting of agenda items in town hall and party meetings. In general, these signals were found to exert more influence on regulatory outcomes through their ability to shape norms and discourse, rather than their utilisation for the advancement of individual career prospects.

6.7. Conclusion

Careerism is a real and universal force. It may apply more in settings where one’s job is one’s lifeline, as within a work unit, or where there is a scarcity of work opportunities, as in less economically developed cities or industries or where the individual has limited employability and so feels a sense of scarcity.

In Chapter 5 we saw that energy efficiency is clearly gaining prominence as a political issue; thus, in an SOE employees will be evaluated based on how they perform on energy efficiency matters. While energy efficiency is allotted points in employee valuation, the weighting of energy efficiency is not so high that poor performance would significantly derail someone’s career, so downside risk is relatively low. However, upside opportunity can be significant if an employee or leader becomes a champion of energy efficiency and demonstrates gains. Energy can also be a forum for an employee to garner attention and resources that can be helpful to their work dossier.

While careerism provides some motivation to individuals it is not a force that unites around a common cause, nor does it lead to coordinated collective behaviour. It was not cited by regulators, nor by regulatees, as being decisive in driving behaviour. Rather, careerism and self-interest more generally were identified by most interviewees as an element of the overall mix of factors. The existence of careerism needs to be acknowledged and blended with other factors developing regulatory mixes. The next three chapters visit a few of the other factors that recurred in interviews.

Chapter 7. Deliberation

There doesn't have to be a lot of democracy. Leaders just decide—but we help prepare them.

– Mid-level Refinery Manager

7.1. Overview

In answering the question of which factors enable the state to effectively regulate state-owned enterprises in relation to energy efficiency, the introductory chapters of this study outlined some of the formal regulatory tools that are in use, and their limitations. Chapters 4, 5, and 6 explored certain non-formal regulatory factors by examining social and political factors and careerism. This chapter discusses the processes of deliberation in regulating energy efficiency and how deliberative processes increase industry—and, in some cases, local government—willingness and capacity for regulation and compliance.

The issue is that the process for setting goals and targets for energy efficiency is complicated. Regulators, headquarters, and plants need to collaborate to set goals that are realistic and challenging and that fit within the nation's overall plans for growth. In a market economy, the invisible hand is expected to manage most of the work. In a reforming planned economy that is trying to drive change in its own SOEs in an area such as energy efficiency, the challenge is more complex. Goals need to be bought into by the key actors. When asked about the process for setting targets, respondents almost unanimously (33 of 35) described a process of deliberation. Without a 'how', the goals are empty and will continue to be missed, as they were for years in energy efficiency. Central government targets often form a theoretical basis at first; then a process of deliberation occurs that goes up and down the whole country, from the top to the bottom and back again. This process of deliberation serves three main functions that are pertinent for our purposes: it triangulates information and allows socialisation of options,⁶⁴ diffuses ideas and experiences, and builds capacity and understanding.

Deliberation here refers most simply to a process of reasoning about choices. The term is defined in more detail in the next section below.

This chapter, then, is about processes. It explores the process of deliberation in the energy sector in China: the discovery of solutions through communication and collaboration, the process of developing capacity to do things, to be responsive to challenges and regulations. Deliberative processes are not necessarily born out of some noble pursuit of harmony, but are the byproducts of the need to solve complex problems.

The dark undertone to all this deliberation revealed in interviews is that it often occurs out of fear of transgressing or offending others who may somehow retaliate through political

⁶⁴ The process of triangulating information includes both verifying the accuracy of information, but also involves a social dimension of creating buy-in and avoiding offending anyone or setting targets that are manifestly unachievable. See section 3 below for more detail.

channels. The tendency to deliberate was attributed by some respondents to fear of taking a misstep. This recalls the limits of social and political licence and careerism discussed in the previous three chapters. Other respondents attributed the habit of deliberation to the scientific and engineering training of most cadres and to Marxist traditions of praxis and democratic centralism.

Regarding Marx's approach of democratic centralism, one interviewee commented: 'The system of democratic centralism where you enquire, research etc. feedback to the centre and once they decide, you stick with it, influences deliberation' [DW-KM&RW]. But the same interviewee went on to comment that 'ordinarily, get a bunch of Chinese colleagues together and ask them for input and good luck getting any participation'. He then observed that many of the visible political events are entirely scripted and asked, rhetorically, where the deliberation happens, then, if not publicly? His reply was, behind a curtain, in small trusted groups, and the job of each person in those groups is to have had deliberations in their own small trusted groups, and so on down the line.

A production manager at one refinery described the two biggest factors affecting energy efficiency as policy change and attention of leaders, but immediately added that for either of these things to happen, much deliberation must have taken place already.

The two biggest factors were policy and leader's attention. There was a lot of discussion and consultation and research before the decision was taken though; it is impossible to do this without. Must consider every aspect of the gains and losses, pros and cons (*lihai he libi guanxi*). [LSIN-WC]

The reference above to gains and losses can be interpreted to also refer to calculating who gains and who loses, to ensure that you are not causing loss or trouble to someone without properly planning for it.

This chapter argues that deliberation is an important factor in achieving regulatory outcomes. This seems to be the case regardless of what motivates the deliberations, although the authenticity of deliberations is seen by respondents as affecting their quality.

7.2. Deliberation—a working framework

Whereas discourse is the interactive process of conveying ideas (Schmidt 2008), deliberation here is defined as a process in which two or more people communicate to enhance understanding towards a decision or end. The communication can be in any form. The concept has its roots in Aristotle's notion of *phronesis* (Abizadeh 2002). Deliberation implies a process that is scientific (aimed at increasing understanding) rather than political (aimed at a preconceived outcome). It is a way to reason about choices.

In the field of deliberative democracy, there is a related notion of authenticity in deliberations (Dryzek 1990, pp. 14–17; 2000) The full notion of authenticity implies a situation in which there is a robust civil society and deliberations can exist independently of the state. Such a situation clearly does not exist for state-owned refineries in China.

An emerging sub-field within the literature on deliberation specifically examines deliberation that takes place in authoritarian contexts such as China (He 2014). He argues that deliberative practices are ‘well and truly alive’ in China, but that they ‘don’t readily map’ with Western theoretical models of deliberative democracy. He proposes a ‘theoretical reconstruction of deliberative culture’, rooted in Confucianism, and by doing so sets up a framework for recognising authoritarian deliberation as an adoption, by the government, of deliberative practices to improve governance and enhance authority.

Dryzek and He both talk about deliberation as having certain characteristics (authentic, inclusive, and consequential). It is certainly not argued that the deliberation in Chinese settings shares these characteristics. China remains a largely authoritarian regime where, if circumstances dictate, strong and severe command and control can be exercised. With major refineries and petrochemical plants, however, this sort of control is rarely exercised because the state relies on them for supply of fuels and the large enterprises are not easily bullied. Nonetheless, this ‘hammer’ referred to in regulatory discourse looms quietly in some people’s minds. The capacity to spring into almost martial control of almost any branch of government or government-owned enterprise was subtly alluded to by a senior NDRC leader who referred to the SARS⁶⁵ period in China: ‘Take SARS as an example. In a very short period we [the NDRC] were hugely effective. NDRC has power. We took over some things and made policy decisions and sent money in the right directions to make things happen’ [XNDRC-CH]. Despite limitations on the forms deliberation takes in China, it is still worth studying and understanding better.

This study does not intend to explore the subtleties of the various kinds of deliberations, nor does it claim that all deliberations taking place around energy efficiency are ‘authentic, inclusive and consequential’ in the way that Dryzek describes deliberative democracy (Dryzek 2000), although it notes that the data from this study suggest that scientific or coordinative or authentic approaches to deliberation are more conducive to learning, engagement, capacity-building and, thus, to achieving regulatory outcomes. Interviewees from plants, almost universally, described greater responsiveness to deliberative processes that were authentic or aimed at genuine learning, as contrasted with propaganda-type communications or box-ticking deliberations aimed at conveying political mandates.

This chapter focuses on some of the impressive contributions that deliberation and collaborative approaches to regulation make to energy governance/regulation in Chinese SOEs. It is observed that respondents from both industry and government admitted that deliberations between government and industry were usually ‘communicative’ or political and yielded limited engagement, while deliberation within the companies belonging to a group (particularly within the plant and headquarters) were usually more ‘coordinative’ or authentic/scientific and yielded more engagement.

⁶⁵ SARS or severe acute respiratory syndrome is a viral disease. An outbreak occurred in China in 2002 and had far reaching public health implications across the country and globally. It also challenged the country’s political and regulatory infrastructure at many levels triggering evaluation and reform driven from the central government. For further reading see Fewsmith (2003).

Viewed in this way, deliberation serves important functions of both a political and scientific nature—it contributes to normative change and affects agendas (political/communicative) and it increases the ability to execute those agendas (scientific/coordinative). In fulfilling this dual role, deliberation performs several specific functions: verifying information and learning; sharing and distributing experience and knowledge; building capacity; building consensus and unity of vision (as observed around target-setting), signalling again towards attention-worthy matters, etc. Each of these functions is examined in detail in this chapter as a factor in driving regulatory outcomes.

7.3. Deliberative actors and spaces—SOE internal deliberations and deliberations with regulators

7.3.1. Deliberation model #1—within the SOE group

Deliberation occurs at many levels on issues related to energy efficiency. Deliberation can occur on the smallest and simplest scale, between a few individuals responsible for formulating ideas about something, all the way up to large meetings formally convened for the exchange of ideas. Deliberative processes are closely related to the processes explored in the last chapter of norm-building and cultural change through changing discourses. In recent years, energy efficiency has begun to occupy an increasingly prominent position in formal deliberations within the corporate structures of the oil and gas SOEs. This is probably a reaction to the attention to these themes by the politicians in policy documents, speeches, and other norm-building discourses. As a leader of a refinery in a major Chinese city described:

Every year three to four times at least, we have meetings with all the leaders of the other plants within our corporate group [Sinopec]. The meetings take place usually in Beijing but sometimes in other places. The meetings have special themes and each time, plants that have good performers give presentations. In recent years, the themes have been related to improving efficiency in manufacturing. The other big theme is energy efficiency. Mainly from 2010 this theme became very dominant. [XSIN-DKZ]

Several things are noteworthy. Foremost is that these deliberations are happening *within* the enterprise group. Three to four times a year is a high frequency for meetings of this scale. To summon leaders from so many plants with that regularity sends a strong signal but also creates a lot of ‘glue’ around an issue and gives a lot of ‘space’ for communication (and, ideally, learning). Much can germinate with that level of tending. Having those with positive experience give presentations helps to make the meetings experience-based and grounded in practice—both fundamental to good learning and science. This contrasts with older practices of having meetings that are highly politically charged and full of rhetoric and high ideals but begin and end in words. Many such meetings still occur. But for energy efficiency, since about 2010, the deliberations have become increasingly structured and more case-based, experience-based and scientifically oriented, according to a number of respondents.

It is noteworthy that since about 2010, the deliberative space-creation has occurred against a political and discursive backdrop of the theme of energy efficiency receiving attention in the media and being championed by figures such as then-Premier Wen Jiabao, who began to make public speeches emphasising its importance.

Deliberations that occur *within* the enterprise benefit the planning process while also building capacity throughout the enterprise to synthesise and apply knowledge usefully to energy efficiency challenges and opportunities. These deliberations are both quantitative and qualitative in nature.

7.3.2. Deliberation model #2—between enterprise and regulators to communicate targets

Deliberations also occur between the enterprise and regulators to determine the quantitative goals and metrics for managing energy efficiency. This is mainly done through targets and target-setting processes.

Deliberations that take place between the municipal government and plants bear less resemblance to authentic deliberation as discussed in the literature. Local government regulators lack the resources and expertise to engage in scientific or coordinative deliberations. Instead, they conduct communicative/political deliberation from time to time in various forms, such as meetings and conferences. This is a sort of flag-waving and, though not entirely perfunctory, it seems to have little practical effect beyond distributing targets that have been handed down from above. Regulators at the city level occasionally negotiate targets but, in such instances, they are haggling with enterprises, because usually the most they can do is to redistribute the burden a little from one company in their jurisdiction to another. A manager at a small plant in western China commented:

We are much more afraid of the local government. Sinopec, we can communicate and consult with but with government, it's harder to deliberate. They don't understand our industry. [XSIN-WC]

7.3.3. Deliberation model #3—between regulators and stakeholders to gain responsiveness

A lawyer working in the field of energy and energy efficiency in China highlighted the space that exists for deliberative processes to fill in gaps or bolster the effect of the law. He described the law as having limited direct effect on regulatory outcomes and actors. Rather, law provides boundaries and a framework for the activities of protagonists within the system, which are subject to discussion and negotiation. A great deal still relies on the decision-making and authority vested in the individuals and individuals deliberate carefully when applying their discretion.

What is said by the NDRC takes a long time to filter down. The key issue in the implementation of the policies is the issue of discretion. It's not rule of law or rule by law. Law is there but it's kind of a framework for the application of discretion. So, the discretion of the local official at the local energy management centre tells you if you can ... but before they apply their discretion, they're usually going to talk it through with all the stakeholders to avoid surprises. [DW-KM&RW]

While discretion of local officials is broad, often government regulators also experience significant challenges. The individuals charged with responsibility for regulation feel that their ability and authority is curbed by an array of factors, including resources, political pressures, informational asymmetries, and even their own shortcomings. This sense of

limitation on the part of regulators also spurs them to seek collaboration with the firms they are regulating. One NDRC leader commented about large national SOEs in the energy sector.

We don't have the power to manage them; they're helping our economy. We hope they come and they comply. [XNDRC-CH]

Although there are examples of local government taking strong measures against enterprises, this sentiment, from a senior city-level NDRC official, was typical of the attitude of city-level authorities; they did not wish to take enforcement measures against the major refineries for energy efficiency issues. They preferred an approach of deliberating and reaching consensus on what the enterprise would deliver and then holding them to their commitment.

7.4. Deliberative content and processes—what makes deliberation work and how?

7.4.1. *Targets set by regulators for enterprises*

One of the key bases for deliberation between plants, headquarters, and government regulators is around targets. Targets are measurable and can provide a footing for grounded and substantive dialogue about energy governance objectives. Targets are an important instrument for regulating actors in energy efficiency, perhaps the most important and most heavily relied-upon, according to the interviews in this study. However, targets are tricky to wield for two main reasons.

First, once set, the outcome is binary. Either the plant achieves them or fails to achieve them. If failure occurs, it is not just problematic for the actors, who will be embarrassed and perhaps penalised. It is also problematic for the regulators, who often have limited ability to really punish failures. In this case the awkward unwillingness of the regulators to hurt the firms becomes explicit, eroding the credibility of the system. The curtain falls on the theatrical aspect of the regulatory schema.

Second, in settings such as refineries and petrochemical plants which are so complex, regulators struggle to set targets that are relevant and meaningful to each plant. Plants are at different places along the maturity curve of modernisation and energy efficiency; thus, targets vary greatly from site to site. This variation requires more tailor-made regulatory solutions. They also are ill equipped to determine whether those targets are being properly met or if gaming is taking place.

Thus, the process of customising targets and setting them is important, as is the process of enlisting the firms in participating in that process and having them believe in it. Not only is there a value in creating consensus around the targets, but the process of working on that consensus also raises the capacity and experience of the parties— both regulator and regulated. An official from the NDRC at the city level, who is responsible for managing energy efficiency, described the process whereby local government targets are settled.

The process is the same as corporate planning roll up—roll down. They roll up information and reviews of status (participants provide input: *yijian*). This happens in the form of lots of small meetings that take place between government (NDRC and the relevant department of each industry). The way this looks is that each company has an energy efficiency department. They are responsible to master (*zhangwo*) the information

of their company and then they come to a meeting ... [We compile that information and] then the government takes that information, and then they make decisions with little reference to us and roll down the plans. We are basically expected to deliver on those plans. [XNDRC-CH]

Deliberation occurs mainly during the internal planning and review of targets within the enterprise. In some instances, deliberation also occurs when those targets are reviewed with government regulators. The targets set by government regulators are often seen as being somewhat disconnected from the real conditions of the firm.

Mostly, when they give their targets, it is unrelated to our actual circumstances. It is related to the savings quotas they are given by provincial level government and they pass that on. So, we must go and do work with them [the government].

The higher we try to improve our quality, the more our energy use will be. It is inherently paradoxical. We send emails, call them, also we have to go and visit them in person—sometimes four to five times a year. That doesn't include the city government visits we make. Local NDRC, they have five people. Provincial level they have seven or eight. They give their work to the Energy Efficiency and Emissions Reduction Inspection Centre (*jieneng jianpai jianzi zhongxin*). All the grunt work and numbers are handled by the Centre (*zhongxin*). Our relationship with them is good. [XCQPC-SUO]

Although the firms describe the planning of targets as somewhat disconnected from the circumstances of the enterprise, the situation is improving. More recently, it is not so disconnected that targets are set at unrealistically high levels for firms. This is avoided through socialisation of numbers before making them final. In practice, this means meetings between the energy efficiency department of the enterprise and its counterpart in the local government, where numbers are crunched and jointly reviewed. But this is a more recent phenomenon. What the series of passages below shows is that the situation is changing or improving over time. More deliberation is occurring internally among regulators and with firms. Notably, NDRC officials say that

NDRC gives hard targets and we don't really consider the situation of the enterprises that much when setting the numbers. Enterprises push back on their targets but we don't have much we can do. And to be frank, this is a limitation currently. [LNDRC-WK]

In this case, the NDRC official explained that it is very rare to grant any relief on numbers once they are handed down, because to give a reduction to one plant would mean having to increase targets for another. Another NDRC official said:

In the Eleventh Five-Year Plan (11-5), our target nationally was 19.2%. The Twelfth Five-Year Plan (12-5) target is 16%. This time the target was set more scientifically. This time they were much more specific. It was targets relative to various areas. For example, areas with a lot of agriculture don't use that much power to begin with ... so they don't have space to reduce that much. [XNDRC-CH]

This official was explaining that the central government has learned from experience and now has a more sophisticated appreciation of how to view energy efficiency. Whereas in the past targets were 'peanut buttered' or spread evenly across various regions, by the Twelfth

Five-Year Plan the government could disaggregate energy efficiency expectations based on which core industries dominated an area. He went on to say:

First set goals ... We give groups of targets. We are a coordinating body—we don't directly regulate/enforce in the traditional sense that much. We make the calculations and set the expectation. For energy efficiency, the data in the private sector is very weak. In industry, it is much clearer and more easily ascertainable. Industry comprises 40% of energy usage in the city. Reductions have already been made in the energy index for industry. Going forward, looking to the future, the ability for industry to reduce is limited. With industry, one focus is to maintain attention to improvements. Also, we are making step-changes through the Close-Decommission-Divest-Merge Initiative⁶⁶ (*guantingzhuanbing*). Again, targets are a big instrument, then other offices audit those who don't meet their targets and for them—new projects will not be approved. Consequently, their further development will be stalled. This is a big disincentive. NDRC—we manage approval of new projects. [XNDRC-CH]

However, while the NDRC officials described the sophistication of the approach now taken by government, the energy efficiency manager of one of China's most modern and advanced refineries boasted that they had never missed their targets.

There are only two to three people in this energy efficiency department. Presently there has never been a case where we missed our target. [ZHSIN-CZ]

The interviewee may have been exaggerating in claiming that they have never missed a target. There was other evidence that they had missed some of their energy efficiency metrics, though it may have been a failure to report rather than missing a target.

Even if it is true, when targets are such that they are almost never missed, one may ask if those targets are of value and, if they are of value, are they challenging enough? This is a fair question and there is certainly evidence, in the interviews with plant employees, of enterprises leaving 'wobble room' for themselves in their targets. But the answer may lie in several of the other elements of the process of deliberation, learning, and capacity-building that have been set out here. In part, targets are met because they are socialised and discussed before they are set. Also, there is the element of signalling that has been discussed in Chapter 3. The energy efficiency manager of a small plant in western China, who is responsible for interfacing with local authorities in setting energy efficiency targets, described how the process of preparing for government meetings drove deliberation and learning within the plant. After complaining that the government figures are not set scientifically and are instead just handed down to enterprises to meet quotas, he went on:

Generally though, we can meet the government figures. There was one year when we didn't meet them. That year, their figures were totally unreasonable, then we had to go and seek them out to discuss it. I have to do my homework and prepare. Prior to the meeting, I will provide analysis in a document, then I visit them. I mainly discuss with the Bureau of Industry and Information Technology (*gongxinwei*). The fellow there is [anonymized]. But the result is usually that they don't reduce the target by much if

⁶⁶ This refers to an initiative that several managers talked about which involves modernizing the overall portfolio of plants throughout China by: Decommissioning, Divesting or Merging older, less efficient plants which will over time raise the index of the portfolio in terms of energy and emissions.

anything because any reduction they allow me has to be made up for by someone else.
[XSIN-WC]

This quote highlights system inflexibility, from the government side especially, in being responsive to industry feedback. Nonetheless, it is notable that prior to meetings with government a lot of preparation and internal deliberation takes place. This process naturally increases capacity within the enterprise and drives norms towards policy goals by prompting internal deliberation and attention to energy efficiency.

Thus, enterprises are forced to think more about energy efficiency to prepare for dialogue with regulators about their targets. As these excerpts indicate, once targets have been formally set by regulators, they are very difficult to negotiate or change substantially. Even before they have been distributed there is very little room afforded to the regulators to change numbers, because they too struggle to negotiate their overall figures, so what is discounted for one firm needs to be added to another. Once the die is cast, it is a zero-sum game. Thus, if there is an opportunity for adjustment, it exists in the early stages when overall regional targets are being set. It pays to be involved in the conversations about goal-setting early on, before the die is cast.

The Municipal Commission of Economy and Information Technology (*jinji xinxihua weiyuanhui*) is our counterpart. They give me our targets. Before they give targets, we communicate—phone and meetings. There are even times when we have a lot of daily communications. This year they gave us a tough number and we think we can't make it; so, we must provide feedback. But we rarely formally give feedback—it makes things complicated. So, we give feedback informally so that they can more easily adjust it.
[ZHSIN-CZ]

Thus, the enterprise needs to be well-informed about its own circumstances and capabilities, as well as what targets it can meet, to be prepared to confront regulators when targets are set, if for no other reason than to manage their expectations about outcomes. However, such feedback is usually not given formally or in a way that might be construed as adversarial or challenging. Rather it is through an informal, polite, deliberative approach that is seeking a conversation.

Being well-prepared also means having agreed on and rehearsed a description of status, existing goals, their achievability, and how to achieve them. Through these dialogues, reality is defined-constructed within the firm and then between the firm and the government regulators through a process that is partially exploratory and partially creative—not entirely unlike the social sciences. That is, there may not be an easily objectively verifiable status or set of data. Instead, the circumstances of a firm and expectations around its current and future performance are constructed or modelled.

7.4.2. Targets set by the enterprise for itself

In parallel to the process of formal target-setting that occurs between regulators and the enterprise is the process by which the enterprise sets its own targets. This process is necessary to prepare for negotiations with regulators but takes on a purpose of its own as well; the purpose of building consensus and uniting around a set of figures that can be justified

somewhat objectively. The three quotes below come from managers at three different plants in three different regions of China, but they each provide colour and insight into how the planning meetings are held. Note that they are talking about the targets set by the enterprise for itself. This process sometimes feeds into the targets set by regulators as well, but often runs in parallel. These may not be the same as those set by the regulators. Notably, one of the quotes is from a PetroChina plant.

The leader of the energy efficiency office of one of the well-established refineries in eastern China described the target-setting process as follows.

To set targets there will be meetings. Lots of meetings to report, then discuss, then propose, then leaders consider and feedback, etc. Usually it takes at least two or three rounds to settle targets. The meetings take place between department leaders. Our department heads are extremely experienced. So, they set the targets themselves because of their knowledge. There doesn't have to be a lot of democracy. Leaders just decide—but we help prepare them. [JSIN-YZ]

Another Sinopec manager at a smaller Western plant describes a similar process of deliberation and exchange.

We first take targets from headquarters. We receive them in person and we sit there across from them and deliberate extensively and negotiate a figure that at once gives pressure and is achievable. [XSIN-WC]

Similar testimony came from another manager from a PetroChina plant in the western region of China.⁶⁷

Every month we have targets and we will receive those from the general manager. About once or twice a year there will be meetings about energy efficiency for exchange and learning ... There have been some companies that do coal trading. But we haven't done that. Energy efficiency is mostly done indirectly. It is still not something that we give a lot of direct attention to yet. It is becoming more important ... Our awareness of this issue is also tied to the general manager's awareness of this. [XCQPC-SUO]

Internal deliberation to set enterprise targets can serve as a means of building unity of vision and avoiding conflict. As with the above passage highlighting that the meetings take place three to four times a year, the following passage first calls attention to the regularity and frequency of meetings, and then to the level of engagement across the whole group of companies by noting that 'thirty-something' sites participate in such deliberations. To create a pattern of congregation on this scale is a significant investment for headquarters. It was suggested earlier in this chapter that bringing people together around an issue creates adherence and opens spaces for deliberation. Also, the process of preparation for these meetings stimulates subsets or eddies of deliberation. Plans are drafted, drafts are circulated and reviewed, their robustness is examined and tested internally, groups within the company digest and prepare until, eventually, these plans are presented at large meetings. Plans and

⁶⁷ Notably, Petrochina, as described earlier, works more upstream and is considered, by most, as an SOE group to place less emphasis on energy efficiency and on corporate and regulatory compliance generally.

details of performance against those plans are circulated among stakeholders to create a cadence.

We have meetings every year for energy efficiency, twice a year. Thirty-something plants participate. For us it was set up in our production division—under planning. We do a plan each month about how we might meet the targets. Each month we circulate a plan for every group and department and if they are missing their targets then we will penalise them internally. [XSIN-WC]

In the last sentence one can also see further evidence of proxy regulation, whereby the headquarters penalises individuals and departments. Penalties are meted out (often at the enterprise level against individuals in this sort of context) when there are gaps. This reference to the enterprise internally penalising its employees for missing targets is also an additional data point for shadow regulation, discussed in Chapter 3 under structures.

7.4.3. *Authenticity of deliberation*

Most theories about deliberation generally suggest that to the extent that deliberation is conducted as ‘scientific process’ (explorative deliberation grounded in specific issues and experience) it tends to lead to more consensus, less conflict, and better decisions.

When deliberation occurs around specific energy-related issues, parties are collecting information and enhancing understanding. Deliberation around target-setting can sometimes look like negotiation, especially if each occurrence of deliberation is viewed as an event. But if viewed as a process, other dimensions become apparent. Through the expression of different views, more light is shed on issues and better decisions can be made. Additionally, by airing out different positions and interests, risks and pitfalls of conflict can be avoided, or at least anticipated. The head of energy efficiency for a large plant in eastern of China noted:

Of course, I cannot single handedly make the plant achieve all its targets. I cannot possibly deal with energy efficiency on my own. So, in our implementing measures (*banfa*), I will write all the work that the various departments, like procurement, quality, operations, what each one must do. Each department has a liaison responsible to deal with energy efficiency matters and they will give input into these implementing measures ... After I write the draft of these implementing measures, then I must circulate it among the departments and they each need to accept it. The liaison is responsible to get back. The liaison is called a *bushi*. [JSIN-ZZ]

To understand the relevance of these implementing measures, or *banfa*, it helps to reproduce another section of the same interview in which the department head describes her perception of the law and how it trickles down to the plant.

At the national level, there are laws—*falü*, then at the regional level, there are regulations—*tiaoli*, then I’m responsible to have reference to the laws and regulations and translate them into implementing measures—*banfa*. [JSIN-ZZ]

The authoring of the *banfa* (implementation measures) has significant regulatory impact, and the deliberation that occurs in the process of settling these *banfa* allows an opportunity for negotiating targets and policy expectations internally with other department heads in the enterprise; but it also has an important impact on normative awareness and capacity. Through

this process of deliberation, the laws/regulations/implementing measures are internalised for the plant and owned by all.

7.4.4. Summary of findings on deliberative content and process

For targets and the deliberation around them, several things emerge from the data. First, the extent to which targets are taken seriously by plants varies between different plants and cities. Both the cities and the plants are at different places along the curve of development towards energy efficiency maturity. This makes it difficult to make sweeping generalisations. Second, the effectiveness of targets in simply driving compliance is limited unless both plant and regulator are mature, the targets are set scientifically, and the plant has the capacity to achieve them. Third, where authentic deliberation is occurring before the targets are set, the plants feel more committed to the targets and experience more partnership with their regulators. Fourth, deliberation that at the plant level (for government-set targets and for plant-set targets in the shadow regulatory space) around targets is more honest, scientific, and nuanced than the deliberation with the regulators. Fifth, and perhaps most importantly, although the targets become the focus for deliberations, senior or experienced officials and managers recognise that currently the targets are not usually harshly enforced and so the process of deliberating and learning together how to manage energy efficiency issues is key. In a sense, this is a kind of probationary period until more stringent laws and tougher enforcements begin; deliberation helps everyone prepare for that but also to be aware when that shift starts to happen.

7.5. Functions of deliberation

Interviewees identified a number of purposes served by deliberation around energy efficiency. Deliberation serves the important purpose of triangulating and verifying information through which effective experimentation and policy learning can take place, which can be helpful in a complex, and somewhat fragmented, political system. It also serves the purpose of diffusing this policy learning by allowing for the exchange and sharing of experience to take place. Most importantly, within the positive-sum sphere of increasing energy efficiency, the bottleneck of capacity to implement ‘beyond compliance’ solutions to complex problems is significantly addressed through deliberation, which serves to strengthen the capacity of actors to achieve regulatory outcomes.

7.5.1. Deliberation as a method of triangulating information

As discussed in Chapter 2, bureaucratic decision making in China is fragmented (Lieberthal & Oksenberg 1998). Central–local relations and the relative power and influence of central, provincial, municipal, and lower levels of government in regulation add complexity to the regulatory landscape (Chung 2016; Montinola et al. 1995; Bo Zhiyue, in Naughton & Yang 2004; O’Brien & Li 1999). And the Chinese Communist Party pervades the bureaucratic structures, attempting to unify and integrate among the fragmentation (Andrews-Speed 2010). The party does this through appointing, dismissing, and moving human resources in and out of key positions and guiding important decisions through a process of elite

consultation (or deliberation) that takes place in ‘small leadership teams’ (*lingdao xiaozu*) (Chan 2003, p. 407).

Given the complex matrix relationships between different administrative levels and departments of government, central powers face challenges gathering information and input that is reliable and meaningful to decision-making. When drawing up policies or rules for the further implementation of existing priorities, lawmakers and those responsible for implementing the law need to be able to judge and evaluate what is working and what is not.

In Western systems, the media and NGOs perform an important function in providing feedback mechanisms and input into the perception and knowledge of regulators and lawmakers. In China, the absence of an independent and free media, as well as a highly underdeveloped ‘third sector’ of civil society, leaves a gap that must be bridged by other methods. Deliberation is one such method.

The situation with energy efficiency in Chinese SOEs is one in which an understanding of realities on the ground is gained through constant and multiple conversations that are embedded in practice. Regulators can accumulate knowledge through a combination of what makes sense under rational scrutiny and what appears to be yielding desirable results as shown by the data collected from experiences. This process is threatened when political ideology overrides scientific process or where dispassionate reflection and calculation are undermined by ‘yes-man’ deferentialism to leaders, either in the hope of currying favour or for fear of incurring displeasure, which can occur in the ways discussed in Chapters 4 and 6.

Interestingly, much of what is most visible, especially to outside observers, is scripted or highly structured and constrained in terms of deliberation. However, there are forums in which frank and less constrained deliberations take place—behind the curtain, usually, and often focused around specifics; it is easier to roll up one’s sleeves when focusing on a project or a task such that issues, not individuals, are the key focus. One is reminded again of the pithy comment ‘big things have small meetings’, which suggests a kind of ultimate ‘rule by elite’, but there are also elements of inclusion and participation in the process.

Marx had the idea of democratic centralism (*minzhujizhongzhi*). In this system of democratic centralism where you enquire, research, provide feedback to the centre and once they decide, you stick with it. But for example, when we get our colleagues together, good luck getting a decision or input out of them. Or look at the Eighteenth CCP National Congress (*shibada*). It is all scripted. So where does the collaboration and deliberation happen? Does this happen within the party rather than the government? It must be within the NDRC, Shanghai Advanced Research Institute (SARI). Deliberation has a very long history in China ... so you can see the willingness to deliberate and learn. [DW-KM&RW]

Any deliberation is only as good as the information that is brought to it. Thus, the collection, production, analysis, and presentation of information matter. Deliberations based on quality information are clearly more effective than deliberation that occurs in the dark or with fudged numbers.

The force of informationalisation and the possibilities allowed by recent technological developments in tracking and sharing information are disruptive factors that are enabling better regulation of enterprises by their headquarters. Several enterprise managers commented about the impact of automation and control systems that allow for the generation of huge amounts of data that can be used to inform decision-making and planning. Again, this is mostly only useful to headquarters who have the resources and know-how to make sense of the numbers. Regulators like the NDRC and Economic and Information Committee (*jinxinwei*) may identify anomalies or patterns, but lack the manpower and the specialised experience to make significant input or sense from such data without expert assistance that they currently don't have time to seek out. But for headquarters, the access to such information allows significant insight and an ability to manage more directly.

Informationalisation is a big force for us at Sinopec. In recent years, everything is on digital systems so it's very difficult to fudge numbers or play games with our headquarters. [LSIN-CKZ ZKZ]

7.5.2. *Deliberation about theories and to diffuse experience*

How learning occurs is as important as what is being learned. The process or methods of learning are critical to the long-term objective of creating what Fiorino refers to as reflexive dynamics in regulation. If regulators at every level (government, headquarters, within the enterprise) develop ways of learning, rather than fixed understandings of problems and solutions, then their understanding can evolve and improve. This is conducive to the localisation of decision-making and the eventual empowerment of the leaders who are closest to the problems. However, this is a process and there are several key methods that are used to promote it. Deliberation is at the core of these processes. As one manager explains:

We have large meetings in which macro concepts and directions are discussed and explored. Then I consider these concepts and compare them to our own circumstances and context. From there, I decide on a set of things.

Also, headquarters constantly conducts fieldwork or diligence into what we are doing. They keep sending expert panels to us. Take, for example, water recycling systems. These are huge volumes of water and there are huge energy efficiency implications to this work. It is important how we utilise our pumps, how much water, how much pressure, etc. They will then benchmark against many of our other plants and send proposals and funding to help us. They will make their own calculations about how much savings we can make.

Also, headquarters will send experts to come and be with us in areas where we haven't done so well. They will do a pointed study and, through a process of dialogue and communiques, give us a list of things we need to do to improve. Listing things that need investment and things that need new management. They give money where needed and push us to accomplish. [XSIN-WC]

The passage above touches upon a few different concepts related to methods of learning. Learning occurs through deliberation, praxis, and benchmarking.

Headquarters also organises lots of high-level training. I've attended many times, usually twice a year. At our plant level, we have occasional training called Job Training (*gangwei lianbing*). For example, this week, I will organise a team of folks to display some new

technologies and where our plant sits relative to others and what we need to do to keep up. [XSIN-WC]

Another method of learning is through cross-pollination between sibling firms:

Learning from other sites is a method; we can proactively go and sometimes headquarters organises. For example, Loss Control (*sunshi guanli*). So, we think a certain plant is doing this well, and we will go to study how they've done it. We know who is doing well because of our regular biannual meetings where everyone connects and shares. [XSIN-WC]

To the extent that deliberations are used to share knowledge and best practice, they are helpful to enterprises in increasing energy efficiency. Numerically, one respondent estimated that the majority (60%) of changes made to processes are learned or adapted from other plants [LSIN-CKZ]. Indeed, the ability of deliberation to diffuse best practices may be one of the most influential factors identified here. It has proven to have numerous benefits, being easy, cheap, of proven effectiveness, scalable, and low-risk. An energy efficiency manager at a large plant in eastern China described how deliberation hosts benchmarking.

In principle, I don't participate in their [operational division's] meetings but I am responsible for promoting effective technologies and methods for saving energy. New technologies: we use good experiences as experimental points (*shidian*).⁶⁸ Also, Shanghai municipality has technology sharing meetings and we attend. They [the operational division] don't go. We go and come back and report. SOEs have this strength—lots of platforms for communication. Each leader will hold review meetings every few months. Various individuals come together to discuss. Also, international visitors with new technologies come to our department. [JSIN-ZZ]

However, deliberation can be heavily influenced by employee deference to higher-ups:

Our technology recommendations are recommendations not commands. But if the leader promotes it, then it is mandated. In an SOE we say if the leader recommends, it is mandated. [JSIN-ZZ]

The last part of the quote above highlights again the risk of power-relationship dynamics as disruptors of the scientific process and rigorous decision-making. Often, leaders with experience are aware of the 'mandatory' weight of their recommendations and so they are very cautious in how they communicate to prevent unnecessary interference. However, this is not always the case, and many bad decisions or problematic case studies are the result of something a leader said that no one had the volition to contradict.

One way to avoid this sort of folly is to have checks and balances of some sort. SOEs are less inclined towards outright adversarialism, but there are bureaucratic measures and matrices in the relationships between managers and decision-makers that are designed to create interdependencies, and those interdependencies result in a sort of accountability and connectedness. Matrix relationships and interconnectedness are certainly a feature of structure and culture. But it is what this structure and culture give rise to that is the real factor here. The structure and culture give rise to deliberation and constant sharing and distribution

⁶⁸ See Heilmann (2008a).

of information. The sharing and distribution of information, in turn, increases the ability to triangulate and verify information. It also creates a cadence within the organisation and generally helps align actors within an enterprise and enterprises with regulators. Course correction can happen much more speedily where these sorts of neuron networks exist.

The main reason for the speedy movement of information is: lots of non-direct managerial relationships. You report to so many people, so everyone keeps good relationships and communication with lots of people. [ZHSIN-CZ]

Maintaining good relationships as a matter of self-interest goes much further than just reporting lines. Given the interconnectedness of people at various levels, one never really knows which relationship may impact a future promotion or one's career more generally, so most people operate with a great deal of decorum and caution. This is touched on in the section on careerism and social licence, but is raised here as a dynamic that affects deliberation:

Once or twice a year we attend energy efficiency meetings and report to each other at headquarters. We then follow up on themes that are relevant to us. We also welcome outsiders to introduce their experience to us. We have very little contact with foreign oil and gas companies. Within Sinopec we are super open—constant discussions and interaction. This occurs mainly through meetings, making contacts and issues or leads or examples/cases ... At headquarters, there is an Energy Management and Environmental Protections Department (*nengyuan guanli huanbao bu*). [ZHSIN-CZ]

One other dimension of deliberation that deserves mention is deliberation internationally. This often occurs through third-party agencies such as the World Bank or other development organisations. Publications, events, and delegations all form part of international deliberation activities. These forums allow China to learn from more advanced groups and countries but also, more recently, provide a space for China to showcase its own technologies and governance methods. It is becoming increasingly common for developing countries to turn to China as a model of development success and to subscribe to bundles of Chinese support that include finance, technology, and methods. A 2014 World Bank paper titled *Bringing China's Energy Efficiency Experience to the World* is a good example of this dynamic.⁶⁹

It can be seen that structure and institutions that foster deliberation are repeatedly emphasised as highly relevant to improving learning and capacity-building around energy efficiency.

7.5.3. Deliberation as a means of capacity-building

Several of the insights presented above seem to fit a narrative of developments that strengthen regulators' ability to enforce. While informationalisation that makes it difficult to fudge numbers, and managerial or technical instruments and innovations that lead to increases in involvement and supervision from headquarters seem to be merely empowering regulators by allowing them access to information and enabling punitive measures, the reality is more complex. These developments combine with elements of social licence, such as naming and shaming, to promote self-regulation within the enterprise. But, most critically, it is the

⁶⁹ <https://www.worldbank.org/en/news/feature/2014/06/27/bringing-chinas-energy-efficiency-experience-to-the-world-knowledge-exchange-with-asian-countries>

building of capacity within enterprises that enables effective regulation. As the following section describes, capacity-building was found to be a key factor in this study, both in terms of achieving regulatory outcomes and as an aim and focus of the regulatory system. Energy efficiency is an issue that is win–win for the enterprise, even in the short term. Thus, enterprises are aligned with regulators in the broad goal of increasing efficiency. The challenge for enterprises is how to achieve the goal, and how to prioritise⁷⁰ it against other, sometimes competing, aims such as continuity, budget, return on investment, and quality of output. This means that the capacity to design and roll out systems for energy efficiency and to continually improve them is a capacity that is core to effectiveness. It is the absence of this capacity that seems to be a bottleneck for many enterprises. Thus, for regulators, achieving regulatory outcomes necessitates increasing capacity to achieve basic compliance as well as the ‘beyond compliance’ innovations that are necessary to making gains in energy efficiency.

This building of capacity will be further explored below. It is also important to note, however, that capacity-building is a significant outcome of deliberation. Thus, deliberative processes between regulators and enterprises, and within enterprises, serve to build capacity through an iterative communicative process.

When reflecting on comments from enterprises in particular, about how informationalisation makes it difficult to fudge numbers, or about increased involvement and supervision from headquarters through various instruments and innovations, be they technological or managerial, one might see these factors as a part of strengthening the ability to enforce, empowering regulators with access to information that may trigger the use of some kind of punitive measures. Equally, one might say that such information combined with elements of social licence—naming and shaming—would lead to better self-regulation within the enterprise. And both observations would be true.

However, the earlier quotes also highlight something further, something that lies at the nub of this study—namely, that capacity-building is critical and is certainly a focus of the regulatory system around energy efficiency. Since energy efficiency is win–win for the enterprise, even in the short term, enterprises are aligned with the overall goal of increasing efficiency. The challenge for them is how to achieve it and how to prioritise it against their other aims (continuity, budget, return on investment, quality of output etc.). Thus, the capacity to design and roll out systems for energy efficiency and to continually improve them is a capacity that is core to effectiveness. The absence of this capacity is often one of the bottlenecks for many enterprises. For regulators, achieving regulatory outcomes necessitates increasing the capacity and ability to achieve continuous improvement. This is taken up in Chapter 8.

7.6. Maintaining a credible threat

Although this chapter has focused on deliberation and collaborative approaches, it should be acknowledged that traditional enforcement of strict regulations still occurs in this space. It

⁷⁰ Prioritising competing goals is something of a normative exercise and the relationship between capacity-building and norm-building is acknowledged and addressed further on in this chapter.

would be erroneous to conclude that the government is absent from regulation or that it lacks the will to intervene against powerful or ‘lifeline industry’ SOEs.⁷¹ The threat of potentially very tough consequences underlies much of the ordinary day-to-day contact between regulators and regulatees and is what allows exchanges to happen with so much decorum. There are examples of government intervening with severe measures, even with refineries, even with the biggest and most reputable of them.

Local government—if the area meets its number, they will be OK. But if they can’t meet their overall numbers, then it’s trouble. For example, Zhenhai [one of Sinopec’s flagship refineries]—they added a project which they didn’t plan properly for. The provincial government directly limited their manufacturing. So, there are some exceptional cases where if a plant cannot meet its overall numbers, the government will come and slow you down to make sure they don’t miss their overall figures. But even in such extreme cases they won’t limit your refining probably, but they will limit petrochemical work. [XSIN-WHW]

This passage describing shut-down events and direct government intervention in firm operations and output relates to an extreme, almost belligerent violation. The response of the government here was not punitive so much as part of an effort to avoid missing its own city-level targets, which were blown out by the firm’s failure to plan and communicate.

In fact, one senior manager at a large refinery provided a dissenting voice in one of his comments, making a sweeping statement that, in China, it is the severe consequences that ultimately lead to change, rather than the expert panels from Beijing and deliberations and capacity-building that they represent.

[I]n fact, the role of such groups as the expert panels in Beijing, is very limited. In China, without inspections, fines and penalties, there will be very little change implemented. Like in the criminal sphere. Without police and jails, what use is the law? [JSIN-JZ]

His comments, however, taken within the rest of his overall responses, can be viewed as a reemphasis of the need to build the base of the regulatory pyramid and the importance of maintaining a credible threat of real punishment.

7.7. Conclusion

As this chapter shows, engaging and animating enterprises to take responsibility for their own energy efficiency is critical to achieving their regulatory outcomes. Hence, the enterprise’s knowledge and capacity to effect change are threshold issues to materialising change. Notably, as actors’ capacity and knowledge increase, so does the motivation to improve further, leading to a virtuous compliance cycle.

Deliberation contributes in a substantial way to regulating energy efficiency. Immediate (short-term) benefits emerge from deliberations that result in targets being adjusted either internally or with regulators. The more impactful and lasting (long-term) results, which are more difficult to observe and measure, occur at the level of enhancing access to information,

⁷¹ Lifeline industries (*mingmaihangye*) are those considered to be critical to the security or development of China and include core infrastructure such as refineries.

raising capacity, and increasing learning generally within and across enterprises and with regulators in their ability to support enterprises.

Unity of vision and understanding helps drive success in achieving energy efficiency. Deliberation helps to increase such unity and align expectations. Planning is informed by deliberations that take place at various levels and between different actors, but the most fruitful deliberations are those that occur scientifically or in the authentic pursuit of improved knowledge. Most often this occurs within the SOE in the ‘shadow regulation’ space described in the third chapter. One of the key objects of this deliberation is targets: setting them and meeting them. Such deliberations are fruitful because they occur around a concrete issue that participants work together to solve. This situation aligns interests among actors. The process of deliberation helps to triangulate information, diffuse experience and new ideas, and build capacity and increase knowledge, as we will see in the next chapter.

Chapter 8. Capacity-building and learning

The solution of present-day problems lie in the re-establishment of a harmonious relationship between man and nature. To keep this relationship permanent we will have to digest the definition of real development: development is synonymous with culture. When we sublimate nature in a way that we achieve peace, happiness, prosperity and, ultimately, fulfilment along with satisfying our basic needs, we march towards culture.

– Sunderlal Bahuguna

In 2006 Sinopec started to promote water conservation and emission reduction (jieshuijianpai). This was an early manifestation of what we currently look at as energy efficiency and other things. They did investigation in many areas. For us they invested seventy or eighty million RMB to install systems for this purpose. These included technology systems (not just information systems). Headquarters sent people, an expert team. They came and did a review and understood our problems. They did extensive and scientific deliberations with us and then devised a solution with us.

– [XSIN-WC]

The sort of deliberation described in the above quotation is an example from one respondent of a process of collective learning and mentoring from headquarters that results in investment in improved technologies, but also in increased capacity of the local enterprise to evaluate its own needs and synthesise and apply knowledge to its own context.

8.1. Overview

Nearly all the previous chapters have contained excerpts from respondents who say that plants, even when they wish to improve their energy efficiency, lack the *capability* and *knowledge* necessary to make big improvements, indicating that capacity is an important bottleneck that must be addressed in improving SOE energy efficiency.

This chapter examines why capacity-building is particularly important to this setting and to energy efficiency in refineries. It then looks at the use of goals and targets, audits and reviews, and applications for funding and project approvals as forms of ‘regulatory exercises’ that drill enterprises and local regulators, developing their capacity for energy efficiency work. Then the chapter turns to localising responsibility and ownership and the effects of that localisation on building capacity. Finally, the chapter looks at capacity built through cross-pollination of learning and experience, before making concluding observations.

Capacity-building is particularly important not only because of a lack of simple cookie-cutter solutions to many of the complex problems in energy efficiency regulation, but also because of the recurring and evolving nature of the problems, suggesting that it is not sufficient to develop formulaic responses.

They are too customised, the problems we have. Perhaps the closest thing [to standardised solutions] is Solomon⁷² and their reports that benchmark everyone. This is one of the most centralised benchmarks. Such reports—including those we receive internally—tell us where we sit relative to others in every area. For example, energy usage, equipment repairs etc. [JSIN-JZ]

Respondents used the terms ‘capacity-building’ and ‘learning’ interchangeably and so the same practice has been adopted here. One respondent explained that capacity and learning are ‘two sides of the same coin’. If there is a subtle difference between the two notions, it is that capacity-building refers usually to developing the capability to perform certain acts, while learning refers to knowledge relevant to energy efficiency work.

8.2. Capacity-building as a regulatory factor

Capacity-building is often discussed by proponents of ‘new regulation’ or ‘overhaul’ approaches to governance. ‘There has been considerable institutional capacity-building to address environmental, climate change, and energy concerns at both the national and provincial levels’ (Schreurs, in Dryzek et al. 2011 p. 717). Such capacity-building has yielded mixed results and it is generally difficult to quantify or correlate the outcomes of capacity-building efforts, since they are often ‘soft’ in nature. Several other scholars from various fields, such as energy policy (Andrews-Speed 2010) and regulation (Fiorino 2010; Gunningham & Grabosky 1998) also acknowledge the importance of capacity-building. Fiorino’s work on environmental governance is replete with references to capacity-building and its importance for achieving better regulatory outcomes. He argues that it increases trust between industry and government, especially as industry has come to take on a greater role in global governance generally through globalisation (Fiorino 2004, p131).

Gunningham et al. (2004) introduce the concept of motivating enterprises to go ‘beyond compliance’ and argue that social licence as a regulatory factor causes enterprises to go beyond compliance. Here, I argue that in addition to social licence and political licence (discussed in Chapters 4 and 5), capacity-building is critical to going beyond compliance in energy efficiency, because enterprises need the know-how and people who can identify opportunities and design and implement energy efficiency solutions.

In Chinese politics, scholars have similarly commented on the importance of capacity-building in achieving improved governance structures and regulatory outcomes (Wang 2006, pp. 3, 13; Pearson 2005). Pearson points out that Western models emphasise strengthening the capacity of regulators. Similarly, Wang highlights the shortcomings in capacity of regulators as a reason for regulatory failure. However, most of the references to capacity-building in the interviews were made by enterprise employees about developing their own capacity to improve and self-regulate.

The common thread running through these discussions of capacity-building is an acknowledgement that capacity needs to be built at the individual and institutional level to

⁷² Solomon refers to Solomon Associates, an energy advisory firm that provides benchmarking data advisory services to companies in the energy industry.

improve the ability to comply with or respond to regulation. Although there are variations between different scholars and their concepts of capacity-building, as noted above, it can be useful to look to the field for strands of understanding about what capacity means at the working level.

8.3. Capacity-building is a Chinese development strategy

At the highest levels of Chinese government, policy impetus for capacity-building exists in the Eleventh Five-Year Plan as well as State Council policy guidance⁷³ calls for the development of capacity at various levels in energy work. A senior NDRC leader who has energy efficiency as part of his portfolio commented on the importance of capacity-building and learning to energy efficiency regulation.

Capacity-building and learning are two sides of the same coin. These are also extremely important. Capacity-building comprises three parts, of course the core is that we need people who have learned the ability to do things: one is regulatory ability (*jianguan nengli*), this refers to the ability of the government to generally manage and understand the field, the second is the ability to inspect and implement the law (*jiancha shifaw nengli*), this includes the ability to penalise, the third is technology ability (*jishu nengli*), this means providing support both from government organs and through market instruments like energy contracting or other market oriented technology and services.
[XNDRC-CH]

8.4. Capacity-building through practice in the energy sector

Capacity is ultimately built through practice. Thoughtful practice occurs when practice occurs and is documented, studied, and deliberated upon collectively by groups undertaking similar endeavours. Thus, a careful study of the common instruments and elements of regulatory activity brings to light facets of capacity-building. Such simple activities as setting goals and targets; instruments such as incentives; and structural changes, such as localising authority or responsibility, can all be forums wherein capacity of actors is built and exercised.

According to engineers and managers within the plants, capacity-building is key because of two significant problems. The first is a loss, in the 1990s, of many of the key people, skills, and capabilities related to promotion and implementation of energy efficiency. The second problem is that improving energy efficiency in refineries and petrochemical plants does not lend itself to simple solutions. Two engineers from a smaller and old facility with a well-regarded energy efficiency division in western China commented:

In the 80s there was a lot of attention and success in energy efficiency. We had good management. During the 90s there was such an unbridled push for economic growth that that became the pure focus and energy efficiency and other things were marginalised and consequently during that decade and much of the next, we lost a lot of the people, skills, and capabilities related to energy efficiency and its promotion and implementation.
[LSIN-CKZ ZKZ]

⁷³ See http://www.gov.cn/zhengce/2015-09/13/content_2930440.htm

A senior sales manager and technology expert in a company that provides furnaces to refineries and plants across the whole country described the second problem in these terms.

Everyone has awareness of energy efficiency now, but how to implement is the big challenge. It's a challenge of implementation. The hardest thing is the contradiction between demand and efficiency. The government is not going to shut them down, so how to resolve the contradiction? Beijing did well in the Olympics. They shut down a lot of big polluters. [LYCAL-YZ]

Interviewees generally emphasised the significance of capacity-building: implementation requires actors capable of implementing. Such individuals must be developed through a process that involves imparting certain skills but also, and more importantly, developing within them the awareness of core issues, the ability to identify and interpret challenges and opportunities, and the capability to synthesise and apply knowledge to make improvements that will result in reflexivity—the ability to make ongoing improvements towards the metrics of improving energy efficiency.

8.5. Capacity-building helps fill gaps in the laws where bureaucrats have authority

When laws are vague or leave lots of gaps,⁷⁴ as they do currently in energy efficiency, then much turns on how executive or bureaucratic autonomy is exercised. Whether such exercise of discretion is done competently and with integrity depends on the qualities and capabilities of those in positions of authority. This makes capacity-building even more important.

Individual discretion means that the level of knowledge and judgement of local bureaucrats is important. They must be able to make good decisions and discharge their obligations effectively. Discretion is expected to comply with law and policy, but this does not always happen.⁷⁵ One very thoughtful NDRC leader, who came originally from a military background, described it in the following terms.

In the long term, laws are necessary but in the short-term, administrative measures and human interaction is the way that things get done. In China, whether it is the law or the administrative system of the government that guides, this is a deep question. [XNDRC-CH]

This shift towards professionalisation of administrators, and rule by law or legal principles, is closely related to the building of professional capacity of those who administer the laws, such as regulators. Hence, capacity-building helps those with authority exercise their discretion in ways that support regulatory priorities rather than merely the whims or social obligations of a bureaucrat.

⁷⁴ See Dai and Taube (2020) for the premise that gaps are left intentionally as part of 'strategic ambiguity in policy formation'.

⁷⁵ In common discourse in China there is reference to two ideas: 'rule of law' vs 'rule of man' (in Chinese, *fazhi* vs *renzhi*.) Often when bureaucrats exercise authority where wide gaps exist in the law, this is administrative rule, or 'rule by man'. It is commonly considered that China has traditionally been ruled by people and their discretion, hence the importance and emphasis in so many aspects of culture on relationships or *guanxi*. It is expected that where relationships are good, discretion will be applied favourably or reasonably at least. For further reading in this regard, see Peerenboom (2002) and Lubman (2002).

Here it is useful to revisit parts of a comment (cited in Chapter 3) from an individual with very close ties to the mayor's office in the same city. He notes very drily that, from his experience, much of what is accomplished even within the increasingly legalistic systems still turns on the exercise of individual discretion.

It's a question of how you enforce the law. For example, if you steal you will be subjected to charges of theft. But how many years, what punishment, is all up to individuals. This is the soft part. [XCG-CL]

Thus, although legal frameworks are emerging and playing a more prominent role in regulatory activities, the system still relies on people to function, and the culture and attitudes of those people still exhibit many features of the 'rule of man' society.

Within such a framework, it becomes extremely important how individuals with authority exercise regulatory discretion and action. For outcomes to be effective, regulators must have the will and the ability to function well. Will is affected by endogenous motivators and exogenous motivators. Factors such as norm-building and culture creation affect endogenous motivators—these have also been explored in Chapter 4. Factors such as incentives and targets are the most commonly used as exogenous motivators—many of these have been explored in Chapter 3. But will and ability are not isolated from each other. Rather, motivation grows as ability to achieve results and experience increases in breadth and depth. As with any field of expertise, as actors develop mastery, their levels of commitment and their abilities can grow together in a virtuous cycle. Hence, an evaluation of capacity-building requires some examination of both will and ability, and their interplay.

Interviewees explained that different actors (government, headquarters, plant leadership) often use different instruments to build capacity. The more knowledge an actor has of an enterprise, the more detailed and involved the instruments can be and the greater the rise in capacity and the effectiveness of the effort. Energy management engineers at a plant in western China described how each actor relates to them through different regulatory instruments:

The government manages us through inspections (*kaohe*) and targets. Headquarters, through targets and communiques. Our plant general manager, through targets and plans—short term plans, long term plans and ad hoc plans, training, competition etc. [LSIN-CKZ ZKZ]

The sections below examine the distinct qualities of capacity-building efforts carried out by different actors, such as headquarters, government, design institutes, and plant managers. They also explore the capacity-building process as it takes place around important regulatory instruments, such as goals and targets, as well as audits, reviews, and reports.

8.6. Building capacity through regulatory exercises—doing drills that strengthen capacities for energy efficiency

8.6.1. Who are the actors that do capacity-building?

Based on the informants' views, the bulk of capacity-building for the refineries visited is done or coordinated by headquarters. It is headquarters that has the know-how and reach

within the enterprises to be effective. Other parties also play roles. The local government supports campaigns for learning, coordinates across industries, and hosts certain events or forums. Design institutes provide experts and conduct research that is published or shared. Suppliers, consultants, and industry experts peddle their products and services but also bring knowledge and expertise that is shared, sometimes for a fee and sometimes as part of their promotional efforts. But the most frequently mentioned capacity-building activities during the interviews were those that related to regulators and headquarters.

Politically speaking, it is also worthwhile to note that it is not only headquarters that is involved in this process of local/indigenous capacity-building. This is perhaps one of the top priorities of the Ministry of Technology (MOT). Indeed, from a policy perspective, it is probably fair to say that the MOT (under direct guidance from the State Council) is driving the move towards local capacity-building throughout SOEs and even the private sector. The comment below is from a manager at a private company that supplies core technologies to refineries and petrochemical plants.

We've also submitted some projects or support from the government for our technology. For example, the Ministry of Technology has sponsored the development of some of our technology by giving us funding for research into energy efficiency technologies. [LRC-YZ CZ]

This was, however, the only instance where someone from a plant referred to the MOT. Typically, the MOT will not be directly involved in the sort of projects that impact energy efficiency for these plants. They are involved more at the strategic level, setting the direction of projects and allocating funds.

Surprisingly, sometimes we find the enterprise doing capacity-building of their regulators, as in the excerpt below.

Because we all lack proper systems or information—the numbers and targets they [government] give us are not reasonable and scientific. So, we have to ceaselessly communicate and work with them to build mutual capacity to set reasonable targets. It takes countless visits and time ... For example, the group under the NDRC is managed by them. Everyone wants to have good relations with them. For example, in safety, they don't understand our work at all; they are outsiders to the industry (*waiheng*). You can't have all experts. You also need managers. But they must develop some expertise. It won't be perfect in one second but over time it will improve. [XCQPC-SUO]

The comments above, from a PetroChina manager in western China, concern his dealings with local government regulators. Ironically, the passage above is an enterprise energy efficiency director talking about building the capacity of the local regulators. The last sentence of the excerpt might sound simple and mundane but is in fact rather profound. It highlights that the issue and outcomes are part of a process. It is not just a series of events, nor is it just about achieving compliance. What is taking place is a process of regulatory development through the strengthening of capacity in both regulated and regulators.

8.7. Setting goals and targets

This study argues that the process of setting goals and targets can serve to significantly build capacity in actors to make gains in energy efficiency. This only holds true, however, to the extent that the goal-setting process is conducted with certain characteristics. When conducted ‘scientifically’ and rigorously, rather than purely politically, and characterised by preparation, deliberation, and learning, the process can result in increased capacity to think, communicate, and act in terms of energy efficiency.

Targets set with headquarters are most instructive in this regard. Targets were discussed in Chapter 7 in relation to how they are set—through a deliberative process. Here, targets are discussed in terms of an important effect—capacity-building. The two processes, deliberative and educational, are, of course, intertwined and mutually reinforcing. Government regulators are often too disconnected from the actual circumstances of enterprises; their role is simply to set targets that are not too divorced from reality. It is then the SOE headquarters that manages the process of goal-setting and planning in a constructive way.

The main management methods are through targets and audits/inspections (*kaohe*). We are heavily regulated by our headquarters. They send documents (*wenjian*) and targets. Their targets are rolled up and then rolled down. They engage with us and require us to provide a lot of details to them and then they set our targets. It is based on our own current situation plus an analysis of how much growth or production we are expected to have. [LSIN-CKZ ZKZ]

This description of targets reveals a form of responsive regulation. It is clear how involved in the process *headquarters* is, in contrast to government, which seems peripheral. Headquarters is intimately involved in the process and sometimes even in the details to ensure variables are being properly accounted for. They are mentoring or accompanying their subsidiaries to strengthen their capacity to report, plan, and comply. This is quite a contrast to the way government regulators engage with the enterprise.

Government targets are firm and baseless. They just pass down what they have. But we have to meet those too. Headquarters’ targets are negotiated but we can’t negotiate much. However, we are involved in the process of setting them and they send people to audit/inspect (*kaohe*) and review. Not necessarily in person every year. But once a year our Development and Planning—(*fazhanguihua*) team will go and visit. Around August to October we communicate with the Development and Planning team at headquarters and they approve all expenditures etc. [LSIN-CKZ ZKZ]

In contrast, the approach of local or provincial government should have wide application because of the limited resources available to regulators and the huge array of enterprises they are expected to oversee.

In our eyes, there are many national SOEs⁷⁶ (*yangqi*) [that have a presence] in Luoyang. We don’t really care if you’re a national SOE. We just care you’re here and we govern you [locally]. We give them documents to manage them. But our relationship is one of partnership. Our requirements are all generally reasonable. We will meet a couple times

⁷⁶ Again, National SOEs or *zhongyangqiye* abbreviated to *yagqi*, are SOEs like the big oil and gas giants, airlines, and many other major SOEs that are nation-wide, often based in Beijing.

a year. Most of our issues are dealt with in such meetings. Too many companies in Luoyang so mostly by phone. Each year we also communicate about targets through document (*wenjian*), audits (*kaohe*), and to notify regarding meetings or training for energy efficiency. [LNDRC-WK]

These comments from the local NDRC in a province in central-western China, where one of the sites is located, show how the government is governing from fifty thousand feet. Their interaction with the enterprise in this case is limited to a few calls a year accompanied by some formal documents and targets, sometimes notifying of training or meetings for energy efficiency generally. Hence, the local government does not play much role in capacity-building.

The remoteness of the local regulators again highlights the significance of the corporate regulation that takes place through headquarters. Yet, even with the relative effectiveness of headquarters' regulation, overall progress is hindered by where the enterprises, and the industry, are on the learning curve in China.

In the more developed and advanced cities, government is more actively involved in the target-setting process. It is not the NDRC itself but, rather, the Economic and Information Committee of the city that is more technically oriented. This organisation's role varies in different cities depending on the way the government is structured locally. In Shanghai, where one of the research sites is located, it plays an active role and there is more collaboration even in the setting of targets. Meeting the targets is important, of course, but the underlying theme is one of building the capacity to comply and to plan to make improvements, as conveyed by the following excerpt.

The Municipal Commission of Economy and Information Technology (*jingjixingxi weiyuanhui*) helps us to set our targets. We start planning in October. By October our production plans are already out. So, the process is that we give a number based on our production plans. It works like this: government gives NDRC a total number, then this number is given to the province or city, then each enterprise is given its figures.

Next week I must go to meet with the government to request 13 million tons more of energy. They cannot possibly approve that. So, either I must explain—which explanation won't change their minds and then either reduce production or someone else is going to have lower production, then maybe we can buy from them. It's kind of like carbon trading but not quite. We're all learning from these processes. We are promoting something like that soon—a sort of carbon trading platform. So, we provide the numbers and they approve or balance. They [government] command the final decision. We can appeal but we'd be appealing to them. I have appealed in the past. It's not a problem to do so. [JSIN-ZZ]

Respondents from three localities noted that, in the early stages, energy efficiency management and target-setting is managed directly by the NDRC as part of its portfolio and then, as workload increases and human resources are strengthened, the function is spun-off for more independence. In many cities, they described how the environmental protection agency branches were similarly incubated under the NDRC and then gained their own space and resources.

Although subtleties vary a little in different localities and depending on the history of the plants, some common themes emerge from the passages above regarding goals and targets and their effect on capacity-building. The first is that headquarters plays a dominant and important role in working with local plants to develop their ability to plan and implement energy efficiency gains by working on goals and targets with them. The second is that as they gain confidence in their own ability to plan through setting goals and achieving them, plants become better able to engage with local regulators on targets that are set by them. The third is that as the capacity of local regulators and plants increases, the plants begin to work more intimately with the local regulators in setting targets and planning.

8.8. Audits, reviews and reports, and expert teams

When regulatory tools such as audits, reviews, reports, and expert teams are utilised in a collaborative fashion, they can also serve to build capacity for regulatory effectiveness in energy efficiency. Effective planning, auditing, guiding, and stewarding require capabilities (such as analysing status, target-setting, planning, and evaluation for ongoing improvement) that need to be nurtured and developed over time—both in regulators and regulatees. But there are also procedural, governance, and management capabilities that need to be enhanced at the government and enterprise level. Domain-specific knowledge needs to be learned, hence the importance of learning and enhancing the ability to learn.

Although traditionally thought of as instruments of control and evaluation (Power 1997; Loughlin & Scott 1997; Gunningham et al. 1999), audits and inspections can also be wielded differently as demonstrated by some of the process around SOEs in this study. The difference is nuanced but it was observed that audits and inspections were not just performed to catch out failures. Rather, they served as an internal feedback mechanism and the communication and effort exerted on them was also aimed at developing preventative capacity, or the capacity to be more compliant next time. At least six of the twenty-five enterprise respondents and two of the eight regulators, when discussing audits, referred to them as opportunities for feedback and improvement rather than as mechanisms for formal penalties.

All audits are not the same. But, in one sense, this capacity-building aspect of audits and inspections may be true for all audits or inspections. Some evidence for this interpretation lies in the variety of horizons of the audits and inspections, as highlighted by one energy efficiency manager in a small plant in western China who commented, ‘One is annual audit and inspection, the other is five-year audit and inspection. There are two horizons of performance appraisal’ [XSIN-WC]. Another government regulator from the local NDRC in Xi’an confirmed that ‘we don’t set their targets, but we audit them’ [XNDRC-CH]. What this means is that the NDRC has little say in the targets, but is the proxy expected to report on industry performance. This is consistent with previous quotes from other respondents about the inflexibility of local targets handed out by the local NDRC.

The existence of more than one horizon for the audits suggests motives beyond just catching out enterprises. One must also bear in mind that the audits described by this division chief are government audits. What respondents described can be boiled down as: government does not really know what it is doing and it does not have the resources to audit us stringently, but

it has a cadence of coming and inspecting and auditing us regularly and in different ways against its targets, so we must work on this issue and it keeps ratcheting up its targets each year, so we must make some improvements. And even though we can game them, eventually, we also must improve and get good at what we are talking about. So, this process and drilling forces us to grow and improve.

There are also audits carried out by headquarters. Headquarters obviously has expertise and domain knowledge as well as resources. As shown in Chapter 3, they are the shadow regulator or (surrogate regulator) for the authorities. Headquarters fills a regulatory gap where local regulators are not able to provide dedicated mentoring or accompaniment in the process of planning and learning from the audits and their results. As one site leader commented, ‘the improvements we learn to make we either innovate ourselves, or learn from our colleagues in other plants ... local government has little to offer’ [JSIN-ZZ]. The gap exists partly because regulators simply lack the resources or ‘feet on the street’, but also because they lack detailed necessary knowledge, as previously described.

8.9. Applications and approvals as a way of documenting and reviewing learning

Because managers and operators are often challenged with questions of what and how, the help they require is management knowledge and expertise or technical knowledge and expertise, and most often a combination of both. The process of application and approval for funding creates a framework in which firms need to continually improve their ability to develop new ideas, analyse their feasibility, and socialise them for support. Forcing engineers and managers to write applications and do feasibility studies for grants or investment dollars thus builds capacity. That capacity, in turn, drives more and better attention to energy efficiency.

New ideas come from us locally. They are usually originated from many levels—engineers, managers etc. Every year when a project is completed rewards are given to those who come up with the ideas. They will start with a verbal discussion. Then prepare a report and submit to senior folks. Locally we can approve investments of up to one million RMB. There are two tracks for approval [local and central]. Every penny of course needs lots of approval. But within hundreds of thousands of RMB, we can make some expenditures. [XCQPC-SUO]

Interviews with senior executives at headquarters confirmed that the process of requiring applications for even relatively minor expenditures serves a threefold purpose: ensuring wise investment decisions, having robust financial controls, and developing the capacity of plants to think systematically about their choices [BSIN-MS].

Interestingly, similar processes were used for decades after China’s opening-up to foreign investment, in the approval processes for establishment of new companies and joint ventures. Several former Ministry of Commerce officials who were informally interviewed confirmed that this was partly to ensure centralised control over certain decisions and partly to hone and develop business acumen among local companies and local government bureaus, helping guard against exploitation and big failures during the opening-up period. Some of these measures are still part of the application and approval process for joint ventures in China—

where the government requires submission of a feasibility study that describes how the new enterprise will generally develop strategically and financially.

8.10. Localising responsibility and ownership

Another way of building capacity is through localising responsibility and ownership and, therefore, accountability. In recent years, finances are more closely monitored and controlled by headquarters, meaning expenditures on energy efficiency require approvals. This is a form of centralisation that can slow down decision-making and disempower local plants. But viewed through the lens of capacity-building, other consequences can also be observed. For example, many of the processes involved in seeking approvals for new projects or for funding call upon local actors to plan and think through the feasibility of their intentions and consider their implications for energy efficiency, emissions, or other salient regulatory priorities. Thus, plants are required to essentially prepare business cases for their proposed investments.

‘New projects’ (in the passage below) usually refers to extensions or new facilities or plants. These are huge investments that will set the baseline for decades to come. Approval for such projects is required from high levels of government and is focalised around the NDRC. Funding may refer to funding for retrofits or enhancements to existing facilities; it is approved within the enterprise, but by headquarters for any significant amount. What is important to this theme is that the process of applying for these approvals is developing a rigour and habits that not only signal the importance of these issues and nurture a consciousness of the issues but also provide training in the abilities to evaluate technology, investment, and management systems effectively so that sound decisions can be made. The comments below are from a senior manager at one of the largest refineries in China.

One is for new projects, we must do an energy assessment (*nengpin*) and an environmental impact assessment (*huanping*) and a safety assessment (*anping*). Since around 2011 this practice started. The goal is to control your project’s GDP [energy] intensity to be in keeping with the region. If you go over, then you must resolve it yourself or the local government has to make it up for you. [ZHSIN-CZ]

These assessments are required by law and affect major projects and investments by all companies. Refineries and petrochemical plants are scrutinised because of the risk they pose on all three fronts—energy, environment, and safety. The respondent goes on to describe that these assessments involve third-party evaluation that ensures greater independence, provides for some domain expertise, and allows for additional resources to work with the plants in developing their own local capacity to assess their impact in these areas of regulation.

For us this is a big deal because we constantly have new projects. In this way, they localise responsibility and ownership for the overall energy consumption and intensity of a province or city. These evaluations are conducted by third parties that are specially licensed by the authorities. The one that we suffer a lot because of is the environmental assessment/evaluation. They will review also the reasonableness of your project overall and expect you to demonstrate modernity, etc. This is also for new projects. For existing facilities, they don’t expect these evaluations. So, when you choose machinery, you must use good modern machinery. [ZHSIN-CZ]

In the excerpt above, the respondent describes the application and approval process and how it drives learning. He also presents conflicting evidence about whether headquarters or the plant is in the best position to make energy efficiency decisions for the plant.

Regarding the selection of technology and investment—both of which are discussed in more detail in the section below on energy efficiency solutions—the same respondent notes that although the government and headquarters both have expert panels, none of them are as well informed as the plant.

There are experts from the government and from the Sinopec headquarters that participate in determining what machineries are modern. But ultimately no one knows as well as the plant ... This is the big change in the regulatory atmosphere. Two levels—control your GDP usage, also your energy efficiency work. If you want to continue working, you need to improve a lot of your backward practices. [ZHSIN-CZ]

The dissenting view from headquarters is that ‘sometimes the plants think they know what’s best for their technology needs, but we do a lot of benchmarking and have to ensure good procurement practices [corruption]. But we want them to pull what they need from us, then we can oversee’ [BSIN-MS].

Whether headquarters or plants know best is moot. But what headquarters and the plant agree on is that the focus is on improving the ability of the plant to find solutions for itself. Government regulators, and even headquarters, are ultimately pulling levers of varying degrees of delicacy to exact results from the plants. As one section manager describes his sense of ownership of policies:

When policies come from above, our engineers locally can adapt local implementation policies and measures and our engineers can work with the local implementers to cooperate to ensure this can be delivered effectively. We all have to cooperate. [XSIN-DKZ]

Thus, local managers are structurally and procedurally prompted to take responsibility for solutions, particularly for energy efficiency. To do so, they cooperate and draw resources and help from where they can. One final passage from an energy efficiency manager in a plant in eastern China captures this crisply: ‘Quality, environment, and safety, others will inspect. But efficiency—we evaluate ourselves’ [JSIN-ZZ].

This manager states that the plant evaluates its own energy efficiency progress, indicating local empowerment, but perhaps also that energy efficiency has not yet fully matured to be an issue that is strictly regulated in the same way the environment and safety are. Why is energy efficiency still left so much to the local plant to administer? Perhaps part of the answer lies in the kinds of solutions that energy efficiency requires. The issue of energy efficiency solutions is examined next.

8.10.1. Energy efficiency solutions

After the problems of energy efficiency are defined and prioritised comes the work of solving those problems. Solutions related to energy efficiency usually require decisions to be made

in three areas: technology, investment, and management systems. Issues may require decisions in one or all of these areas.

Headquarters plays a key role in facilitating learning and capacity-building to make decisions in these three areas. Within the enterprise, it is the top management of the plant and corporate headquarters that regulates how these decisions are made. The involvement of headquarters is almost universally seen by the managers in interviews as a positive factor contributing to improving energy efficiency gains. Headquarters both facilitates learning to help make these decisions and directly involves itself in decision-making through approval processes. As stated earlier, these approval processes are aimed at developing capacity as well.

As flagged earlier—in the discussion of ‘Who are the actors that do capacity-building’—design institutes also play an important role in designing and selecting solutions. They are particularly important where *new* facilities or *major* projects are underway.⁷⁷

To gain insight into how capacity for compliance and innovating solutions is strengthened on the ground, it is worthwhile briefly examining the three key areas where decisions are made for solutions in more detail below to gain colour around how plants view each.

8.10.2. Technology

Enterprise leaders were readily able to cite examples of technology-related decisions that have been made with varying degrees of success. Often when describing these successes, they would go into intricate detail evaluating how the decisions were implemented and the various experiences gained from their implementation. Some of these decisions are rather obvious and straightforward practices that are common in international facilities. Others are local innovations that are shared among the enterprises as a result of coordination from headquarters. An engineering leader from a small and ageing, local petrochemical plant provided several examples.

First, Pump Frequency conversion —*jibeng bianping*. Recently we’ve all been using inverter motors—*bianping dianji*. This refers to flat brushless DC motors for small spaces Which is helping to conserve electricity. We have in total ten pumps. Lots of people are using this technology now.

Second, Recovery of Condensate Water—*ningjieshui de huishou*. Using water after it has been steamed for its high temperature. We reuse fifty tons per hour of recycled warm water.

Third, Steam Water Recovery and Utilisation—*qiti shui de huishou liyong*. This is more saving water not electricity, but it adds up to improved efficiency.

Also in connection with our reheating-furnace process—*jiare lu gongyi guocheng*—we are making improvements with the oil that is used in heating furnaces. Five boilers all use gas that is a byproduct of these processes. These initiatives came from three sources: projects promoted by headquarters; sharing of successes from our brother factories in other places—we come back and use them; and creative ideas that are invented by our

⁷⁷ See chapter 5a, Epistemic Discourses, for a brief introduction to design institutes.

local engineers. Effectiveness in energy efficiency cannot depart from these three elements. [XSIN-DKZ]

A few things are noteworthy here. First, from a technological standpoint, the innovations described are not new and can be commonly found in refineries. So the idea of innovation held by these engineers is not necessarily one of inventing the idea so much as being able to copy and adapt the idea locally. Second, of the three places these designs come from, two are directly related to programs coordinated through headquarters for promoting learning and sharing. The third—creative ideas invented by local engineers—is partly a wild card, but also relies heavily on the ongoing skill- and ability-building promoted by headquarters and sometimes through design institutes. Thus, the importance of headquarters in promoting grassroots learning and capacity-building is highlighted in this passage.

A more senior engineering leader (division director-level) from the same small and ageing facility also shared examples of technological innovations and how they come to exist.

Low temperature heat utilisation (*diwenri*) is something we promote in many places. We use it to heat the crude oil. It works for heating but also for cooling. In good situations, then we use it for some equipment cooling ... Each site will develop a program and feasibility study and headquarters will review and approve. Mostly we are dealing with headquarters Refining Management Division (*lianyou shiye bu*). They will hand it up to Corporate Development and Planning Department (*fazhan jihu bu*) usually for anything above 30 million RMB of investment, their approval is needed. [XSIN-WC]

As in the passage above from his colleague [DKZ], this director refers to the influence of headquarters in not only promoting technologies but also approving the selection of them. The process is not just one of control but, rather, one that inherently causes learning. The enterprise must identify an issue and propose a solution with a feasibility report. Headquarters reviews and approves the report based on certain metrics and expectations that the technology is expected to meet. Often these metrics are tied to return on investment as well – making the issue of energy efficiency one of economics. Again, it is worth mentioning that the technology referred to is not cutting-edge, which is not surprising in this case as the site is old and small.

In addition to learning from other sites within a group, or even within the few major SOE refineries (as referenced in Chapter 5), some learning and exchange also takes place at the international level. Again, this is mostly coordinated either by provincial or higher levels of government or through headquarters—mostly through headquarters. Learning from international players has an additional layer of complexity in that every company and country has vested interests in promoting certain technologies and approaches, and there is some caution and reluctance to become overly dependent on any one or few systems given the highly sensitive nature of refining and petrochemical activity and its importance to national security. Similar phenomena exist for flight navigation systems, telecommunication operating systems, and so forth in that, as a nation, China does not want to be prone to ‘hacking’ of one form or another.

State government is also learning from other countries—Japan and the US—about energy efficiency contracts. Since they promoted this new kind of contracting and there have

appeared countless companies who promise that they can achieve savings. But we cannot tell which is actually good. As these companies all surface and we can be clearer who is who, then we will be in a better position to evaluate them. [XCQPC-SUO]

While the comments from this senior enterprise leader seem somewhat cryptic towards the end, his offline commentary and the context of his comments made it clear that he is referring to the complex array of issues described above.

Thus, technology can have a significant impact on energy efficiency. But for technology to work, certain conditions are needed. First, appropriate choices need to be made about technology. Second, the people using the technology need to be capable of using it effectively and of adapting as needs change. When these two conditions exist together, technology can have a positive and lasting effect on regulatory outcomes.

The several passages above are from enterprise leaders and engineers. Below is a short passage from a director in the NDRC at the city level where the same enterprises are located. He is stating that training and promotion of technology are among the main instruments through which the government can support local industries.

Successes ... Our main instruments ... Training and promotion of technology. Each year—NDRC will promote certain notable technologies or developments and then sometimes we tie this to funding or rewards. [XNDRC-CH]

So, from the NDRC's perspective, the promotion of technologies has been key to successes and they drive 'desirable' behaviours or choices by tying them to funding or rewards to the plant, so that the plant can make the investments with more ease. This leads neatly into the issue of investment, which is closely tied to selection of technologies.

8.10.3. Investment

Investment can be thought of in three buckets: investment in hardware, investment in software, investment in people. Traditionally, Chinese SOEs have been big spenders on hardware and have fallen short on investment in software and people. There are many anecdotes about Chinese hospitals with state-of-the-art MRI devices or other equipment sitting collecting dust because of maintenance issues or lack of personnel able to operate the machines.

In refineries and petrochemical facilities, there has been a solid history of investment in software relating to control systems and technologies—DCS (digital control systems) that help monitor and regulate the movement and flow of production factors, including energy in a facility. Every plant I visited had some form of DCS; it is scarcely possible to operate plants these days without one. More recently, increasing investment in people has also emerged. One must acknowledge the number of meetings, conferences, and delegations abroad to learn best practices that are undertaken by headquarters to raise consciousness and increase capacity. Big investment decisions, however, are mostly constrained by requirements on return. Decision-making on energy efficiency investments is constrained by the tendency of people to make imperfect calculations and be influenced by emotions or biases, even when

they are trying to be rational (Green & Shapiro 1994; Kahneman 2011). This is described by a manager in a large refinery in eastern China.

In our enterprise, we are most afraid of investment. When you invest—it takes a long time for the result to be visible. Not like if you buy products and sell them immediately. In reality it's not such a slow return to invest in energy efficiency, but it's not that visible. For us Chinese, if I invest, I want to invest one dollar and get two. I feel like it worked. But if I invest eight or ten dollars; if I save two dollars, I won't feel the saving. It's not obvious where the saving came from ... Energy efficiency is definitely a theme that is now receiving attention. But to implement in SOEs, it is still a big step. Currently we're not forced, so less effect. [JSIN-YAO]

The manager of a refinery of substantial scale comments above about the pressures of return on investment and proving correlation. Establishing correlation is cherished in many circles and is most certainly important, yet one can see here that overemphasis on the need for direct correlation can inhibit the achievement of important goals. This challenge of finding and proving correlation is exacerbated by the complexity of the systems, as described by the manager above in his use of the term 'visible' and in his last few words: 'it's not that obvious where the saving came from'.

Perhaps in order not to bear too heavily on the enterprises, some autonomy is permitted by headquarters for smaller expenditures; but for most plants, the limits of their independent authority are set quite low when it comes to new investments. Headquarters maintains tight control over the purse strings for capital outlays.

When we have new ideas—if they are in the tens of thousands of RMB then we can have them approved by the general manager. Bigger changes like a few hundred thousand RMB need approval from headquarters—again mostly seasonally. We are generally supported to make our changes but we are constrained in terms of having to show the feasibility of our plans. And return on investments. [LSIN-CKZ]

The passage above is telling and should not be read just on its face value. From the perspective of the enterprise, this low-level manager is describing the limits of local authority and is testifying that he generally feels support from headquarters to make changes and investments. However, within the broader narrative of learning and capacity-building, his comments reveal something else as well: that to receive funding the enterprise and the people applying for funding must go through a process of thought and reflection, a process that necessitates learning and systematically doing analysis around the decision being made. This is part of the process of capacity-building, yet it also improves the ability of the headquarters to govern and exercise influence.

The comment below from a senior engineer at one of China's flagship refineries provides an excellent summary of the decision points for an engineer. The leaders at this facility are at the cutting edge of technology and management and enjoy the privilege of relative autonomy from, and influence with, headquarters. Still, his comments are very telling.

First, our biggest savings are through low temperature heat utilisation. In our factories, this has several hundred megawatts of impact. Second, streamlining of our lines and

things like UOP technology.⁷⁸ Third, is machinery—such as furnaces. Furnaces are the single biggest users of energy. So, if i can improve their quality and reduce the frequency of their repairs and replacement then I have a big saving as well. Fourth is production process and operations optimisation ... The first and third need big investment. We need to look at the return on investment. For us it is easy to get headquarters' approval. Because we are the biggest and very profitable. If we can achieve 30% return, we can get easily approved. [ZSIN-CZ]

One can see that he refers to technology (in all four points), management and systems (in his second point) and investment in the final paragraph. The respondent's comments thus cover all the decision points outlined in this section on technology. Further, it is notable that the biggest impact, even at such an advanced refinery, is a common technological feature seen in many plants. Finally, and most notable, is his comment that 'return on investment' is a necessary factor—so enterprises and headquarters are still viewing energy efficiency as a commercial issue rather than a zero-tolerance issue or something that can be amortised for compliance or sunk cost as part of a larger agenda. He also points out that it is easier for the profitable enterprise to make their own decisions. Finally, he concludes that expectations on returns are very high (30% is high by almost any metric).

At a macro level this is bad news for the normative agenda of achieving greater energy efficiency, because the bulk of existing plants are not that profitable and there are not that many energy efficiency initiatives that can achieve 30% ROI or a three-year payback rate. One implication of this is that if regulators (proxy regulators to be more exact—the SOEs) want to substantially increase levels of compliance, one of the easy levers to pull will be to lower the ROI expectations, which will allow for more investment.

Thus, learning and capacity-building around solutions contributes to regulatory effectiveness, in that where there are ways of achieving high-yielding results, these ways can be quickly shared and disseminated among many sites through institutionalised deliberation processes such as meetings and other sharing forums—as discussed previously in Chapter 7 and further below. This helps create a multiplier effect when considered from a macro perspective. Additionally, the learning is inherently valuable and contributes to regulatory effectiveness in the longer term, in part through smaller investments that can be implemented by the site itself—these add up over time. The process can also contribute in part to building the overall learning and ability to respond to energy efficiency signals—which can be adjusted or lowered as energy efficiency becomes a greater need.

8.10.4. Management and systems and know-how

'Management systems' is a sort of catch-all that applies to operating systems, plant layout and systems such as performance contracting that do not necessarily require additional investment or new technology but, rather a reordering or optimisation of what is already there. There is a good deal that can be achieved through management and systems. This may involve know-how or experience more than technology and is worth highlighting given the

⁷⁸ UOP is a division of a multinational company (Honeywell) that provides process and catalytic solutions that are used in almost every refinery in the world due to their positive impact on plant efficiency and output.

constraints on technology and investment described above. Thus defined, management systems are the proverbial ‘low-hanging fruit’. Sometimes it may also involve other parties who provide some factors exogenous to the system, such as finance or expertise. One example of such a third party is EMCs (Energy Management Companies). EMCs provide expertise but also sometimes take on the up-front costs of investment and recover them over time, which can be attractive for plant managers—who are under pressure to meet financial metrics.

8.10.5. Energy Management Companies—third-party experts providing solutions

EMCs operate by guaranteeing a level of saving that results from their services. Their services are typically the installation of technology and management systems that improve efficiency by a predictable amount. The companies guarantee a fixed saving and their margin is any additional saving beyond what they guarantee. Thus, the enterprise receives a predictable outcome and can often avoid the up-front outlay as well, since many EMCs will front the cost and recover over time. A whole body of legislation and incentives has been formed to promote EMCs across all industries. This effort has had mixed results, with many companies claiming to be EMCs to gain the incentives and benefits. Sinopec ended up mandating the use of its own in-house EMC suppliers, who were a kind of stand-alone in-house firm. [JSIN-ZZ]

The director of a design institute explained how they use EMCs.

We are using EMC as a method to get investment and improve capacity and performance. Drawing on the dynamics and capabilities in the market using specialist energy management company vehicles that will specialise in this sort of systemic expertise and can get funding for their projects [LPEC-JSW]

What occurred with EMCs in this space is unfortunate. It was explained to me by a lawyer who is a specialist in EMC regulations. He has been advising the Shanghai Municipal Government on its EMC policies and hosting forums for industry leaders to dialogue for over a decade. He explained that, policy-wise, EMCs were supposed to be vehicles that would bring entrepreneurship, agility, and finance solutions to enterprises weighed down by bureaucracy or capital constraints. Instead, several problems arose: first, it was learned that for EMCs to be effective in this space, they must achieve a certain scale and, in order to do that, they often lose some of their agility and entrepreneurial spirit; second, given that EMCs made a certain margin and because they potentially provided a way to circumnavigate the need to apply for funds from headquarters, they were effectively blocked from participating freely in cooperation with enterprises. Instead, headquarters established their own EMCs. Because in-house EMCs are captured and are not really subject to market forces, many of the benefits of having EMCs are not achieved in an ecosystem like this [DW-PC].

8.10.6. Energy efficiency products and know-how

Each of the examples in the excerpts below shows a type of adjustment to management systems. The first is through software that allows for optimisation of system controls, and the

second is an example of shared learning that provided indicators of how to adjust pressure and temperature at certain points in a facility to improve efficiency.

2009–2012—PetroChina headquarters did a project they collaborated with KVC, so a supplier wanted to sell their software and they did an educational forum. Altogether five sites used this. This is early days for this experiment. The software models your equipment and then provides suggestions for how to reduce energy usage. We were an experimental point. The result was 3.9 units of gain. The investment was made by headquarters. Another example, each year we put up money or headquarters gives funding for energy efficiency transformation. In 2011 we used equipment optimization. The pressure of certain equipment was adjusted and the temperature was ... increased. [XCQPC-SUO]

Thus, plants can also develop new capacities from experiences with products and know-how that they encounter and seize. One way to encounter new things is by having employees of the plant visit new environments where they can learn. This brings us to intervisitation and transfers.

8.10.7. Intervisitation and transfers

Efforts have also been made to strengthen capacity by sending individuals abroad or moving them around to different environments for periods to distribute and broaden understanding (referred to by some scholars as intervisitation). Within the party system it is common for leaders from industry to be sent for a six-month stint to work in government and vice versa to improve connectivity between industry and government and to broaden their perspective. Many leaders are also sent abroad to universities, or sometimes even on programs with other multinational corporations to develop their capabilities. A lawyer and former editor of a China law publication commented on the financial (banking) sector in China as a parallel example, where some capacity was built through sending people abroad.

There are lots of examples of sending people abroad to learn about new ways of doing things. They're doing it in energy efficiency now. [Previously], they sent lots of young scholars abroad to learn how to do this regulatory stuff in the financial sector. Policy is all about implementing in the end. They had to develop qualified personnel. [DW-KM&RW]

Nearly half the respondents from the sites and the design institutes mentioned exchanges or visits with overseas experts as part of the process by which they assimilate new knowledge. The larger, more modern refineries had access to much more of this sort of opportunity.

There has been an absolutely concerted effort to send people out to learn stuff. It started with academics in the 80s in economics, business, law etc. a lot of the brilliant ones, including some of the people whose thinking was behind the economic zones, stayed abroad after June 4.⁷⁹ They didn't go back because they didn't know if their new thinking would be unwelcome. Now more and more people are coming back. [DW-KM&RW]

The passage above, highlights that dissemination of know-how occurs through the movement of people and that results depend more upon people than upon the creation of structures

⁷⁹ June 4—*liusi* is a common way of referring to the Tiananmen Massacre which occurred on June 4, 1989.

which, however grand they may be, can become hollow if they lack the necessary blend of human factors to make the structures work. Hence, intervisitation and transfers of personnel form an important part of capacity-building. However, it is not a factor that can be neatly controlled and may lead to unexpected results, such as the loss of key talent as described above.

8.10.8. Benchmarking, studying others and replicating or emulating

One of the simplest ways of learning, referred to already in several sections, is through benchmarking and imitation. This is what one manager in a plant referred to as ‘learning from our brothers’. He went on to explain that ‘headquarters facilitates it’ [XSIN-DKZ].

Another manager described the philosophy at his plant.

Our boss has a method. He says even an idiot can get things by watching his neighbour. So, we learn and set our targets based on a reference to others around us. [XCQPC-SUO]

In some contexts, imitation carries a negative connotation, but in the realm of learning and capacity-building, imitation strengthens abilities and capacity. ‘Knocking off’ what someone else is doing until you can do it as well—and eventually better—has become a proven modus operandi for many Chinese enterprises of all scales and sizes. The process of learning to imitate involves communication, analysis of the elements of that which is being imitated, study of that which is being imitated and so forth.

You cannot depart from communication! You must study from those with experience. In our organisation, there are few people who can do this sort of communication well and artfully. First, promotion from headquarters—this is done through documents it is usually obligatory. They promote technology with investment. If you use it, I will give you money. This way, the site will choose to do it because there is no cost and it cements better relations with headquarters. Second, learning from brother sites—we went to Jinan refinery. I spent four months there. We observed how they handle their water, electricity etc. Then we held meetings to update our leader. We then evaluate to what extent it is feasible for us to raise our standards. But where did the money come from? We have a technology improvement funds—(*jigai feiyong*). This is a budget that is given to the site by headquarters. Every site provides a plan and then headquarters approves it. [XSIN-DKZ]

Much of the benchmarking takes place between enterprises and is coordinated by headquarters.

Learning and technology is mainly coordinated by headquarters. They distil the good things and share them with all the plants. They’ll invite people with good experiences to go elsewhere and guide others. That’s how expert teams are formed. [JSIN-ZZ]

Benchmarking and imitation does not only occur among sibling plants within one SOE group. It also occurs between SOE groups, between city and provincial governments, and even internationally.

Xi’an is good. I have interesting things there. It’s going to be a focus of our activities. It has a sister relationship with Minneapolis or Minnesota. Lots of exchange around energy efficiency and learning ... We’ve started a relationship with PetroChina on biofuels for

the aerospace industry. We are trying to help them develop the aviation standards. We are trying to develop blended fuels and coal to liquid fuels. [EU-PC]

Nor is benchmarking limited to first-hand comparisons carried out by SOEs or governments. There is industry-related data that are assimilated by third parties that effectively set norms through their benchmarking and comparisons. In the refining space, perhaps the most notable of these is Solomon,⁸⁰ whose reports are considered as holy writ. One manager confirmed that ‘we still regularly participate in Solomon assessments’ [ZHSIN-CZ].

Solomon reports were referred to by several others as well. (Recall, references to Solomon in the section above on capacity to innovate customised solutions as well.) A manager from another plant and a different SOE similarly commented that ‘we look at Solomon reports. Headquarters gives reports each year. They use an energy intensity figure—we’ve started using that as a figure since last year’ [XCQPC-SUO].

Learning from international best practice is also coordinated through headquarters, as described by one manager in a plant.

Learning new things with foreign groups is always through headquarters ... Tens of meetings each year to communicate and learn. [JSIN-JZ]

Hence, data and intelligence are blended, even at the plant level where they look at numbers given by headquarters, from local government and from international expert bodies to calibrate their own expectations about energy intensity and performance.

In terms of effectiveness or leading to directly observable outcomes, benchmarking and studying from others feature highly as impactful ways of building capacity and contributing to regulatory outcomes. If measured by the number of projects that result from a process, then the majority of projects seem to be the result of some sort of benchmarking or sharing activity.

Six out of ten of the projects we do come from learning we take from our brother companies. There is a lot of energy and resources that go into learning from each other. Since we have so many sites this is quite productive and meaningful. Every year we get together and present on our learning and if I think another plant has things I can learn from I can locally get approval and funding to go visit and spend time and they are very open with us about everything they do. They share everything they can. Then I will come back and have to figure out how to adapt what we’ve learned to our local needs. Then we prepare a feasibility and get funding and approval to roll it out. The movement of information and understanding is key. [LSIN-CKZ ZKZ]

The implications for regulatory effectiveness of benchmarking and sharing as a part of capacity-building are quite significant. When viewed in combination with the structural features of connectedness within, and even among, the oil and gas SOEs, it becomes apparent that there is a special sort of connectivity that exists partly because of cultural and institutional heritage and partly as something that is quite consciously promoted and retained. That connectivity allows an unusually efficient flow of information and knowledge, which

⁸⁰ Solomon refers to Solomon Associates, an energy advisory firm that provides benchmarking data advisory services to companies in the energy industry.

can be very valuable for increasing capacity in energy efficiency work. Hence, regulatory outcomes in energy efficiency can be driven and augmented through intervisitation and transfers that result in proliferating know-how and increase connectivity at multiple levels, including at the grassroots.

8.10.9. Training

Another aspect of capacity-building and learning coordinated by headquarters is training. Training is one of the more commonly seen and oft-mentioned aspects of capacity-building. Training refers mostly to the transfer of a skill or specific ability. At the simpler levels, this may include activities along a production line. At higher levels of complexity, it may involve the ability to interface with or use certain software or applications for automation or plant management. However, such skills or abilities are limited to doing a learned act or behaviour rather than learning to learn—which is necessary for long-term reflexivity and adaptability. Still, training and upgrading of skills adds to the ability to achieve basic regulatory effectiveness. The level of training sets a baseline and provides a common language, which can help with deliberation, learning, and higher order capacity-building activities such as praxis. Several of the passages cited above refer to training as a feature of capacity-building and learning. A senior manager commented about how the younger generation of managers gain significantly from such training and use it to keep current on software developments in efficiency management, but this sort of training is in the simple form of imparting skills rather than training of the sort that makes engineers into innovators or proponents of change and improvement.

There is regular training in new technologies for automation systems. But us older generation maybe aren't very good at it. The young ones live and breathe it. [ZHSIN-CZ]

Training in things such as new technologies is likely to assume increasing importance for new generations of managers and engineers as innovations in artificial intelligence and digital automation continue to disrupt the industry. Disruptive changes predicted in the traditional industrial spaces will mean that plants with staff who are adaptive and in the habit of learning new things, will perform better and survive.

8.10.10. *Inculcating habits of learning and flexibility—behaviours*

Institutional actors such as other enterprises, headquarters, and research institutes are important to helping plants with energy efficiency performance. These groups can try to provide guidance and knowledge; however, a recurring theme is that the ability to learn about and, most importantly, implement solutions remains subject to the capacity and abilities of the individuals who do the work at the plant level. As the leader of one of the smaller and older facilities insightfully pointed out, in the end you must work with people to get things done, and the capacity of those people is one of the fundamental building blocks of the equation.

Take, for example, anti-corruption. It is a slow process. All the management and awareness happens slowly. It's not something that they just decide and then bang, bang, bang it's rolled out from the top down. Change depends on the capacity of the people or human resources to implement. Especially for the change to be sustainable and ongoing.

With equipment, if you must make a change, it's easy ... you know its specifications etc.
But with people, it's a perpetual cycle of learning and change and adapting. [LSIN-WCZ]

The above passage elucidates a theme repeated by many interviewees, that even in the highly engineering- and equipment-oriented world of refineries and petrochemical facilities, change and improvement involves people at many points, and the work of developing the capacity of people takes time and effort and is progressive. Simply training people to take pre-programmed courses of action is relatively simple in any industrial setting; that is, after all, what most line workers do, and automation technologies can do so much of the optimisation work better than humans can. The challenge is in remaining flexible, responsive, and adaptive to a dynamic matrix of facts to synthesise and apply knowledge or solutions; this work requires systematisation.

For capacity-building to go beyond mere training or skill-building, actors must be self-actualised protagonists in the process of learning and gaining capacities. Again, deliberation is a fundamental part of that process of self-actualisation and learning. Through deliberation, not only are ideas socialised but actors are forced to think and become conversant in the ideas they are deliberating upon. For deliberations to be rich, they must be able to refer to actual experience or successes and failures from the field; otherwise, deliberations become forums for exchanging rhetoric or pontification, at worst, or venues for guesswork and hunches at best. Thus, while deliberation yields direct results that affect regulatory outcomes, it also enables and contributes to other factors such as capacity-building. In preparing for deliberations, capacity is built as reports are assembled, numbers are analysed, technology and innovations are evaluated and tested, and plans are devised. And these efforts are often reviewed with various interest groups who function as sounding boards and provide input.

Our energy efficiency work is done through annual summaries. When we summarise, we plan what to do for the next year. We will put together a plan and solicit input from various stakeholders in meetings. We request every group to prepare their own reports and then we have those reviewed. Then we hold meetings. Industry, construction, merchants, agriculture. These are the main categories. Energy efficiency is the improvement of efficiency of use of resources ... We also interact with Ministry of Science. Every year we also promote certain technologies. At the state level, there is also a technology list but that is rough. [XNDRC-CH]

In the passage above a government regulator is describing how a host of reports, summaries, and meetings are used to prompt deliberations and work around energy efficiency.

8.11. Conclusion

Political salience and urgency around energy efficiency is not currently as great as for other issues. To begin with, energy efficiency gains in refineries and petrochemical plants are difficult to quantify. Second, regulating the absence of efficiency is generally more difficult than measuring, say, emissions or safety failures. Third, it currently does not have a direct impact on the public. In other words, the average citizen does not feel like the lights or heat at home are going out because of a lack of energy efficiency. The combination of these current realities make capacity-building an extremely important factor in driving energy efficiency outcomes in this setting.

Capacity-building is a factor that drives regulatory performance. It is perhaps the biggest issue for enabling regulatory outcomes, especially outcomes defined as ‘beyond compliance’. However, it takes a lot of time for this factor to be effective, and it is difficult to show direct correlation in the form of regulatory outcomes demonstrably resulting from or affected by new capacities and learning. As a factor, capacity-building involves different elements and certain combinations of these elements are more impactful for regulatory outcomes than others. For example, benchmarking and copying are among the most commonly used and replicable elements, but have limited applicability to lower order compliance. However, while they may not apply as clearly to the idiosyncratic problems of a site, for an enterprise manager it is easier to obtain approval for something that has already proven successful elsewhere than it is for a wholly novel innovation. Thus, the path of least resistance is to imitate existing successes in sister plants.

Innovation of new solutions therefore requires a slightly different set of elements. This includes learning from other sources and collaboration within and among epistemic communities and specialist organisations, such as design institutes focused on design and technological advances. However, with design institutes—as we have already seen—there are also challenges, particularly in getting their attention and resources for retrofit projects. All countries suffer the challenges involved in the steep investment curves required to retrofit old facilities to meet similar standards to those new technologies can provide, but rarely in any country are there so many new refineries and plants being constructed. The pace of growth of new facilities makes it more difficult to focus attention on existing facilities.

The real capacity-building is occurring through systems designed by headquarters to drill plants and drive improvements. Each plant usually has a focal person or team upon which energy efficiency activity pivots. The success of that pivot depends on the weight assigned by senior managers and how persuasive a case can be made for various energy efficiency solutions. These can sometimes be helped along by extra funding from headquarters or coordination from local government. Hence, the energy efficiency manager or official of a plant drives capacity-building because it is their job; and the plant leader or operations and investment leaders also drive solutions because it helps them meet their production goals.

We have seen in the last two chapters that deliberation and capacity-building are two highly interlinked processes that combine to form a powerful force for participation and systematic improvements in energy efficiency work. These two processes augment energy efficiency behaviour in ways that laws alone cannot in these massive SOEs. The next and final chapter summarises the questions posed at the outset of this project and weaves together the findings, contributions, and limitations of this work. It then offers some preliminary recommendations and areas for further research.

Chapter 9. Conclusions

Humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web, we do to ourselves. All things are bound together ... all things connect.

– Chief Seattle

9.1. Restatement of research question and key findings by chapter

This study set out to examine how massive state-owned enterprises, economic and political juggernauts on the Chinese and global stage, interpret and apply policies, laws and regulations relating to energy efficiency in China. It did so by asking two main questions: What are the factors that contribute to regulatory effectiveness in moving Chinese state-owned enterprises—specifically refineries—to become more energy efficient? How do these state-owned refineries respond to different kinds of regulatory pressures, and why?

Chapter 1 explored the complexities and importance of improving energy efficiency in the Chinese refining and petrochemical sector. It described the methodology adopted for this study and outlined what this study is, and is not. The study is an exercise in object- and sector-specific research rather than an attempt to study regulatory effectiveness in the abstract. The practical outcome of this work is a contribution to questions about the regulation of energy efficiency in the petrochemical sector in China during a specific period. It is not argued that the findings apply perfectly to other subjects of regulation beyond energy efficiency. I do not make a priori conclusions or widely generalisable findings about regulation in China and acknowledge the many limitations in trying to gain a textured insight into state-owned refineries in China.

Chapter 1 also provided a historical and factual briefing on energy efficiency in China to provide an entry point to the story of energy efficiency in China's state-owned refineries.

Chapter 2 considered why formal regulatory factors—defined as factors that are situated in or rely upon formal legal and regulatory institutions for their effectiveness—are insufficient on their own to resolve energy efficiency regulation in large state-owned Chinese refineries. Formal regulatory factors include traditional regulatory instruments, such as laws and rules, that threaten penalties for violation; economic instruments; standard-setting; and government-supervised or controlled access to an industry through permits or covenants (Gunningham & Grabosky 1998). The chapter summarised several theoretical frameworks that are useful in considering these issues. Drawing heavily on the work and approaches of scholars such as Braithwaite, Gunningham, Drahos, Van Rooij, Scott and Fiorino, who have provided ways of looking at regulation that go beyond laws and regulations, this chapter used the framing of responsive regulation, smart regulation, and nodal governance to suggest a more nuanced conception of regulatory activity and factors that affect regulatory outcomes in a Chinese SOE setting.

Chapter 2 summarised the current discourses among Chinese scholars and practitioners, which emphasise strengthening formal legal and regulatory institutions such as judicial independence; stronger, more independent agencies with increased resources; and greater ability by the state at various levels to command and control. While acknowledging that strengthening formal institutions is a worthwhile and necessary endeavour, I focus on other factors that have had a demonstrable impact on regulatory outcomes within SOEs and, in subsequent chapters, present findings that suggest ways to augment those influences. These indigenous or existing factors in China easily lend themselves to being augmented and in the recommendations section of this conclusion (below), I sketch a few ideas about regulatory mixes that emerge from the factors in Chapters 3 to 9 that may be worth testing for enhanced effectiveness.

Core to the idea of enhancing effectiveness are the twin themes of willingness and capacity to comply. Chapter 2 identified these two themes, which emerged from interviews, and situated them theoretically, connecting the literature of regulation with theories from institutionalism.

Several factors, categorised in this study as formal and informal, emerged from the data. The formal factors were identified as legal instruments, incentives, and penalties from regulators, and these were addressed in Chapters 2 and 3. The informal factors were identified as signalling, social and political factors, careerism, deliberation, and capacity-building or learning. Each of these factors was considered in detail in Chapters 3 to 8. Taken together, they are not a definitive list of factors that influence SOE behaviours, but they were the factors that emerged from interviews with key actors at refineries as recurring themes in exploring why and how they made decisions in relation to energy efficiency.

Chapters 3 to 8 incorporated first-hand observations from veteran SOE employees and managers in refineries, energy efficiency departments, government bureaus, and consultants and experts, who described how legal, social, and political constructs influence their individual and organisational willingness and capacity to comply with new energy efficiency requirements. From the data, a pattern emerges of how discourses, deliberation, and capacity-building are used as means of increasing an SOE's willingness and capacity to meet new regulatory targets. It also becomes apparent that, for SOE managers, the people at their company's headquarters and those in senior SOE leadership positions are the most immediate and influential regulators for front-line managers. These influential corporate leaders often play a double role, as both industry leaders and senior cadres in the Communist Party.

Chapter 3 provided a brief review of the history of energy efficiency laws in China, concluding that laws, while important, are not the forum where energy efficiency regulation occurs in practice for large SOEs. While laws provide legitimacy for bureaucratic action, their primary value is in signalling priorities from the government or the party. Notably, Chapter 3 introduced the concept of 'the regulatory curve', an indicator of how far along in the development of capacity a subset of the economy needs to be in order to act in consonance with policy objectives. Early in the curve, control is centralised or goals are set but loosely enforced by regulators; then, as capacity develops locally and understanding is enhanced, knowledge increases—as does the ability to execute energy efficiency improvement plans.

Local empowerment is gradually achieved through this process of learning and, as the refineries become more capable, the state rolls out rules that are more detailed and challenging. These rules are in turn more vigorously enforced by the state through its regulatory agencies.

Chapter 4 set out the pattern of testimony by the respondents showing how asymmetries in information, resources, and power make SOE headquarters the most relevant and influential regulator for central government priorities in energy efficiency. SOE employees repeatedly refer to headquarters in a way that shows it functioning as proxy regulator for central government. Elites and managers within the SOE and corresponding government offices look at laws and regulations, as well as other communiques and patterns from the central government and headquarters, to know what is expected of them. Although SOEs are, in effect, units of government, this finding is still surprising because when one looks at other SOEs—for example, in coal mining, steel, or cement production—there are enormous difficulties in bringing these SOEs into line with even the most fundamental of government policies, such as those relating to safety or pollution.

Chapter 5 attempted to shed some light on the murky world of political dynamics—who regulates at the headquarters of these large SOEs? It introduced the concept of ‘political licence’ and argued that political licence matters because orders from the top seldom simply translate into outcomes at the working level; there is too much complexity for that to happen easily. Thus, leaders need to cultivate networks and credibility in all directions around them, to optimise influence. This can create strong synaptic systems that enable the flow of knowledge and influence throughout the massive enterprise and all its branches and subsidiaries. The dark side is that it can lead to cronyism and corruption.

Chapter 6 addressed the issue of careerism as a force that matters in certain settings in China. Interviewees suggested that careerism is a bigger factor for people who have limited job mobility or for those who rely on the ‘iron rice bowl’ of SOEs, as well as those in remote regions where the economy is less developed. Hence, careerism as a regulatory influence on managers may weigh more heavily in an aged refinery in Luoyang, for example, than in Shanghai or in a state-of-the-art refinery in Ningbo. Notwithstanding the importance of careerism, energy efficiency counts for real points in employee evaluation metrics and provides a space in which employees can seek attention from their seniors to bolster their career dossier. However, given that so many operational priorities in SOE refineries are rated as critical, employees sometimes are left to triage when those priorities compete. The message from leadership is, ‘Yes, you must achieve them all’ or, as one person put it, ‘Have your foot on the gas and the brakes at the same time’. Careerism in this study is thus shown to be a real, but limited, factor influencing managerial and organisational responses to the energy efficiency demands from Beijing. It is also problematic to characterise it as a driver of behaviours, because it does not unite and coordinate actors around a common cause. Other factors, such as political dynamics, deliberation, and capacity-building, combined with the forceful effect of laws, policies, and signalling, appear to be more important in the blend of regulatory influences on SOE refineries.

Chapter 7 documented how deliberation is systematically applied to goal-setting, reflection, course correction, and learning within both individual SOEs and the energy sector. It also noted that deliberation serves to disseminate knowledge and build unity of thought and vision, based on observed outcomes at a corporate, regional, and national scale. This chapter showed how targets can sometimes be adjusted through deliberative processes, and how constant dialogue around specific objects of learning in energy efficiency enable collective learning to occur. Such learning is a must if plants are ultimately to be the locus of activity for optimal energy efficiency outcomes. One important caveat is that for deliberations to be effective (by which we mean increasing connectivity between nodes and increasing the strength and overall functioning of various networks), they must be conducted as a process of improvement rather than ‘tick-the-box’ events, and it helps if they are authentically geared towards advancing scientific ends. Evidence for this is shown in the section on Deliberative Content and Process in Chapter 7. Deliberation is thus inextricably linked with the process of capacity-building, which is discussed in Chapter 8.

Chapter 8 explored why capacity-building matters and how it occurs. Making gains in energy efficiency is complicated at the evaluation, design, and execution levels; it requires abilities that go beyond training and skills. Strong capacity to solve energy efficiency drives energy efficiency outcomes. This chapter looked at the battery of capacity-building tools applied to and within Chinese SOE refineries and what interviewees say about these tools. It found that imitation of successful plants is one method of building capacity for lower order refineries. For SOEs with higher order capacities, it finds that their capacity to innovate is built over time through a cycle of experimentation, deliberation, capacity-building, and learning—effectively a kind of action-research within the company. That process includes learning from other sites, and from sites of specialist knowledge—like China’s design institutes, which focus on design and technological advances. The effectiveness of any of these elements, however, depends heavily on the weight and support given to the process by the top leadership at the plant level.

The remainder of this chapter examines the scholarly contributions of this work and its limitations; summarises the theoretical and policy implications emerging from the findings; discusses the general impressions and reflections of the author; and provides some recommendations for directions and areas of future research.

9.2. Contributions and limitations of this study

9.2.1. Contributions

This study of Chinese SOE responses to state demands for greater energy efficiency has sought to make contributions at three levels: empirical, theoretical, and practical.

The empirical contribution of this study is its unparalleled access to managers responsible for interpreting and applying new regulatory standards within Chinese SOEs—specifically, within refineries. It draws heavily on interviews with those managers on the ground, to give some grit and texture to the description of a sector of the Chinese economy that is often difficult to access. In China, the nexus between energy and national security makes access to

sites like the ones studied here very difficult. In the current political climate in China, it is unusual to have been able to spend time walking the production lines, reviewing details of plant performance, and talking about complex employee and political relationships and challenges with headquarters and regulators. The data collected from these interviewees can hopefully provide a basis for further research and exploration.

The study seeks to understand these SOE operations from the inside out—how key actors conceptualise and think about regulatory issues as they experience them, within their industry and locally.

This study contributes to theories of regulation and governance. First, it considers how regulation occurs in circumstances where laws may not be particularly effective; this is relevant to developing economies such as China's, but also within developed economies to sectors that are not easily regulated by laws or legal instruments.

For China, my findings challenge the proposition that stronger legal instruments are a panacea to regulatory challenges, especially when applied to large SOEs. Certainly, stronger and more independent legal institutions provide a framework for action. However, there are regulatory dynamics affecting SOEs that rely more on other factors. This study argues that political influence, social and political capital, networks and reputation, careerism, and deliberative processes all play a role in regulatory behaviours at the enterprise level. It is easy to imagine how some of these factors might be less influential in liberal democratic systems, where the enterprise has recourse to legal rights and can challenge its regulators through legal processes and forums. In China, SOEs rely much less on formal regulatory systems, particularly when these large state-owned players operate in sensitive domains such as refining, which affects the country's energy supply. Thus, we can observe that non-formal regulatory factors become more salient.

Evidence of these non-formal regulatory influences can be seen in chapter after chapter of interview excerpts that indicate deference to government authorities and headquarters, but also in the caution and politeness that regulators show towards SOEs—especially centrally-managed ones. We saw this in Chapters 4 and 5. What we see is a tendency to eschew adversarial approaches in regulator–regulatee engagement in favour of alternative modes of engagement that are more reciprocal and process-oriented. These alternative modes, in their best forms, put the regulators and regulatees on the same side of the table, working towards a common goal of achieving better energy efficiency outcomes. Such a model is consistent with one of the themes recommended by Fiorino for the US environmental regulatory system, which historically was notoriously adversarial in its approach to environmental regulation. It is worth considering the implications of some of the experience in the Chinese setting, not only for other non-democracies with developing formal legal systems, but even for mature Western systems that may be finding their existing adversarial structures counterproductive at times.

This study emphasises the importance of four kinds of regulation influences that move Chinese SOEs towards energy efficiency: shadow regulation, political licence, deliberation,

and capacity-building (deliberation and capacity-building are coupled together in the discussion below, given their interrelatedness). These are elaborated in the next section.

The practical contributions of this work occur at two levels. First, there are implications for how domestic governance and regulation of energy efficiency occurs within China. The observations about regulatory mixes and the synthesis of commentary from enterprise managers and stakeholders provide recommendations for domestic regulators, SOEs, and those who work with them. These are summarised in the recommendations section below.

Second, for the international community, a deeper understanding of how macro-policies are actually implemented and enforced domestically within the Chinese economy can help inform diplomatic and political efforts aimed at changing industry behaviour in China. In other words, it is useful, when developing diplomatic approaches to China, to understand how energy governance works at a sub-national level and what challenges the central government faces.

a. Shadow regulation

From Chapter 4 we recall that the headquarters of SOEs function as a locus of deliberation and policy learning, and thus play an important role in building capacity for regulatory compliance in energy efficiency. Their resources and intimate industry knowledge also equip them to make more meaningful evaluation of plant performance than the often sparsely resourced energy efficiency regulation offices at the city level. Hence, headquarters function as the de facto auditor and enforcer of many of the targets set for plants. We also saw that when a plant significantly misses its targets, headquarters may intervene to broker a solution with the local regulators. Thus, headquarters not only play an important role in driving regulatory outcomes but also acts as an avenue of appeal or coordination for resolving tensions in political priorities between the national and local level.

Asymmetries in information, resources, and power make the role of corporate headquarters significant, functioning as a proxy regulator for central government in rolling out energy efficiency policies in SOEs. We refer to this sort of proxy regulation as ‘shadow regulation’. Awareness of this shadow regulation and the ability to tap into it for reach and influence is proposed here as a key ingredient in an effective regulatory mix.

b. A new form of licence—‘political licence’ in China

Chapter 5 introduced the concept of political licence as a useful construct for thinking about regulatory influence in China’s massive SOEs. Political licence is conceived as a fourth dimension to the existing three dimensions of licence (economic, social, and regulatory) observed in Gunningham and Kagan’s work on industry behaviour (2003, 2004, 2009). SOEs are owned by the government. Hence, their regulation and management is in some ways different from regulation of the private sector in terms of the dynamics of power and influence. Despite being state-owned, it is not always as straightforward as simply subjugating them to top-down command-and-control regulation. It is important to understand how these dynamics manifest and how they help and hinder in achieving regulatory outcomes.

Regulatory scholars acknowledge the importance of regulatory licence. China scholars talk about fragmented authoritarianism and the impact of tensions between local and central priorities, as well as the inherent tensions between priorities of economic growth and efficiency on the one hand and environmental protection on the other. In daily discourse and in the media, the Communist Party is often imagined or described as though it is all-powerful and can rule through command and control. Scholarship on Chinese SOEs mainly directs attention to structural changes or moves towards market economics and liberalisation, as well as the professionalisation of SOE management. However little attention has been given to the more specific and nuanced ways that political dynamics can shape regulatory behaviour.

Interviews for this study revealed a new dimension of licence beyond the social and regulatory; this new dimension is here termed ‘political licence’. Political licence, which can be held by an individual or at the firm level, is a form of credibility and capital that can be gained or lost. Basically, individuals and firms strive to gain political licence from elites with authority to give such licence. Having more political licence means increased autonomy, prestige, access to resources, and authority, as well as greater opportunities for professional development.

Political licence is a real and strong factor in driving motivation and exacting compliance and engagement. It cannot substitute for capacity-building and deliberation, however, and has a dark side that can present as cronyism, clientelism, and corruption. Political licence is found in most regulatory mixes that are effective and is likely to remain a key factor in the foreseeable future for Chinese SOEs, but it has high transactional costs. Reliance on political licence is a short-cut to getting things done, because it works through a network of ‘trusted’ individuals or firms to aid decision-making. Thus, while it helps to get difficult things done quickly and reliably, it does not involve all the players in a process of learning and participating and, therefore, does little to build local capacity and vision across the entire organisation. Senior government planners acknowledge this limitation and are continuing to work on engendering localised ownership and ability through norm- and capacity-building efforts, which are discussed elsewhere.

c. Catalysts for effectiveness of regulatory instruments—deliberation and capacity-building as differentiators of effectiveness

This study makes no claims regarding effective mixes of regulatory factors but some tentative observations are advanced, based on the specific sites observed and interrogated through interviews. A few notable patterns and themes emerged from interviews, and these are summarised below.

Laws form a basis for change. They provide legitimacy for action, but on their own do not usually provide impetus. To add impetus to laws, a combination of social and political factors is instrumentally employed, with varying degrees of effectiveness. Political licence has already been described above, but social forces and careerism work together to augment the effectiveness of regulatory uptake. Recall from Chapter 4 that I argued that social licence is not effective for an issue such as energy efficiency because it does not directly affect the public. Instead, peer esteem and reputational factors catalyse the uptake, and internalisation,

of policies and relationships that form the basis for prompting and managing action. Much of this peer esteem and reputational influence—as well as the webs of relationships—is logged and brokered through corporate headquarters. By analogy, it is as though the corporate headquarters functions as a sort of stock exchange or trading board where people’s social portfolios are rated and traded over the course of their lives. This is analogous to the multiple schemes of ‘social credit’ that the Community Party now employs outside the corporate setting.⁸¹ The Party Organisation Department and local government offices act like buy/sell analysts, providing input and reports that feed into this exchange. Thus, an environment is created in which social and political credibility are commoditised, sought after, collected, and traded in a very sophisticated manner. However, these instrumental factors prompt behaviour and activity that is based on expediency or on rational calculation. On their own, these factors do little to prompt the intrinsic commitment and motivation that is needed to drive the sort of innovation and conviction needed to design and implement energy efficiency solutions. To achieve this, something beyond laws and regulations, even augmented by social and political catalysts, is required. Actors need to be stimulated, to be interested in energy efficiency and its worth.

Among those interviewed, there were clusters of actors who demonstrated commitment to energy efficiency and who were active proponents of change and improvement. I noticed a few common elements in these clusters of proponents. They were regularly involved in deliberations about energy efficiency; they participated in activities that increased their knowledge and capacity around energy efficiency; and they conveyed an enthusiasm and belief in the value of energy efficiency for one reason or another. Notably, it did not seem to matter what value they attributed to energy efficiency—whether it was simply good management of a plant, helping the environment, supporting national security in some small way, or even out of blind patriotism and fervour for national policy (which one or two interviewees certainly displayed).

Regular involvement in deliberations around energy efficiency brought the issue to life for the manager-proponents. They became part of a community that was learning and sharing knowledge and experience in this domain. Consequently, they wanted to gain experience so that they could participate and contribute more meaningfully to these deliberations. The experience resembled a scientific community working together to advance knowledge in a field of endeavour—and indeed, in a sense, that is what it was. This deliberation, occurring with the backing of laws and regulations and legitimised in the eyes of senior leaders through the signalling and sponsorship of government and SOE leaders at different levels, appeared to have had a strong effect on driving energy efficiency awareness and activity in some plants.

Deliberation alone, however, is of limited efficacy, especially if the participants are at a similar level of experience and knowledge. Their ability to help each other or drive progress and new discovery is limited and slow. Thus, these deliberative efforts were further enhanced by systematic capacity-building efforts. Frameworks exist around these enterprises under

⁸¹ For a summary of the social credit system see <https://time.com/collection/davos-2019/5502592/china-social-credit-score/>

which improvements are stimulated and tracked, exchanges occur with international peers, journals are circulated, and conferences held; thus, learning from experts becomes a *modus operandi* that complements deliberation and works hand-in-glove with the deliberative process to drive progress. These frameworks are discussed in Chapters 7 and 8.

The practical implications of this mix of deliberation and capacity-building is that it functions as a powerful factor in driving improvements. It contributes to willingness to comply and increases intrinsic motivation. It also enhances the ability of individuals and plants to comply and to innovate solutions that can improve energy efficiency. This is important for a regulatory domain like energy efficiency, where intrinsic motivation is needed and where bespoke solutions are required for each plant. These are the elements that allow a localisation of ownership, thinking, and design of policy goals. The ideal outcome would be that the plants and workers all the way down to the grassroots are mobilised and empowered to be self-actualised proponents of energy efficiency.

The theoretical implications of this argument are that the different roles of the Chinese government in the regulatory process raise interesting questions about how government can be involved in changing industry behaviour. What we see in this Chinese setting is much more than a simple regulator that audits and metes out punishments and incentives. It is also a far cry from the direct command and control that one might expect to see in an enterprise directly owned, and ultimately run, by the government. The roles that SOE headquarters and party organs play in brokering social credit and political capital, and the role they play in building the framework for deliberation and capacity-building, combine to form a sophisticated matrix of influences that appeals to rational motivations but also to altruistic and idealistic motivations in the individual protagonists. This matrix of influences is also fed by an urge in the protagonists to learn and advance.

d. The ‘regulatory maturity curve’

The concept of the ‘regulatory maturity curve’ or ‘regulatory curve’ has been referenced in the summary of this study above and is also briefly mentioned in the discussion section below. It is introduced in detail in Chapter 3, where evidence emerges from different data sources—plant managers, government officials, and energy lawyers—all pointing to a similar pattern of government behaviour in new areas of policy attention, such as environmental management or energy efficiency.

Simply put, new laws are introduced with strict standards that are often unachievable for regulatees at the time the laws are first enacted. The intention is that enforcement will gradually ratchet up as the capacity of plants (and regulators) to understand and comply with (or enforce) standards increases. Over time, as the capacity of the plants to comply increases and the capacity of regulators to regulate actors likewise increases, all the parties move along the curve towards stricter enforcement of the laws and standards.

This approach provides a method for developing regulatory capacity among all actors in a setting where the parties may lack requisite skills and technical abilities at first. It is also a useful approach for issues that are new or that the parties do not have a lot of experience with. Central laws and policies are written that are aspirational and broad, allowing a

framework for working towards the ‘ideal state’. Then, at the local level where the detailed work occurs, detailed regulations and implementation measures are drafted and rolled out as local capacity emerges. Hence, the legislative framework that combines milestone laws and policies with more flexible local rules supports a gradual approach of moving from broad unenforced laws towards detailed implemented regulations.

9.2.2. Limitations

This study is limited in its scope. It is focused on a fixed number of enterprises and how they deal with their energy efficiency challenges. The sites for this study are each different and do not include small and medium enterprises, foreign invested enterprises or massive, privately owned companies. The regulatory dynamics for each are different, and they are also different for issues other than energy efficiency. For example, environmental regulation, in the form of emissions, waste management, and treatment of hazardous chemicals, presents a very different set of regulatory dynamics. Nonetheless, there are some parallels between these two policy areas and, where meaningful, these connections have been drawn throughout this study.

Another limitation of this study is that the sites that furnish the case-studies for analysis do not represent the complete universe of refineries and petrochemical plants in China; they represent a ‘small n’ study. The qualitative approach to speaking with plant managers and regulators is also vulnerable to the claim that the interview data is anecdotal. No clear claims of correlation—let alone causality—between the regulatory factors identified and the energy efficiency outcomes at a particular plant can be made from the data for this research. Of course, this limitation was conceived as part of the design of the project. Thus, to the extent that observations and recommendations are made, they are based on a contextualised reading of the social reality experienced by both the author and the respondents in interviews, discussions, and direct observations of the research sites.

The sites selected for the study represent a strategically chosen sample that was not randomised. However, as described in the methodology section of Chapter 1, efforts were made to make the sample relevant and credible and saturation was reached in the interviews within the sample.

As discussed in Chapter 1, this study did not set out to be a quantitative discovery of ‘objective’ reality within China’s energy sector. Instead, the study takes an intersubjective approach with a view to simply improving understanding the research questions. Emphasis has thus been on the responses of interviewees and how they perceive and interpret regulatory factors relating to energy efficiency.

9.3. Recommendations

9.3.1. Regulators

The findings of this study show that regulators have a wider range of effective regulatory tools available to them than typically thought. These can be deployed in different mixes or combinations. Regulators should be aware of the existence of these tools and should not feel

that they must rely only on formal regulatory factors that often require mature legal systems to function properly. For example, where courts do not provide a reliable forum for driving enforcement, the combination of political influence through a network of elites and a deliberative process to tease out reliable information seems to be effective as an alternative method of driving regulatory gains. Or, for example, in situations where regulators are unable to evaluate the energy performance of a complex plant, building the willingness and capacity of the plant to better evaluate and optimise itself through a mix of facilitating best practice sharing, specialist consultants, and collective target-setting seems to be a way of stimulating improvements that even an anaemic regulatory institution could deploy.

The regulators in this study often felt uneasy using legal or formal enforcement mechanisms to drive energy efficiency improvements in the centrally-owned refineries in their jurisdiction (for the reasons described in Chapters 3, 4, and 5). Those who were more skilled in operating with the informal factors of regulation identified in this study had more tools with which to influence the refineries locally. More explicit attention should be given by regulators to harnessing the influence of these informal factors and understanding how they work.

9.3.2. SOEs

The SOEs in this study ought to diagnose, on a plant-by-plant basis, which combinations of key factors are of most influence for driving energy efficiency. For modern, advanced facilities this may be a combination of best practice sharing, experimentation learning, rewards, and increased political licence. For older or more remote plants, there may be a greater focus on learning from best practice, motivating through careerism-related incentives, capacity-building efforts in management and technical knowledge, and the well-worn use of traditional incentives.

9.3.3. Technology

The regulators in this study (defined as the state- and city-level bureaus charged with regulating energy efficiency), in attempting to drive energy efficiency, are confronted with severe resource limitations. They need to leverage technology to create synergies for governance. By digitally capturing a host of information relevant to energy efficiency in these plants, many gains can occur—for example, increased transparency or visibility of data related to plant performance and optimisation once energy efficiency data from plants are standardised and digitally available. This, in turn, allows for greater scrutiny and analysis by headquarters, regulators, and interest groups. This trend is already occurring in environmental regulation, where data about pollution or emissions are published and can be analysed and scrutinised by many different interested actors.

Plant energy use data is just one dimension of data that can be digitised with powerful implications for improving governance. Another dimension is the capture of the networks and relationships within and between firms. There are a host of industry-gear social networking applications that connect individuals and plants, like Facebook or LinkedIn but for industrial and professional purposes. Such resources start to show patterns or paths of communication and nodes and networks of activity that have influence on systems. Through

these digital networks, huge influence can be exerted on social and political dynamics as well as on deliberative processes. Such technological developments are already well underway, with many startups at various stages of developing such applications.

On the one hand, such broadly integrated systems accessing and monitoring the technical details and social aspects of industrial activity seem dystopic. Viewed in one light, the implications of having digital footprints and the monitoring of every interaction and relationship; a database of one's social and political 'credit' in the industrial setting; and profiles of the background, achievements and failures of each individual and plant, may seem sinister. On the other hand, individuals already widely and willingly participate in many of these practices through technologies that they use daily. The juggernaut of big data, with all its benefits and often unseen costs, is hurtling onward and the industrial sector, including refineries, is no exception to its influence.

Regulators should keep up with the developments occurring in technology, big data and artificial intelligence. They ought to participate in the discourses around these fast-moving areas of endeavour so that they are not lagging behind, playing catch-up as new technology disrupts both industries and the regulatory landscape.

Technological advances are occurring rapidly that will allow integrated digital control systems, artificial intelligence, lean manufacturing processes, and other similar advances to be integrated into a holistic process management solution that can analyse huge amounts of complex data, providing recommendations for all manner of efficiency changes. Such recommendations can be harvested at the plant or corporate level and even be made visible to regulators or third parties eventually in various forms of PPP (public-private partnership) arrangements where feasible. Hence policies also need to be developed to support and promote efforts in these directions. As these technologies develop and are rolled out, the relevance of the informal regulatory factors identified in this study may diminish. The upsurge in data—if it can retain quality and reliability—will create increased transparency and likely lessen the 'human' element of management activity. Conversely, if the technology and data are not reliable or become overwhelming, these informal factors may become more critical to management activity, recalling the way in which we observed managers and regulators in this study only trusting people in their networks.

9.4. Discussion

There are a few broad lessons from the field that can be highlighted as part of the conclusions of this research.

First, energy is viewed as a factor of production and so investment in improving its efficiency is subject to the ordinary considerations of ROI (return on investment). Enterprises and headquarters still view energy efficiency as a commercial issue, rather than a zero-tolerance issue or something that can be amortised for compliance or treated as a sunk cost as part of a larger agenda. In the current economic climate, expectations on returns are very high: around 30% or payback within three years, as evidenced in Chapter 5. Thus, for energy efficiency initiatives to be taken up by a plant, they need to have an acceptable payback period for any

investment required. Major investments of funds by the plants are controlled by headquarters, which also use funds to buy up energy resources abroad.

Second, the simplest and biggest lever for energy efficiency gains longitudinally is the central initiative of *guantingbingzhuan* (shutting down plants, stopping lines, merging plants, disposing of assets). That is, rather than retrofitting old inefficient plants, these four options are applied to plants that are not worth upgrading. Meanwhile, a parallel strategy involves investing in best technologies and designs for new plants to raise the waterline. This may not be a feasible approach in a lot of economies, but with the rate of investment and establishment of new refining and petrochemical facilities in China, this approach has some merit. Nonetheless, old plants need to be cleaned up and dealt with properly; simply selling them off does not solve their energy efficiency or environmental problems.

Third, for improving energy efficiency in the existing SOE facilities visited, a combination of traditional legal instruments combined with a system for learning, deliberating, and developing capacity is being applied to drive reform. This combination of hard and soft factors is effective for driving change. Such combinations could also be applied to other issues requiring regulatory attention, such as workplace safety and environmental protection. As indicated above, complex problems have complex solutions that do not lend themselves well to simple command-and-control methods of management. They require self-actuated and capable protagonists who can synthesise and apply knowledge effectively to develop solutions to problems that occur under very specific circumstances.

In summary, certain types of deliberation and learning, such as capacity-building, have been shown to be key factors in producing the type of protagonist who can bring about successful regulatory outcomes. Deliberation can occur to persuade or negotiate and can shape actors' motivation and awareness, but this 'deliberation as persuasion' does little to actualise evolving 'beyond compliance' capabilities at the individual and organisational level. Under ideal conditions, deliberation and capacity-building feed and support each other such that deliberation also serves the function of capacity-building and capacity is continually increased for more effective deliberation. Thus, as discussed extensively in Chapters 7 and 8, the combination of the two factors (deliberation and capacity-building) increases their effectiveness as regulatory factors.

Fourth, SOE leaders at various levels and party cadres seem to be part of a sophisticated machinery that has an evolving methodology for driving reform. The methodology is based on a scientific process that involves experimentation, study, and deliberation to further knowledge in a given field. It also involves laws, incentives, and political and social dynamics to stimulate attention to a given issue. It seems this combination of hard and soft factors is an element of Chinese governance methodology that has evolved over the years.

Fifth, energy efficiency, as an object of regulation, is probably on an upward sloping curve of regulatory attention and enforcement. Energy efficiency laws will be increasingly enforced as energy becomes more a more pressing need, whether due to scarcity or to increased demand. Current efforts and attention around energy efficiency will increase knowledge and capabilities to comply more readily with energy efficiency laws as the environment evolves.

In many ways, this resembles the way that environmental protection laws and emissions regulations and the elevation of food safety as a policy issue have been enforced over the last two decades.

9.5. Recommendations for directions and areas of future work

This study did not look at energy efficiency compliance and efforts of the Chinese refineries in their overseas operations. That would be a very interesting comparative study. It also did not look quantitatively at energy efficiency compliance versus other forms of regulatory compliance—say, health and safety, environmental or financial controls (although there were many anecdotal comparisons by interviewees to environmental regulation). Such contrasts would also make a useful comparative study.

Another interesting path of inquiry would be to determine the extent to which international norms affect policy through the experiences of national oil companies or major petrochemical actors. In other words, is the uptake of reform faster because these industries are aware of global trends already through interactions with peers and competitors abroad? Or are they archaic and slow because they tend to be insulated and protected? If traces of both can be found, what accounts for each?

One of the ways that learning accumulates is by opening spaces where mutual learning can occur and best practices can be shared. Further study of how SOEs can achieve this would be of value. By design, this study did not probe the inner workings of each corporate headquarters, but focused on enterprise-level analysis. However, an enhanced understanding of how each headquarters views itself and the work it carries out in policy learning and adaptation, and how the party apparatus connects with this activity, can shed light on questions of governance and regulation in non-democratic settings.

Bibliography

- Abelson J., Eyles J., McLeod C.B., Collins P., McMullan C., Forest P.G. (2003). Does deliberation make a difference? Results from a citizens panel study of health goals priority setting. *Health Policy* 66, 95–106.
- Aberbach J.D., Christensen T. (2003). Translating theoretical ideas into modern state reform: economics-inspired reforms and competing models of governance. *Administration & Society* 35(5), 491-509.
- Abizadeh A. (2002). The passions of the wise: ‘Phronêsis’, rhetoric, and Aristotle’s passionate practical deliberation. *The Review of Metaphysics* 56(2), 267–296.
- Aden N., Sinton J. (2006). Environmental implications of energy policy in China. *Environmental Politics* 15, 248–270. <https://doi.org/10.1080/09644010600562542>
- Afsah S., Blackman A., Ratunanda D. (2000). *How Do Public Disclosure Pollution Control Programs Work? Evidence from Indonesia*. Resources for the Future discussion paper 10515. <https://doi.org/10.22004/ag.econ.10515>
- Afsah S., Laplante B., Wheeler D. (1996). *Controlling Industrial Pollution: A New Paradigm*. World Bank Policy Research Working Paper No. 1672. <https://doi.org/10.1596/1813-9450-1672>
- Aggeri F. (1999). Environmental policies and innovation: A knowledge-based perspective on cooperative approaches. *Research Policy* 28, 699–717.
- Aherne M. (2009). Regulating aged care: Ritualism and the new pyramid. *Leadership in Health Services* 22, 340–354.
- Ahmed E., Braithwaite J. (2011). Shame, pride and workplace bullying. In S. Karstedt, I. Loader and H. Strang (eds), *Emotions, Crime and Justice*. Oxford: Hart Publishing.
- Alford W.P., Liebman B.L. (2000). Clean air, clean processes—The struggle over air pollution law in the People’s Republic of China. *Hastings Law Journal* 52, 703.
- Alford W.P., Shen Y. (1997a). Limits of the law in addressing China’s environmental dilemma. *Stanford Environmental Law Journal* 16, 125.
- Ali R., Zhao H. (2008). Wuhan, China and Pittsburgh, USA: Urban environmental health past, present, and future. *EcoHealth* 5, 159–166.
- Amable B. (2003). *The Diversity of Modern Capitalism*. Oxford: Oxford University Press.
- Ammeter A.P., Douglas C., Ferris G.R., Goka H. (2004). A social relationship conceptualization of trust and accountability in organizations. *Human Resource Management Review* 14, 47–65. <https://doi.org/10.1016/j.hrmr.2004.02.003>
- Andrews-Speed C. (2004). *Energy Policy and Regulation in the People’s Republic of China*. The Hague: Kluwer Law International.
- Andrews-Speed P. (2009). China’s ongoing energy efficiency drive: Origins, progress and prospects. *Energy Policy* 37, 1331–1344. <https://doi.org/doi: DOI: 10.1016/j.enpol.2008.11.028>
- Andrews-Speed P. (2010). Perspectives on the governance of energy in China. *Journal of Resources and Ecology* 1(2), 135–144. <https://doi.org/10.3969/j.issn.1674-764x.2010.02.005>
- Andrews-Speed P., Zamora A., Rogers C.D., Shen L., Cao S., Yang M. (2002). A framework for policy formulation for small-scale mines: The case of coal in China. *Natural Resources Forum* 26(1), 45–54.
- Angle S.C. (2005). Decent democratic centralism. *Political Theory* 33, 518–546.
- Anheier H.K., Gerhards J., Romo F.P. (1995). Forms of capital and social structure in cultural fields: Examining Bourdieu’s social topography. *American Journal of Sociology* 100, 859–903.
- Antal M. (2010). *Strategic Management of Environmental Decisions: The Role of Social, Policy, and Cognitive Networks*. Available at https://www.researchgate.net/profile/Miklos_Antal3/publication/266577512_Strategic_management_of_environmental_decisions_the_role_of_social_policy_and_cognitive_networks/links/54e5b7c00cf276cec174763f.pdf

- Aoki M. (2001). *Towards a Comparative Institutional Analysis*. Cambridge, MA: MIT Press.
- Atkins E. (1986). The deliberative process: An analysis from three perspectives. *Journal of Curriculum and Supervision* 1, 265–93.
- Ayres I., Braithwaite J. (1991). Tripartism: Regulatory capture and empowerment. *Law & Social Inquiry* 16, 435–496.
- Ayres I., Braithwaite J. (1995). *Responsive Regulation: Transcending the Deregulation Debate* (eBook). Oxford University Press.
- Ayres I., Braithwaite J. (1992). *Responsive Regulation: Transcending the Deregulation Debate*. Oxford: Oxford University Press.
- Bach D., Newman A.L., Weber S. (2006). The international implications of China's fledgling regulatory state: From product maker to rule maker. *New Political Economy* 11, 499–518.
- Bachner B. (1996). Regulating pollution in the People's Republic of China: An analysis of the enforcement of environmental law. *Colorado Journal of International Environmental Law & Policy* 7, 373.
- Bai C.E., Du Y., Tao Z., Tong S.Y. (2004). Local protectionism and regional specialization: Evidence from China's industries. *Journal of International Economics* 63, 397–417.
- Bai C.E., Lu J., Tao Z. (2006). The multitask theory of state enterprise reform: Empirical evidence from China. *The American Economic Review* 96, 353–357.
- Baldwin R., Cave M., Lodge M. (2012). *Understanding Regulation: Theory, Strategy, and Practice*. Oxford University Press on Demand.
- Bambawale M.J., Sovacool B.K. (2011). China's energy security: The perspective of energy users. *Applied Energy* 88, 1949–1956. <https://doi.org/10.1016/j.apenergy.2010.12.016>
- Bandura A. (1996). Failures in self-regulation: Energy depletion or selective disengagement? *Psychological Inquiry* 7, 20–24.
- Bardach E., Kagan R. (2002a). *Going By the Book: The Problem of Regulatory Unreasonableness*. Abingdon: Transaction Publishers.
- Bardach E., Kagan R.A. (1982). *Going by the Book: The Problem of Regulatory Unreasonableness*. Philadelphia, PA: Temple University Press.
- Barry N. (1994). What is distinctive about China's economic transition? State enterprise reform and overall system transformation. *Journal of Comparative Economics* 18, 470–490.
- Bazilian M., Onyeji I. (2012). Fossil fuel subsidy removal and inadequate public power supply: Implications for businesses. *Energy Policy* 45, 1–5.
- Beck U. (1992a). From industrial society to the risk society: Questions of survival, social structure and ecological enlightenment. *Theory, Culture & Society* 9, 97.
- Beck U. (1992b). *Risk Society: Towards a New Modernity*. Thousand Oaks, CA: Sage Publications.
- Beck U. (1998). The politics of risk society. *Estudios Demográficos y Urbanos* 13(39), 693–695.
- Beck U., Ritter M., Lash S., Wynne B. (1993). *Risk Society: Towards a New Modernity*. London: SAGE Publications.
- Béland D. (2005). Ideas and social policy: An institutionalist perspective. *Social Policy & Administration* 39(1), 1–18. <https://doi.org/10.1111/j.1467-9515.2005.00421.x>
- Benhabib S. (1996). *Democracy and Difference: Contesting the Boundaries of the Political*. Princeton, NJ: Princeton University Press.
- Berrah N., Feng F., Priddle R. & Wang L. (2007). *Sustainable Energy in China: The Closing Window of Opportunity*. Directions in Development Energy & Mining. Washington, DC: World Bank.
- Beyer S. (2006). Environmental law and policy in the People's Republic of China. *Chinese Journal of International Law* 5, 185.
- Bigo D. (2011). Pierre Bourdieu and international relations: Power of practices, practices of power. *International Political Sociology* 5, 225–258.
- Bishin W.R. (1977). Judicial review in democratic theory. *Southern California Law Review* 50, 1099.
- Black J. (2005). *Regulatory Innovation: A Comparative Analysis*. Cheltenham: Edward Elgar Publishing.
- Black J. (2010). *The Rise, Fall and Fate of Principles Based Regulation*. LSE Legal Studies Working

- Paper No. 17/2010. Available at SSRN: <https://ssrn.com/abstract=1712862> or <https://dx.doi.org/10.2139/ssrn.1712862>
- Black J., Baldwin R. (2010). Really responsive risk-based regulation. *Law & Policy* 32, 181–213.
- Black J., Baldwin R. (2012a). When risk-based regulation aims low: A strategic framework: Strategies for regulating low risks. *Regulation & Governance* 6, 131–148. <https://doi.org/10.1111/j.1748-5991.2012.01127.x>
- Black J., Baldwin R. (2012b). When risk-based regulation aims low: Approaches and challenges. *Regulation & Governance* 6, 2–22.
- Blackman A. (2000). Informal sector pollution control: What policy options do we have? *World Development* 28, 2067–2082.
- Blackman A., Bannister G.J. (1998). Community pressure and clean technology in the informal sector: An econometric analysis of the adoption of propane by traditional Mexican brickmakers. *Journal of Environmental Economics and Management* 35, 1–21.
- Blackman A., Newbold S., Shih J.S., Cook J. (2000). *The Benefits and Costs of Informal Sector Pollution Control: Mexican Brick Kilns*. Working Paper. Available from <https://agris.fao.org/agris-search/search.do?recordID=US2016207690>
- Blackman A., Shih J.S., Evans D., Batz M., Newbold S., Cook J. (2006). The benefits and costs of informal sector pollution control: Mexican brick kilns. *Environment and Development Economics* 11, 603–627.
- Bleischwitz R., Hennicke P. (2004). *Eco-efficiency, Regulation, and Sustainable Business: Towards a Governance Structure for Sustainable Development*. Cheltenham: Edward Elgar Publishing.
- Bleischwitz R., Welfens P.J.J., Zhang Z.X., eds. (2011). *International Economics of Resource Efficiency: Eco-Innovation Policies for a Green Economy*. Dordrecht: Springer.
- Bodin Ö, Crona B.I. (2009). The role of social networks in natural resource governance: What relational patterns make a difference? *Global Environmental Change* 19, 366–374.
- Bohman J. (1998). Survey article: The coming of age of deliberative democracy. *Journal of Political Philosophy* 6, 400–425.
- Bohman J. (2004). Realizing deliberative democracy as a mode of inquiry: Pragmatism, social facts, and normative theory. *The Journal of Speculative Philosophy* 18, 23–43.
- Bohman J., Rehg W. (2002). *Deliberative Democracy: Essays on Reason and Politics*. Cambridge, MA: MIT Press.
- Borgonjon J., Vanhonacker W.R. (1994). Management training and education in the People's Republic of China. *International Journal of Human Resource Management* 5(2), 327–356.
- Börzel T.A. (2003). *Environmental Leaders and Laggards in Europe: Why There is (Not) a 'Southern Problem'*. Farnham: Ashgate Publishing.
- Bourdieu P. (1986). The forms of capital. In: J. Richardson, ed., *Handbook of Theory and Research for the Sociology of Education* (pp. 241–58). Westport, CT: Greenwood.
- Boyer M., Laffont J.J. (1999). Toward a political theory of the emergence of environmental incentive regulation. *The RAND Journal of Economics* 30(1), 137–157.
- Boyer R. (2001). The regulation approach as a theory of capitalism: A new derivation. In A. Labrousse, J.D. Weisz, eds., *Institutional Economics in France and Germany. Studies in Economic Ethics and Philosophy* (pp. 49–92). Berlin: Springer.
- Boyer R. (2004). New growth regimes, but still institutional diversity. *Socio-Economic Review* 2, 1.
- Boyer R., Saillard Y. (2002). *Regulation Theory: The State of the Art*. London: Routledge.
- Bradbrook A., Heffron R., Ronne A., Tomain J., Talus K. (2018). A treatise for energy law. *The Journal of World Energy Law & Business* 11(1), 34–48. <https://doi.org/10.1093/jwelb/jwx039>
- Bradbrook A.J. (1993). Energy law: the neglected aspect of environmental law. *Melbourne University Law Review* 19(1), 1–19.
- Braithwaite J. (1981). Enforced self-regulation: A new strategy for corporate crime control. *Michigan Law Review* 80, 1466.

- Braithwaite J. (1993). Beyond positivism: learning from contextual integrated strategies. *Journal of Research in Crime and Delinquency* 30, 383.
- Braithwaite J. (1998). Institutionalizing distrust, enculturating trust. In V. Braithwaite, M. Levi, eds., *Trust and Governance* (pp. 343-375). New York, NY: Russell Sage.
- Braithwaite J. (1999). Accountability and governance under the new regulatory state. *Australian Journal of Public Administration* 58, 90–94.
- Braithwaite J. (2002a). Rewards and regulation. *Journal of Law and Society* 29, 12–26.
- Braithwaite J. (2002b). Rules and principles: A theory of legal certainty. *Australian Journal of Legal Philosophy* 27, 47.
- Braithwaite J. (2002c). *Restorative Justice and Responsive Regulation*. New York, NY: Oxford University Press.
- Braithwaite J. (2005). *Neoliberalism or Regulatory Capitalism*. RegNet Occasional Paper No. 5. Available at SSRN: <https://ssrn.com/abstract=875789> or <http://dx.doi.org/10.2139/ssrn.875789>
- Braithwaite J. (2006). Responsive regulation and developing economies. *World Development* 34, 884–898.
- Braithwaite J. (2008). *Regulatory Capitalism: How It Works, Ideas For Making It Work Better*. Cheltenham: Edward Elgar Publishing.
- Braithwaite J. (2011). The essence of responsive regulation. *University of British Columbia Law Review* 44, 475.
- Braithwaite J. (2011). The essence of responsive regulation. *University of British Columbia Law Review* 44, 475.
- Braithwaite J., Braithwaite V. (1995). The politics of legalism: rules versus standards in nursing-home regulation. *Social & Legal Studies* 4, 307–341.
- Braithwaite J., Coglianese C., Levi-Faur D. (2007a). Can regulation and governance make a difference? *Regulation & Governance* 1, 1–7.
- Braithwaite J., Department of Health Housing & Community Services. (1993). *Raising the Standard: Resident Centred Nursing Home Regulation in Australia*. Canberra: AGPS.
- Braithwaite J., Drahos P. (2000). *Global Business Regulation*. Cambridge; Cambridge University Press.
- Braithwaite J., Makkai T., Braithwaite V. (2007) *Regulating Aged Care: Ritualism and the New Pyramid*. Cheltenham: Edward Elgar Publishing.
- Braithwaite J., Walker J., Grabosky P. (1987). An enforcement taxonomy of regulatory agencies. *Law & Policy* 9, 323–351.
- Braithwaite V. (1995). Games of engagement: Postures within the regulatory community. *Law & Policy* 17, 225–255.
- Braithwaite V., Braithwaite J. (2001). An evolving compliance model for tax enforcement. In N. Shover and J.P. Wright, eds., *Crimes of Privilege: Readings in White-Collar Crime* (pp. 405–19). New York, NY: Oxford University Press.
- Braithwaite V., Braithwaite J., Gibson D., Makkai T. (1994a). Regulatory styles, motivational postures and nursing home compliance. *Law & Policy* 16, 363–394.
- Brandt L., Zhu X. (2000). Redistribution in a decentralized economy: growth and inflation in China under reform. *Journal of Political Economy* 108, 422–439.
- Brinton M.C., Nee V. (1998). *The New Institutionalism in Sociology*. Stanford, CA: Stanford University Press.
- Brown L., LaFond A., Macintyre K.E. (2001). *Measuring Capacity Building*. Chapel Hill, NC: Carolina Population Center.
- Brown M.A., Cortes-Lobos R., Cox M. (2011). Reinventing industrial energy use in a resource-constrained world. In F.P. Sioshansi, ed., *Energy, Sustainability and the Environment* (pp. 337–66). Boston, MA: Butterworth-Heinemann.
- Burns J.P. (2004). *Government Capacity and the Hong Kong Civil Service*. Oxford: Oxford University Press.

- Burris S., Drahos P., Shearing C. (2005). Nodal Governance. *Australian Journal of Legal Philosophy* 3, 30-58.
- Cai Y., Yang S. (2005). State power and unbalanced legal development in China. *Journal of Contemporary China* 14, 117-134.
- Cairney P., McHarg A., McEwen N., Turner K. (2019). How to conceptualise energy law and policy for an interdisciplinary audience: The case of post-Brexit UK. *Energy Policy* 129, 459-466.
- CarbonBrief. (2018). China leading on world's clean energy investment, says report. <https://www.carbonbrief.org/china-leading-worlds-clean-energy-investment-says-report> (accessed 4.15.18).
- Carpini M.X.D., Cook F.L., Jacobs L.R. (2004). Public deliberation, discursive participation, and citizen engagement: A review of the empirical literature. *Annual Review of Political Science* 7, 315-344.
- Carruthers B.G., Halliday T.C. (2006). Negotiating globalization: Global scripts and intermediation in the construction of Asian insolvency regimes. *Law & Social Inquiry* 31, 521-584.
- Carter C.R., Dresner M. (2001). Purchasing's role in environmental management: Cross-functional development of grounded theory. *Journal of Supply Chain Management* 37, 12-27.
- Chai Q., Zhang X. (2010). Technologies and policies for the transition to a sustainable energy system in China. *Energy* 35, 3995-4002. <https://doi.org/10.1016/j.energy.2010.04.033>
- Chambers S. (2003). Deliberative democratic theory. *Annual Review of Political Science* 6, 307-326.
- Chambers S. (2004). Behind closed doors: Publicity, secrecy, and the quality of deliberation. *Journal of Political Philosophy* 12, 389-410.
- Chambers S. (2009). Rhetoric and the public sphere. *Political Theory* 37, 323.
- Chambers S., Kopstein J. (2001). Bad civil society. *Political Theory* 29, 837-865.
- Chan H., Wong K., Cheung K., Lo J. (1995). The implementation gap in environmental management in China: The case of Guangzhou, Zhengzhou, and Nanjing. *Public Administration Review* 55(4), 333-40. <https://doi.org/10.2307/977124>
- Chan H.S. (2003). The civil service under One Country, Two Systems: The cases of Hong Kong and the People's Republic of China. *Public Administration Review* 63: 405-417.
- Chateau B., Lapillonne B. (2012). *Energy Demand: Facts and Trends. A Comparative Analysis of Industrialized Countries*. Dordrecht: Springer Science & Business Media.
- Chege Kamau, E. (2005). Environmental law and self-management by industries in Kenya. *Journal of Environmental Law* 17(2), 229-244, <https://doi.org/10.1093/envlaw/eqi018>
- Chen X. (2003). Nengyuan anquan yao zhongshi neibu yinsu, qiangdiao zhengce tizhi baozhan [Energy security must attach importance to internal factors and stress the safeguarding of the policy system]. *Zhongguo Nengyuan* [China Energy] 5. <http://www.china5e.net/dissertation/policy/20050718121240.html>.
- Chen Z., Porter R. (2000). Energy management and environmental awareness in China's enterprises. *Energy Policy* 28(1), 49-63
- Cherryholmes C.H. (1992). Notes on pragmatism and scientific Realism. *Educational Researcher* 21(6), 13-17. <https://doi.org/10.3102/0013189X021006013>.
- Cheung P.T., Chung J.H., Lin Z. (2016). *Provincial Strategies of Economic Reform in Post-Mao China: Leadership, Politics, and Implementation*. London: Routledge.
- Chien S.-S. (2007). Institutional innovations, asymmetric decentralization, and local economic development: A case study of Kunshan, in post-Mao China. *Environment and Planning C: Government and Policy* 25, 269-290.
- Chien S.-S. (2010). Economic freedom and political control in post-Mao China: A perspective of upward accountability and asymmetric decentralization. *Asian Journal of Political Science* 18, 69-89.
- Chien, S.-S. (2008). Local responses to globalization in China: A territorial restructuring process perspective. *Pacific Economic Review* 13, 492-517.
- Child J., Lu Y., Tsai T. (2007). Institutional entrepreneurship in building an environmental protection system for the People's Republic of China. *Organization Studies* 28, 1013.

- Chin G., Thakur R. (2010). Will China change the rules of global order? *The Washington Quarterly* 33, 119–138.
- China Dialogue. (2016). Climate, energy and China's 13th Five-Year Plan in graphics. China Dialogue, 18 March. <https://www.chinadialogue.net/article/show/single/en/8734-Climate-energy-and-China-s-13th-Five-Year-Plan-in-graphics> (accessed 3.1.18a).
- China Infrastructure Industries Government Regulatory System Reform Task Force. (2002). *Yanjiu Baogao* (Research report). Beijing: Zhongguo Caizheng Jingji Chubanshe.
- ChinaFile. (2016). How China's 13th Five-Year Plan addresses energy and the environment. *China File* [online document], 10 March. <http://www.chinafile.com/reporting-opinion/environment/how-chinas-13th-five-year-plan-addresses-energy-and-environment> (accessed 3.1.18).
- Chung J.H. (1995). Studies of central–provincial relations in the People's Republic of China: A mid-term appraisal. *The China Quarterly* 142, 487–508.
- Chung J.H. (2000). *Central Control and Local Discretion in China: Leadership and Implementation During Post-Mao Decollectivization*. Oxford University Press on Demand.
- Chung J.H. (2000). *Central Control and Local Discretion in China: Leadership and Implementation during Post-Mao Decollectivization*. Oxford: Oxford University Press.
- Chung J.H. (2016). *Centrifugal Empire: Central–Local Relations in China*. New York, NY: Columbia University Press.
- Clements B., Jung H.-S., Gupta S. (2007). Real and distributive effects of petroleum price liberalization: The case of Indonesia. *The Developing Economies* 45, 220–237.
- Climate Spectator. (n.d. [paywalled]). A tipping point for fossil fuels. *The Australian*. <http://www.climatespectator.com.au/commentary/tipping-point-fossil-fuels> (accessed 11.15.11).
- Climate Spectator. (n.d. paywalled). Explainer: China's carbon market plans. *The Australian*. http://www.climatespectator.com.au/commentary/explainer-chinas-carbon-market-plans?utm_source=Climate%20Spectator&utm_medium=email&utm_campaign=209eabd3d2-CSPEC_DAILY (accessed 11.15.11).
- Climate Spectator. (n.d.). Coping with China's urban tsunami. *The Australian*. http://www.climatespectator.com.au/commentary/coping-chinas-urban-tsunami?utm_source=Climate%2BSpectator%2Bdaily&utm_medium=email&utm_campaign=Climate%2BSpectator%2Bdaily&utm_source=Climate+Spectator&utm_campaign=01fd552bce-CSPEC_DAILY&utm_medium=email (accessed 11.7.11).
- Climate Spectator/ (n.d. [paywalled]). Consumerist China: Is it sustainable? *The Australian*. http://www.climatespectator.com.au/commentary/consumerist-china-it-sustainable?utm_source=Climate%2BSpectator%2Bdaily&utm_medium=email&utm_campaign=Climate%2BSpectator%2Bdaily&utm_source=Climate+Spectator&utm_campaign=5df82366e7-CSPEC_DAILY&utm_medium=email (accessed 11.2.11a).
- Cohn M. (2001). Fuzzy legality in regulation: The legislative mandate revisited. *Law & Policy* 23, 469–497.
- Conca K., Wu F., Mei C. (2006). Global regime formation or complex institution building? The principled content of international river agreements. *International Studies Quarterly* 50, 263–285.
- Connor T., Haines F. (2013). Networked regulation as a solution to human rights abuse in global supply chains? The case of trade union rights violations by Indonesian sports shoe manufacturers. *Theoretical Criminology* 17, 197–214.
- Constantin C. (2007). Understanding China's Energy Security, *World Political Science* 3(3), 1–30. <https://doi.org/10.2202/1935-6226.1026>
- Cox R. (2004). The path-dependency of an idea: Why Scandinavian welfare states remain distinct. *Social Policy and Administration* 38 (2), 204–219.
- Crozier M., Huntington S.P., Watanuki J. (1975). *The Crisis of Democracy*. New York, NY: New York University Press.

- Dai S., Taube M. (2020). Strategic ambiguity in policy formulation: Exploring the function of the term ‘township and village enterprises’ in China’s industrial ownership reforms. *Journal of Chinese Governance*, 1–25. <https://doi.org/10.1080/23812346.2020.1809272>
- Dannreuther R. (2003). Asian security and China's energy needs. *International Relations of the Asia-Pacific* 3(2), 197–219. <https://doi.org/10.1093/irap/3.2.197>.
- Daojiong Z. (2005). China’s energy security and its international relations. *The China and Eurasia Forum Quarterly* 3, 39–54.
- Daojiong Z. (2006). China’s energy security: domestic and international issues. *Survival* 48(1), 185–7.
- Daojiong Z. (2008). Tuozhan zhongguo nengyuan anquan yanjiu de keti jichu [Expanding the underlying question in research on China’s energy security]. *Shijie Jingji yu Zhengzhi* [World Economics and Politics] 7, 80.
- Davies G., Burgess J. (2004). Challenging the ‘view from nowhere’: Citizen reflections on specialist expertise in a deliberative process. *Health & Place* 10, 349–361.
- Deily M.E., Gray W.B. (1991). Enforcement of pollution regulations in a declining industry. *Journal of Environmental Economics and Management* 21, 260–274.
- Dezalay Y., Garth B. (1995). Merchants of law as moral entrepreneurs: Constructing international justice from the competition for transnational business disputes. *Law & Society Review* 29, 27.
- Dezalay Y., Garth B. (2011a). *Lawyers and the Rule of Law in an Era of Globalization*. London: Routledge.
- Dezalay Y., Garth B.G. (1996). *Dealing in Virtue: International Commercial Arbitration and the Construction of a Transnational Legal Order*. Chicago, IL: University of Chicago Press.
- Dezalay Y., Garth B.G. (2002). *The Internationalization of Palace Wars. Lawyer, Economists, and the Contest to Transform Latin American States*. Chicago, IL: University of Chicago Press.
- Dezalay Y., Garth B.G. (2011b). Hegemonic battles, professional rivalries, and the international division of labor in the market for the import and export of state-governing expertise. *International Political Sociology* 5, 276–293.
- Diduck A. (1999). Critical education in resource and environmental management: Learning and empowerment for a sustainable future. *Journal of Environmental Management* 57, 85–97.
- Đjilas M. (1966). *The New Class: An Analysis of the Communist System*. London: Unwin.
- Dougherty S., Herd R., He P. (2007). Has a private sector emerged in China’s industry? Evidence from a quarter of a million Chinese firms. *China Economic Review* 18, 309–334.
- Dowdle M.W. (2002). Of parliaments, pragmatism, and the dynamics of constitutional development: The curious case of China. *New York University Journal of International Law and Politics* 35(1), 1–20.
- Dowdle M.W. (2005). Of socialism and socialist legal transformations in China and Vietnam. In J. Gillespie, P. Nicholson, eds., *Asian Socialism & Legal Change: The Dynamics of Vietnamese and Chinese Reform* (pp. 21–44). Canberra: Asia Pacific Press.
- Dowdle M.W. (2009). China and post-Fordist regulation. *Hong Kong Law Journal* 39, 649–74.
- Dowdle M.W. (2009). The geography of regulation. In D. Levi-Faur, ed., *Handbook on The Politics of Regulation* (pp. 576–89). Cheltenham: Edward Elgar
- Dowdle M.W. (2013). Competition in the periphery: Melamine milk adulteration as peripheral ‘innovation’. In M. W. Dowdle, J. Gillespie, & I. Maher (eds.), *Asian Capitalism and the Regulation of Competition: Towards a Regulatory Geography of Global Competition Law* (pp. 199–227). Cambridge: Cambridge University Press.
- Dowdle M.W., Wilkinson M.A. (2015). *On the Limits of Constitutional Liberalism: In Search of a Constitutional Reflexivity*. NUS Law Working Paper No. 2015/009. Available at SSRN: <https://ssrn.com/abstract=2686013>
- Downs E. (2006). *China*. Foreign Policy Studies Energy Security Series. Washington, DC: Brookings Institution.
- Downs E.S. (2004). The Chinese energy security debate. *The China Quarterly* 177, 21–41.

- Downs E.S. (2007). The fact and fiction of Sino-African energy relations. *China Security* 3, 42–68.
- Drahos P., Braithwaite J. (2002). *Information Feudalism*. London: Earthscan.
- Dryzek J.S. (2005). *The Politics of the Earth: Environmental Discourses*. 2nd edn. Oxford: Oxford University Press.
- Dryzek J.S. (1990). *Discursive Democracy: Politics, Policy Science, and Political Science*. Cambridge: Cambridge University Press.
- Dryzek J.S. (2000). *Deliberative Democracy and Beyond: Liberals, Critics, Contestations*. Oxford: Oxford University Press.
- Dryzek J.S. (2001). Legitimacy and economy in deliberative democracy. *Political Theory* 29, 651–669.
- Dryzek J.S. (2005a). Deliberative democracy in different places. *Journal of Zhejiang University (Humanities and Social Sciences)* 3.
- Dryzek J.S. (2005b). Deliberative democracy in divided societies. *Political Theory* 33, 218.
- Dryzek J.S. (2008). Two paths to global democracy. *Ethical Perspectives* 15, 469–486.
- Dryzek J.S. (2010). Deliberative turns. In J. Dryzek, S. Niemeyer, *Foundations and Frontiers of Deliberative Governance* (pp. 3–19). Oxford: Oxford University Press.
- Dryzek J.S. (2013). *The Politics of the Earth: Environmental Discourses*. 3rd edn. London: Oxford University Press.
- Dryzek J.S., Norgaard R.B., Schlosberg D. (2011). *The Oxford Handbook of Climate Change and Society*. New York, NY: Oxford University Press.
- Dudziak M.L. (2011). Symposium on Judicial Independence at Harvard Today. Legal History Blog. <http://legalhistoryblog.blogspot.com/2011/03/symposium-on-judicial-independence-at.html> (accessed 3.30.11).
- Durant R.F., Fiorino D.J., O’Leary R. (2004). *Environmental Governance Reconsidered: Challenges, Choices, and Opportunities*. Cambridge, MA: The MIT Press.
- Economy E.C. (2004). *The River Runs Black: The Environmental Challenge to China's Future*. Ithaca, NY: Cornell University Press.
- Economy E.C. (2007). The great leap backwards: The costs of China’s environmental crisis. *Foreign Affairs* 86(5), 38-59
- Economy E.C. (2011). *The River Runs Black: The Environmental Challenge to China's Future*. 2nd edn, Ithaca, NY: Cornell University Press
- Edmonds R.L. (1999). The environment in the People’s Republic of China 50 years on. *The China Quarterly* 159, 640–49.
- Eichhorst U., Bongardt D. (2009). Towards cooperative policy approaches in China: Drivers for voluntary agreements on industrial energy efficiency in Nanjing. *Energy Policy* 37, 1855–1865.
- Eldridge D.. (2004). *Capacity Building for Regulation*. CRC Policy Brief No. 4. London: University of Manchester/CRC. Available at <https://assets.publishing.service.gov.uk/media/57a08cd1e5274a27b2001451/CRCpb4.pdf>
- Elster J. (1998). *Deliberative Democracy*. Cambridge: Cambridge University Press.
- Engeli I., Rothmayr A.C. (2014). *Comparative Policy Studies: Conceptual and Methodological Challenges*. Dordrecht: Springer.
- Environment Protection Authority Victoria (n.d.). *Compliance And Enforcement Policy*. Available at <https://ref.epa.vic.gov.au/~media/Publications/1388%203.pdf>).
- Ernst D., Naughton B. (2008). China’s emerging industrial economy: Insights from the IT industry. In C.A. McNally, ed., *China’s Emergent Political Economy: Capitalism in the Dragon’s Lair* (pp. 35–59). London: Routledge. 75, 39.
- Estache A., Laffont J.J., Zhang X. (2004). Downsizing with labor sharing and collusion. *Journal of Development Economics* 73, 519–40. <https://doi.org/10.1016/j.jdeveco.2003.04.003>
- Fa-gen X.U., Jiang H. (2006). Deliberative mechanism and the practice of inner-party democracy of the CPC: A pondering over the permanent system of the Party Congress in Jiaojiang District, Zhejiang Province. *Journal of Southwest Jiaotong University (Social Sciences)* 1.

- Fan Y., Liao H., Wei Y.-M. (2007). Can market oriented economic reforms contribute to energy efficiency improvement? Evidence from China. *Energy Policy* 35, 2287–2295. <https://doi.org/10.1016/j.enpol.2006.07.011>
- Fang Y., Zeng Y. (2007). Balancing energy and environment: The effect and perspective of management instruments in China. *Energy* 32, 2247–2261. <https://doi.org/doi: DOI: 10.1016/j.energy.2007.07.016>
- Farinelli U., Yokobori K., Fengqi Z. (2001). Energy efficiency in China. *Energy for Sustainable Development* 5, 32–38. [https://doi.org/10.1016/S0973-0826\(08\)60284-7](https://doi.org/10.1016/S0973-0826(08)60284-7)
- Farrell D., Gersch U.A., Stephenson E. (2006). The value of China's emerging middle class. *McKinsey Quarterly* 2, 60.
- Feng T., Sun L., Zhang Y. (2009). The relationship between energy consumption structure, economic structure and energy intensity in China. *Energy Policy* 37, 5475–5483. <https://doi.org/10.1016/j.enpol.2009.08.008>
- Ferris Jr R.J., Zhang H. (2002). Reaching out to the rule of law: China's continuing efforts to develop an effective environmental law regime. *William & Mary Bill of Rights Journal* 11, 569.
- Feshback M., Friendly A. (1992). *Ecocide in the USSR: Health and Nature Under Siege*. New York, NY: Basic Books.
- Fewsmith J. (2003). China and the politics of SARS. *Current History* 102, 250.
- Fewsmith J. (2007). Assessing social stability on the eve of the 17th Party Congress. *China Leadership Monitor* 12, 1–10.
- Fiorino D.J. (1989). Environmental risk and democratic process: a critical review. *Columbia Journal of Environmental Law* 14, 501.
- Fiorino D.J. (1995). *Making Environmental Policy*. Berkeley, CA: University of California Press.
- Fiorino D.J. (1996a). Environmental policy and the participation gap. In W.M. Lafferty, J. Meadowcroft, eds., *Democracy and the Environment: Problems and Prospects* (pp. 194–212). Cheltenham: Edward Elgar.
- Fiorino D.J. (1996b). Toward a new system of environmental regulation: The case for an industry sector approach. *Environmental Law* 26, 457.
- Fiorino D.J. (1999). Rethinking environmental regulation: perspectives on law and governance. *Harvard Environmental Law Review* 23, 441.
- Fiorino D.J. (2001). Environmental policy as learning: A new view of an old landscape. *Public Administration Review* 61, 322–334.
- Fiorino D.J. (2004). Flexibility. In R.F. Durant, D.J. Fiorino, R. O'Leary, eds., *Environmental Governance Reconsidered: Challenges, Choice and Opportunities* (pp. 393–425). Cambridge MA: MIT Press.
- Fiorino D.J. (2006). *The New Environmental Regulation*. Boston, MA: The MIT Press.
- Fiorino D.J. (2010). Sustainability as a conceptual focus for public administration. *Public Administration Review* 70, s78–s88.
- Fiorino D.J., Ahluwalia M. (2020). Regulating by performance, not prescription: The use of performance standards in environmental policy. In D.M. Konisky (Ed.), *Handbook of US Environmental Policy* (pp. 217–230). Cheltenham: Edward Elgar Publishing.
- Fischer-Lescano A., Teubner G. (2003). Regime-collisions: The vain search for legal unity in the fragmentation of global law. *Michigan Journal of International Law* 25, 999.
- Fisher-Vanden K., Jefferson G. Liu H., Tao Q. (2004). What is driving China's decline in energy intensity? *Resource and Energy Economics* 26(1), 77–97
- Fishkin J.S. (2009). *When the People Speak: Deliberative Democracy and Public Consultation*. New York, NY: Oxford University Press.
- Fishkin J.S., He B., Luskin R.C., Siu A. (2010). Deliberative democracy in an unlikely place: Deliberative polling in China. *British Journal of Political Science* 40, 435–48.
- Fleisher B.M., Yang D.T. (2003). Labor laws and regulations in China. *China Economic Review* 14, 426–33.
- Fleming J., Grabosky P. (2009). Managing the demand for police services, or how to control an

- insatiable appetite. *Policing* 3(3), 281–91. <https://doi.org/10.1093/police/pap019>
- Fligstein N. (1996). Markets as politics: A political-cultural approach to market institutions. *American Sociological Review* 61, 656-673
- Florini A. (1996). The evolution of international norms. *International Studies Quarterly* 40, 363–389.
- Florini A. (2003). *The Coming Democracy: New Rules for Running a New World*. Washington, DC: Island Press.
- Florini A. (2007). *The Right to Know: Transparency for an Open World*. New York, NY: Columbia University Press.
- Florini A. (2008). *Global Governance and Energy*. Research Collection School of Social Sciences. Paper 2318. https://ink.library.smu.edu.sg/soass_research/2318
- Florini A., ed. (2000). *The Third Force: The Rise of Transnational Civil Society*. Washington, DC: Carnegie Endowment for International Peace/Japan Center for international Exchange.
- Florini A.M. (1999). Does the invisible hand need a transparent glove? The politics of transparency. In *Annual World Bank Conference on Development Economics*. Washington, DC: World Bank. http://www.worldbank.org/research/abcde/washington_11/pdfs/florini.pdf.
- Florini A.M., Simmons P.J. (2000). The third force: The rise of transnational civil society. *Foreign Affairs (Council on Foreign Relations)* 80(2), 169. <https://doi.org/10.2307/20050089>
- Forsythe M. (2017). China Aims to Spend at Least \$360 Billion on Renewable Energy by 2020. *The New York Times* [online edition], 5 January. <https://www.nytimes.com/2017/01/05/world/asia/china-renewable-energy-investment.html> (accessed 4.15.18).
- Foster K.W. (2006). Improving municipal governance in China: Yantai’s pathbreaking experiment in administrative reform. *Modern China* 32, 221–250.
- Foulon J., Lanoie P., Laplante B. (2002). Incentives for pollution control: Regulation or information? *Journal of Environmental Economics and Management* 44, 169–187.
- Friedman M. (1953). *Essays in Positive Economics*. Chicago, IL: University of Chicago Press.
- Fu Y., Peerenboom R. (2009). A new analytical framework for understanding and promoting judicial independence in China. In R. Peerenboom, ed., *Judicial Independence in China: Lessons for Global Rule of Law Promotion* (pp. 95–133). New York, NY: Cambridge University Press.
- Fung, A. (2003). Survey article: Recipes for public spheres: Eight institutional design choices and their consequences. *The Journal of Political Philosophy* 11, 338–367. <https://doi.org/10.1111/1467-9760.00181>
- Gadamer H.G. (1975). *Truth and Method*. New York, NY: Continuum.
- Gadamer H.G., Weinsheimer J., Marshall D.G. (2004). *Truth and Method*. New York, NY: Continuum.
- Gaines S.E., Kimber C. (2001). Redirecting self-regulation. *Journal of Environmental Law* 13, 157.
- Gainsborough M. (2003). Corruption and the politics of economic decentralisation in Vietnam. *Journal of Contemporary Asia* 33, 69–84.
- Gillespie J., Peerenboom R., eds. (2009). *Regulation in Asia: Pushing Back on Globalization*. London: Routledge.
- Ginsburg T., Moustafa T. (2008). *Rule by Law: The Politics of Courts in Authoritarian Regimes*. Cambridge: Cambridge University Press.
- Gintis H, Bowles S., Boyd R., ErnstFehrd, E. (2003). Explaining altruistic behavior in humans. *Evolution and Human Behavior* 24(3), 153-172
- Gintis H., Bowles S., Boyd R., Fehr E. (2003). Explaining altruistic behavior in humans. *Evolution and Human Behavior* 24, 153–172.
- Glasbergen P. (1996). Learning to manage the environment. In W.M. Lafferty, J. Meadowcroft, eds., *Democracy and the Environment: Problems and Prospects* (pp. 175–93). Cheltenham: Edward Elgar.
- Glasbergen P. (1998). *Co-operative Environmental Governance: Public-Private Agreements as a Policy Strategy*. The Hague: Kluwer Academic.

- Glasbergen P., Groenenberg R. (2001). Environmental partnerships in sustainable energy. *European Environment* 11, 1–13.
- Glicksman R.L. (2006). From cooperative to inoperative federalism: The perverse mutation of environmental law and policy. *Wake Forest Law Review* 41, 719.
- Goff K.E. (1998). Chaos, collaboration, and curriculum: A deliberative process. *Journal of Curriculum and Supervision* 14, 29–42.
- Goodin R.E. (1998). *The Theory of Institutional Design*. Cambridge: Cambridge University Press.
- Goodin R.E. (2000). Democratic deliberation within. *Philosophy & Public Affairs* 29, 81–109.
- Goodin R.E. (2004). Representing diversity. *British Journal of Political Science* 34, 453–468.
- Goodin R.E. (2005). Sequencing deliberative moments. *Acta Politica* 40, 182–196.
- Goodin R.E., Niemeyer, S.J. (2003). When does deliberation begin? Internal reflection versus public discussion in deliberative democracy. *Political Studies* 51, 627–649.
- Goodman D., Robison R. (2013). *The New Rich in Asia: Mobile Phones, McDonald's and Middle Class Revolution*. London: Routledge.
- Goodwin M. (2001). Regulation as process: Regulation theory and comparative urban and regional research. *Journal of Housing and the Built Environment* 16, 71–87.
- Gormley W.T. (1998). Regulatory enforcement styles. *Political Research Quarterly* 51, 363.
- Gray W.B., Scholz J.T. (1991). Analyzing the equity and efficiency of OSHA enforcement. *Law & Policy* 13, 185–214.
- Gray W.B., Scholz J.T. (1993). Does regulatory enforcement work? A panel analysis of OSHA enforcement. *Law & Society Review* 27, 177.
- Green D.P., Shapiro I. ((1994). *Pathologies of Rational Choice Theory: A Critique of Applications in Political Science*. New Haven, CT: Yale University Press.
- Green F., Stern N. (2015). *China's 'New Normal': Structural Change, Better Growth, and Peak Emissions*. Policy Brief. London: Centre for Climate Change Economics and Policy.
- Greif, A. (2006). *Institutions and the path to the modern economy: Lessons from medieval trade*. Cambridge University Press.
- Grimheden J. (2006). The reform path of the Chinese judiciary: Progress or stand-still? *Fordham International Law Journal* 30, 1000.
- Groves T., Hong Y., McMillan J., Naughton B. (1994). Autonomy and incentives in Chinese state enterprises. *The Quarterly Journal of Economics* 109, 183.
- Groves T., Hong Y., McMillan J., Naughton B. (1995). China's evolving managerial labor market. *Journal of Political Economy* 103(4), 873–92.
- Gunningham N., Grabosky P., Sinclair D. (1998). *Smart Regulation: Designing Environmental Policy*. Oxford: Clarendon Press.
- Gunningham N., Kagan R.A., Thornton D. (2003). *Shades of Green: Business, Regulation, and Environment*. Stanford, CA: Stanford University Press.
- Gunningham N., Kagan R.A., Thornton D. (2004). Social license and environmental protection: Why businesses go beyond compliance. *Law & Social Inquiry* 29(2), 307–41
- Gunningham N., Phillipson M., Grabosky P. (1999). Harnessing third parties as surrogate regulators: Achieving environmental outcomes by alternative means. *Business Strategy and the Environment* 8(4), 211–24.
- Gunningham N., Rees J. (1997). Industry self-regulation: An institutional perspective. *Law & Policy* 19, 363–414.
- Gunningham N., Sinclair D. (1999). Regulatory pluralism: Designing policy mixes for environmental protection. *Law & Policy* 21, 49–76.
- Gunningham N., Sinclair D. (2002). *Leaders and Laggards: Next-Generation Environmental Regulation*. Sheffield: Greenleaf Publishing.
- Guo X. (2001). Dimensions of Guanxi in Chinese Elite Politics. *The China Journal* 46, 69-90.
- Guthrie D. (1998). The declining significance of Guanxi in China's economic transition. *The China Quarterly*, (154), 254-282. www.jstor.org/stable/655891
- Gutmann A., Thompson D. (2002). Deliberative democracy: Beyond process. *Journal of Political*

- Philosophy* 10, 153–174.
- Gutmann A., Thompson D.F. (2004). *Why Deliberative Democracy?* Princeton, NJ: Princeton University Press.
- Habermas J. (1994). Three normative models of democracy. *Constellations* 1, 1–10.
- Habermas J. (2003). On law and disagreement. Some comments on ‘interpretative pluralism’. *Ratio Juris* 16, 187–194.
- Habermas J. (2011). A political constitution for the pluralist world society? *Cosmopolitanism* 267.
- Hahn R.W. (1989). Economic prescriptions for environmental problems: How the patient followed the doctor’s orders. *The Journal of Economic Perspectives* 3, 95–114.
- Hahn R.W. (1990). The political economy of environmental regulation: Towards a unifying framework. *Public Choice* 65, 21–47.
- Haines F. (2011). *The Paradox of Regulation: What Regulation Can Achieve and What It Cannot*. Cheltenham: Edward Elgar.
- Hai-tao L.I.U., Hou-li F. (2009). On the literature review of domestic deliberative democracy research. *Journal of Yangtze Normal University* 4.
- Haley J.O. (1991). *Authority without Power: Law and the Japanese Paradox*. Studies on Law and Social Control. New York, NY: Oxford University Press. <https://www.biblio.com/9780195055832> (accessed 5.21.18).
- Haley J.O. (1994). *Authority Without Power: Law and the Japanese Paradox*. New York, NY: Oxford University Press.
- Hall P.A. (1993). Policy paradigms, social learning and the state. The case of economic policymaking in Britain. *Comparative Politics* 25, 275–296.
- Hall P.A., Soskice D. (2001). *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- Halliday T.C. (1987). *Beyond Monopoly: Lawyers, State Crises, and Professional Empowerment*. Chicago, IL: University of Chicago Press.
- Halliday T.C. (2006). Legitimacy, technology, and leverage: The building blocks of insolvency architecture in the decade past and the decade ahead. *Brookings Journal of International Law* 32, 1081.
- Halliday T.C. (2008). The legal complex and judicial activism for political liberalism. Paper presented at the Sawyer Seminar on the Dilemmas of Judicial Power, March 2008.
- Halliday T.C., Carruthers B. (2004). Legal certainty, market uncertainty, and social instability: The confounding case of stalled bankruptcy law in China. Paper presented at the Annual Meeting of the Law and Society Association, May 2004.
- Halliday T.C., Carruthers B.G. (2007). The recursivity of law: Global norm making and national lawmaking in the globalization of corporate insolvency regimes. *American Journal of Sociology* 112(4), 1135–1202.
- Halliday T.C., Osinsky P. (2006). Globalization of law. *Annual Review of Sociology* 32, 447–470.
- Han Z.H., Fan Y., Jiao J.L., Yan J.S., Wei Y.M. (2007). Energy structure, marginal efficiency and substitution rate. *Energy* 32, 935–942.
- Hardiman N., Scott C. (2007). *Puzzles of Agencification: An Organizational Analysis*. Dublin: Geary Institute, University College Dublin.
- Harrison K. (1998). Talking with the donkey: Cooperative approaches to environmental protection. *Journal of Industrial Ecology* 2, 51–72.
- Harrison S.S. (1977). *China, Oil, and Asia: Conflict Ahead*. New York, NY: Columbia University Press
- Harrison S.S., Program, W.W.I.C. for Scholars.A. (2005). *Seabed Petroleum in Northeast Asia: Conflict or Cooperation?* Woodrow Wilson International Center for Scholars, Asia Program.
- Hasnie S. (2002). *Technical Assistance to the People's Republic of China for Establishing the National Electricity Regulatory Commission*. Technical Assistance Report. Asia Development Bank.
- Hawkins K. (2002). *Law as Last Resort: Prosecution Decision-Making in a Regulatory Agency*. New

- York, NY: Oxford University Press, USA.
- Hawkins K., Hutter B.M. (1993). The response of business to social regulation in England and Wales: An enforcement perspective. *Law & Policy* 15, 199–217.
- Hawkins K., Thomas, J.M. (1984). *Enforcing Regulation*. The Hague: Kluwer Academic.
- Hay C. (2006). Constructivist institutionalism. In R.A.W. Rhodes, S.A. Binder, B.A. Rockman, eds., *The Oxford Handbook of Political Institutions* (pp. 56–74). Oxford: Oxford University Press.
- He B. (2014). Deliberative culture and politics: The persistence of authoritarian deliberation in China. *Political Theory* 42, 58–81.
- He B., Warren M.E. (2008). Authoritarian deliberation: The deliberative turn in Chinese political development. Paper presented at American Political Science Association Annual Meeting, Boston.
- He B., Warren M.E. (2011). Authoritarian deliberation: The deliberative turn in Chinese political development. *Perspectives on Politics* 9(2), 269–289
- Heclo H. (1974). *Modern Social Politics in Britain and Sweden: From Relief to Income Maintenance*. Press New Haven, CT: Yale University.
- Heclo H., Wildavsky A. (1974). *The Private Government of Public Money: Community and Policy inside British Politics*. Berkeley, CA: University of California Press.
- Heffron R.J. (2018a). The application of distributive justice to energy taxation utilising sovereign wealth funds. *Energy Policy* 122, 649–654.
- Heffron R.J. (2018b). Reforming Energy Law at a National Level. In *Proceedings of the 2018 International Conference on Energy and Mining Law (ICEML 2018)* (pp. 290–03). Amsterdam: Atlantis Press.
- Heffron R.J., Rønne, A., Tomain, J.P., Bradbrook, A., Talus, K. (2018). A treatise for energy law. *The Journal of World Energy Law & Business* 11, 34–48.
- Heffron, R.J., McCauley, D., Sovacool, B. (2015). Resolving society's energy trilemma
- Heilmann S. (2005). Regulatory innovation by Leninist means: Communist Party supervision in China's financial industry. *The China Quarterly* 181, 1–21.
- Heilmann S. (2008a). Policy experimentation in China's economic rise. *Studies in Comparative International Development (SCID)* 43, 1–26.
- Heilmann S. (2008b). From local experiments to national policy: The origins of China's distinctive policy process. *The China Journal* 1–30.
- Hendry J.R. (2002). *Environmental NGOs and Business: A Grounded Theory of Assessment, Targeting, and Influencing*. PhD dissertation: George Washington University.
- Heberer, T., & Schubert, G. (2017). Political reform and regime legitimacy in contemporary China. In *Critical Readings on the Communist Party of China (4 Vols. Set)* (pp. 978–997). Brill.
- Herring H. (1999). Does energy efficiency save energy? The debate and its consequences. *Applied Energy* 63, 209–226.
- Hess S. (2009). Deliberative institutions as mechanisms for managing social unrest: The case of the 2008 Chongqing taxi strike. *China: An International Journal* 7, 336–352.
- Heurlin C. (2012). Old laws, new citizens: Trust in the courts in the new federal states. *German Politics* 21(4), 411–428.
- Heyes A. (2000). Implementing environmental regulation: Enforcement and compliance. *Journal of Regulatory Economics* 17, 107–129.
- Ho D.Y. (1976). On the concept of face. *American Journal of Sociology* 81, 867–884.
- Holz C.A. (2009). No Razor's Edge: Reexamining Alwyn Young's evidence for increasing interprovincial trade barriers in China. *The Review of Economics and Statistics* 91, 599–616.
- Homans G.C. (1950). *The Human Group*. New York, NY: Harcourt, Brace.
- Homans G.C. (1961). *Social Behavior: Its Elementary Forms*. New York, NY: Harcourt, Brace.
- Homans G.C. (1974). *Social Behavior: Its Elementary Forms* (Revised ed.). New York, NY: Harcourt, Brace.
- Honma, S., Hu J.L. (2008). Total-factor energy efficiency of regions in Japan. *Energy Policy* 36, 821–833.

- Hood C., James O., Jones G., Scott C., Travers T. (1999). *Regulation Inside Government: Waste-Watchers, Quality Police, and Sleazebusters*. Oxford: Oxford University Press.
- Horowitz A., Marsh C. (2002). Explaining regional economic policies in China: Interest groups, institutions and identities. *Communist and PostCommunist Studies* 35(2), 115-32.
- Houser T. (2008). The roots of Chinese oil investment abroad. *Asia Policy*, (5), 141-166.
- Howlett P. (2004). Striking the right balance: The contrasting ways in which the United States and China implement national projects affecting the environment. *Missouri Environmental Law & Policy Review* 12, 17–239.
- Hsu C. (2005). Capitalism without contracts versus capitalists without capitalism: Comparing the influence of Chinese Guanxi and Russian Blat on marketization. *Communist and Post-Communist Studies* 38, 309-327.
- Hu A.G.Z., Jefferson G.H. & Qian J.C. (2005). R&D and technology transfer: Firm-level evidence from Chinese industry. *The Review of Economics and Statistics* 87(4), 780-786.
- Hu H.C. (1944). The Chinese concepts of ‘face’. *American Anthropologist* 46, 45–64.
- Hu J. L., Wang S.C. (2006). Total-factor energy efficiency of regions in China. *Energy Policy* 34, 3206–3217.
- Hu Y. (2007). Implementation of voluntary agreements for energy efficiency in China. *Energy Policy* 35, 5541–5548. <https://doi.org/10.1016/j.enpol.2007.06.006>
- Hua J. (2010). The information disclosure mechanism of energy saving and emission reduction. *Proceedings Of International Symposium On Statistics And Management* 19–22.
- Hua Y., Yang X. (2007). Case study of Lafarge China and Shui on cement: Emission-related CSR in the Chinese cement industry. *Controversies in International Corporate Responsibility* 3, 129–143.
- Huang P.C. (2014). Centralized minimalism: Semiformal governance by quasi-officials and dispute resolution in China. In P.C. Huang, K. Bernhardt, eds., *Research from Archival Case Records: Law, Society and Culture in China* (pp. 461–489). The Hague: Brill/Nijhoff.
- Hui S.C.M. et al. (2000). Building energy efficiency standards in Hong Kong and mainland China. In *Proceedings of the 2000 ACEEE Summer Study on Energy Efficiency in Buildings* (pp. 20–25). ACEEE.
- Hunt T.E., Wilkins T.A. (1992). Environmental audits and enforcement policy. *Harvard Environmental Law Review* 16, 365.
- Huq M., Wheeler D. (1993). *Pollution Reduction Without Formal Regulation: Evidence from Bangladesh*. World Bank Environment Department Division Working Paper. Geneva: World Bank.
- Hurst W. (2006). The city as the focus: The analysis of contemporary Chinese urban politics. *China Information* 20, 457–479.
- Hutter B.M, (1989). Variations in regulatory enforcement styles. *Law & Policy* 11, 153–174.
- Hutter B.M, (1997). *Compliance: Regulation and Environment*. Oxford: Clarendon Press.
- Hutter B.M. (1986). An inspector calls. *British Journal of Criminology* 26, 114.
- Hutter B.M. (2001). Is enforced self-regulation a form of risk taking? The case of railway health and safety. *International Journal of the Sociology of Law* 29, 379–400.
- Hutter B.M. (2005). *The Attractions of Risk-Based Regulation: Accounting for the Emergence of Risk Ideas in Regulation*. Discussion Paper. London: London School of Economics and Political Science/Economic & Social Research Council Centre for Analysis of Risk and Regulation.
- Hutter B.M. (2006). *The Role of Non-State Actors in Regulation*. CARR Discussion Papers (DP 37). Centre for Analysis of Risk and Regulation, London School of Economics and Political Science.
- Hwang K. (1987). Face and favor: The Chinese power game. *American Journal of Sociology* 92, 944–974.
- Hwang K.-K. (1998). Guanxi and mientze: Conflict resolution in Chinese society. *Intercultural Communication Studies* 7, 17–38.
- IEA (International Energy Agency). (1994). *World Energy Outlook 1994*. Paris: IEA.

- IEA (International Energy Agency). (2010). *World Energy Outlook 2010*. Paris: IEA. <https://www.iea.org/reports/world-energy-outlook-2010>
- Jaffe A., Stavins R. (1994). Energy efficiency investments and public policy. *Energy Journal* 15, 43–43.
- Jakobson L., Daojiong Z. (2006). China and the worldwide search for oil security. *Asia-Pacific Review* 13, 60–73.
- Jarvis D.S. (2012). The regulatory state in developing countries: Can it exist and do we want it? The case of the Indonesian power sector. *Journal of Contemporary Asia* 42, 464–492.
- Jenkins A., Braithwaite J. (1993). Profits, pressure and corporate lawbreaking. *Crime, Law and Social Change* 20, 221–232.
- Jenner W.F.J. (1992). *The Tyranny of History: The Roots of China's Crisis*. London: Allen Lane/The Penguin Press
- Jessop B. (1977). Recent theories of the capitalist state. *Cambridge Journal of Economics* 1(4), 353–73.
- Jessop B. (1982). *The Capitalist State: Marxist Theories and Methods*. New York, NY: New York University Press.
- Jessop B. (1990a). Regulation theories in retrospect and prospect. *Economy and Society* 19, 153–216.
- Jessop B. (1990b). *State Theory: Putting the Capitalist State in its Place*. University Park, PA: Pennsylvania State University Press.
- Jessop B. (1995). The regulation approach, governance and post-Fordism: Alternative perspectives on economic and political change? *Economy and Society* 24, 307–333.
- Jessop B. (1997). The governance of complexity and the complexity of governance: Preliminary remarks on some problems and limits of economic guidance. In A. Amin, J. Hausner, eds., *Beyond Market and Hierarchy: Interactive Governance and Social Complexity* (pp. 95–128). Cheltenham: Edward Elgar.
- Jessop B. (1998). The rise of governance and the risks of failure: The case of economic development. *International Social Science Journal* 50, 29–45.
- Jessop B. (2002). *The Future of the Capitalist State*. New York, NY: Polity Press.
- Jessop B. (2004a). 4. Multi-level governance and multi-level metagovernance. *Multi-level Governance* 1, 49–75.
- Jessop B. (2004b). 2 Institutional re(turns) and the strategic–relational approach. In A. Wood, D. Valler, eds., *Governing Local and Regional Economies: Institutions, Politics, and Economic Development* (pp. 23–56). Aldershot: Ashgate
- Jia-gang C. (2008). Democratic consultation and contemporary Chinese political development. *Journal of Beijing Union University (Humanities and Social Sciences)* 2.
- Jiang M. (n.d.). Authoritarian deliberation: Public deliberation in China. In *New Media and the Social Reform* (pp. 273-290). Proceedings of the 2008 Global Communication Forum, Shanghai, China, 21-22, June, 2008. Shanghai Jiao Tong University.
- Jiang S., Lambert E., Wang J. (2007). Correlates of formal and informal social/crime control in China: An exploratory study. *Journal of Criminal Justice* 35, 261–271. <https://doi.org/10.1016/j.jcrimjus.2007.03.003>
- Jiang Z. (2010). *Research on Energy Issues in China*. Singapore: Academic Press.
- Joerges C., Vos E. (1999). *EU Committees: Social Regulation, Law and Politics*. Oxford: Hart Publishing.
- Johnson T., Liu F., Newfarmer R.S. (1997). *Clear Water, Blue Skies: China's Environment in the New Century*. New York, NY: Oxford University Press.
- Jordan A., Wurzel R.K.W., Zito A. (2005). The rise of 'new' policy instruments in comparative perspective: Has governance eclipsed government? *Political Studies* 53, 477–496.
- Jordana J., Levi-Faur D. (2004). *The Politics of Regulation: Institutions and Regulatory Reforms for the Age of Governance*. Cheltenham: Edward Elgar Press.
- Jordana J., Levi-Faur D. (2005a). Preface: The making of a new regulatory order. *The Annals of the American Academy of Political and Social Science* 598, 1–6.

- Jordana J., Levi-Faur D. (2005b). The diffusion of regulatory capitalism in Latin America: Sectoral and national channels in the making of a new order. *The Annals of the American Academy of Political and Social Science* 598, 102.
- Jordana J., Levi-Faur D. (2006). Toward a Latin American regulatory state? The diffusion of autonomous regulatory agencies across countries and sectors. *International Journal of Public Administration* 29, 335–366.
- Joskow P.L., Noll R.G. (1981). *Regulation in Theory and Practice: An Overview*. Cambridge, MA: MIT Press.
- Kagan R.A., Gunningham N., Thornton D. (2003). Explaining corporate environmental performance: How does regulation matter? *Law & Society Review* 37, 51–90.
- Kagan R.A. (1981). *Regulating Business, Regulating Schools: The Problem of Regulatory Unreasonableness*. FG Seminar on Law and Governance in Education. <https://eric.ed.gov/?id=ED208576>
- Kagan r.a. (1984). going by the book: the problem of regulatory unreasonableness. *Journal of Policy Analysis and Management* 2(3), 478.
- Kagan R.A. (1989). Editor's introduction: Understanding regulatory enforcement. *Law & Policy* 11, 89–119.
- Kagan R.A. (1994). Regulatory enforcement. In D.H. Rosenbloom, ed., *Handbook of Regulation and Administrative Law* (pp. 383–422). Washington, DC: CRC Press.
- Kagan R.A., Scholz J.T. (1980). The 'criminology of the corporation' and regulatory enforcement strategies. In E. Blankenburg, K. Lenk, eds., *Organisation Und Recht* (pp. 352–377). Dordrecht: Springer.
- Kagan R.A., Scholz J.T. (1984). The criminology of the corporation and regulatory enforcement strategies. In K. Hawkins, J.M. Thomas, eds., *Enforcing Regulation* (pp. 67–95). Boston, MA: Kluwer-Nijhoff.
- Kahneman D. (2011). *Thinking, Fast And Slow*. New York, NY: Farrar, Straus and Giroux.
- Kamarck, E.C. (2002). The end of government as we know it. In Donahue J.D., Nye J.S., eds, *Market Based Governance: Supply Side, Demand Side, Upside and Downside*. Washington, DC: Brookings Institution Press.
- Kejun J., Woetzel J. (2017). *How China is Leading the Renewable Energy Revolution*. World Economic Forum. <https://www.weforum.org/agenda/2017/08/how-china-is-leading-the-renewable-energy-revolution/> (accessed 4.15.18).
- Kennedy A.B. (2010). China's new energy-security debate. *Survival* 52, 137–158.
- Kennedy S. (2003). The price of competition: Pricing policies and the struggle to define China's economic system. *The China Journal* 49, 1–30. <https://doi.org/10.2307/3182193>
- Kenny M. (1999). Marxism and regulation theory. In A. Gamble, D. Marsh, T. Tant (eds) *Marxism and Social Science* (pp. 35–60). London: Palgrave
- Keping Y. (2010). Toward an incremental democracy and governance: Chinese theories and assessment criteria. In Y. Keping, ed., *Democracy and Rule of Law in China* (pp. 1–33). Brill.
- King L.A. (2003). Deliberation, legitimacy, and multilateral democracy. *Governance* 16, 23–50.
- Klein M., Kaur S. (2014). *Firms Doing Good: How Do We Know? Measurement of Social and Environmental Results*. SSRN Scholarly Paper No. ID 2393749. Rochester, NY: Social Science Research Network.
- Kong B. (2005). *An Anatomy of China's Energy Insecurity and Its Strategies*. Seattle, WA: Pacific Northwest Center for Global Security.
- Kong B. (2009) *China's International Petroleum Policy*. Santa Barbara, CA: Praeger Security International.
- Kooiman J. (1993a). *Governance and Governability: Using Complexity, Dynamics and Diversity*. Thousand Oaks, CA: Sage.
- Kooiman J. (1993b). *Modern Governance: New Government–Society Interactions*. Thousand Oaks, CA: Sage.
- Kooiman J. (2000). Societal governance: Levels, models, and orders of social-political interaction.

- Debating Governance* 138, 66.
- Kostka G., Hobbs W. (2010). *Energy Efficiency in China: The Local Bundling of Interests and Policies*. Frankfurt School Working Paper Series. Frankfurt: Frankfurt School of Finance & Management.
- Kotz D.M. (1990). A comparative analysis of the theory of regulation and the social structure of accumulation theory. *Science & Society* 54, 5–28.
- Kraft M.E. (2017). *Environmental Policy and Politics* (7th edn.). New York, NY: Routledge.
- Krug B., Henrichske H. (2008). *China's Institutional Architecture: A New Institutional Economics and Organization Theory Perspective on the Links between Local Governance and Local Enterprises*. ERIM Report Series Research in Management ERS-2008-018-ORG. Erasmus Research Institute of Management (ERIM).
- Lai Y.-L., Cao L., Zhao J.S. (2010). The impact of political entity on confidence in legal authorities: A comparison between China and Taiwan. *Journal of Criminal Justice* 38, 934–941. <https://doi.org/10.1016/j.jcrimjus.2010.06.010>
- Lawn C. (2006). *Gadamer: A Guide for the Perplexed*. New York, NY: Continuum.
- Lazega E. (2001). *The Collegial Phenomenon: The Social Mechanisms of Cooperation among Peers in a Corporate Law Partnership*. Oxford: Oxford University Press.
- Leach W.D. (2006). Collaborative public management and democracy: Evidence from western watershed partnerships. *Public Administration Review* 66, 100–110.
- Lee L.T. (1961). Chinese Communist law: Its background and development. *Michigan Law Review* 60, 439.
- Leib E.J. (2005). The Chinese Communist Party and deliberative democracy. *Journal of Public Deliberation* 1, 1.
- Leutert W. (2016). Challenges ahead in China's reform of state-owned enterprises. *Asia Policy* 21, 83–99.
- Levi M. (1996). Social and unsocial capital: A review essay of Robert Putnam's 'Making Democracy Work'. *Politics & Society* 24, 45.
- Levi M. (1998). A state of trust. In V. Braithwaite, M. Levi., *Trust and Governance* (pp. 77-101). New York, NY: Russell Sage Foundation.
- Levi-Faur D. (1998). The developmental state: Israel, South Korea, and Taiwan compared. *Studies in Comparative International Development (SCID)* 33, 65–93.
- Levi-Faur D. (1999). The governance of competition: The interplay of technology, economics, and politics in European Union electricity and telecom regimes. *Journal of Public Policy* 19, 175–207.
- Levi-Faur D. (2003a). New regimes, new capacities: The politics of telecommunications nationalisation and liberalisation. In L. Weiss, ed., *States in the Global Economy: Bringing Domestic Institutions Back In* (pp. 161–79). Cambridge: Cambridge University Press.
- Levi-Faur D. (2003b). The politics of liberalisation: Privatisation and regulation-for-competition in Europe's and Latin America's telecoms and electricity industries. *European Journal of Political Research* 42, 705–740.
- Levi-Faur D. (2004a). The rise of the British regulatory state: Transcending the privatization debate. *Comparative Politics* 37(1), 105–24..
- Levi-Faur D. (2004b). Comparative research designs in the study of regulation: How to increase the number of cases without compromising the strengths of case-oriented analysis. In Jordana J., Levi-Faur D. (eds), *The Politics of Regulation: Institutions and Regulatory Reforms in the Age of Governance* (Chapter 8). Cheltenham: Edward Elgar.
- Levi-Faur D. (2005a). The political economy of legal globalization: Juridification, adversarial legalism, and responsive regulation. A comment. *International Organization* 59, 451–62.
- Levi-Faur D. (2005b). The global diffusion of regulatory capitalism. *The Annals of the American Academy of Political and Social Science* 598, 12.
- Levi-Faur D. (2006a). Varieties of regulatory capitalism: Sectors and nations in the making of a new global order. *Governance* 19, 363–366.

- Levi-Faur D. (2006b). Regulatory capitalism: The dynamics of change beyond telecoms and electricity. *Governance* 19, 497–525.
- Levi-Faur D. (2007). *Regulatory Governance. Europeanization: New Research Agendas*. Basingstoke: Palgrave Macmillan 102–114.
- Levi-Faur D. (2010). *Regulation and Regulatory Governance*. Jerusalem Papers in Regulation & Governance: Working Paper No. 1. Available at https://www.researchgate.net/publication/254908793_Regulation_Regulatory_Governance
- Levi-Faur D. (2011). *Handbook on the Politics of Regulation*. Cheltenham: Edward Elgar Publishing.
- Levi-Faur D., Jordana, J. (2005a). Conclusion. Regulatory capitalism: Policy irritants and convergent divergence. *Annals of the American Academy of Political and Social Science* 598, 191–197.
- Levi-Faur D., Jordana, J. (2005b). The rise of regulatory capitalism: The global diffusion of a new order. *The Annals of the American Academy of Political and Social Science* 598, 200.
- Levi-Faur, D. (2006c). Varieties of regulatory capitalism: Getting the most out of the comparative method. *Governance* 19, 367–382.
- Levine M. (2000). *Energy Efficiency Laws and Policies in China*. Presentation to the Earth Technologies Forum, Washington DC.
- Levine M., Forrence J.L. (1990). Regulatory capture, public interest, and the public agenda: Toward a synthesis. *Journal of Law, Economics, and Organization*, 6, 167-98.
- Levine N.M. (1994). Between choice and sacrifice: Constructions of community consent in reactive air pollution regulation. *Law and Society Review* 28(5), 1035–1077.
- Li H., Bao W., Xiu C., Zhang Y., Xu H. (2010). Energy conservation and circular economy in China's process industries. *Energy* 35, 4273–4281. <https://doi.org/10.1016/j.energy.2009.04.021>
- Li H.E., Zhi-hong W., Ying X.U. (2009a). Deliberative democracy and the development of China's united front. *Journal of Anhui Agricultural University (Social Science Edition)* 6.
- Li L. (2011). *Strategies for Judicial Restraint in Chinese Group Action Cases: A Realistic Reaction to Judicialization*. SSRN Electronic Journal. . <https://doi.org/10.2139/ssrn.1789564>
- Li Y., Lin Y., Geertman S. (2015). The development of smart cities in China 20. *China Information Times* 168(2), 28–32
- Li W., Liu J., Li D. (2012). Getting their voices heard: Three cases of public participation in environmental protection in China. *Journal of Environmental Management* 98, 65-72.
- Li Y., Miao B., Lang G. (2011). The local environmental state in China: A study of county-level cities in Suzhou. *The China Quarterly* 205, 115–132.
- Liao H., Holmes M., Weyman-Jones T., Llewellyn D. (2007). Productivity growth of East Asia economies' manufacturing: A decomposition analysis. *The Journal of Development Studies* 43(4), 649-674.
- Lieberman R.C. (2002). Ideas, institutions and political order: explaining political change. *American Political Science Review* 96(4), 697-712.
- Lieberthal K. (1995). *Governing China: From Revolution Through Reform*. New York, NY: W.W. Norton & Co.
- Lieberthal, K. & Oksenberg, M. (1988). *Policy Making in China: Leaders, Structures, and Processes*. Princeton, NJ: Princeton University Press.
- Lin J., Zhou N., Levine M., Fridley D. (2008). Taking out 1 billion tons of CO2: The magic of China's 11th Five-Year Plan? *Energy Policy* 36, 954–970. <https://doi.org/doi: DOI: 10.1016/j.enpol.2007.10.033>
- Lin J.Y., Cai F., Li Z. (2003). *The China Miracle: Development Strategy and Economic Reform*. Beijing: Chinese University Press.
- Lindblom C. (1977). *Politics and Markets*. New York, NY: Basic Books.
- Ling L.H.M. (1996). Hegemony and the internationalizing state: A post-colonial analysis of China's integration into Asian corporatism. *Review of International Political Economy* 3, 1–26.
- Lipsky M. (1980). *Street-Level Bureaucracy*. New York, NY: Russell Sage Foundation.
- Liu P. (2010). Tracing and periodizing China's food safety regulation: A study on China's food safety regime change. *Regulation & Governance* 4, 244–260.

- Liu S., Halliday T.C. (2009a). Recursivity in legal change: Lawyers and reforms of China's criminal procedure law. *Law & Social Inquiry* 34, 911–950.
- Liu X., Zhang W. (2009). *China's Three Decades of Economic Reforms*. London: Routledge.
- Liu Y., Yang X. (2010). The development and policy of substitute natural gas in China. *The Second China Energy Scientist Forum*, Vols. 1-3, 969–976.
- Lo C.W.H., Fryxell G.E. (2003). Enforcement styles among environmental protection officials in China. *Journal of Public Policy* 23(1), 81-115.
- Lo C.W.-H., Fryxell G.E. (2005). Governmental and societal support for environmental enforcement in China: An empirical study in Guangzhou. *Journal of Development Studies* 41, 558–588.
- Lo C.W.-H., Fryxell G.E., van Rooij B. (2009). Changes in enforcement styles among environmental enforcement officials in China. *Environment and Planning A* 41, 2706–2723.
- Logan J. (2000). *Chinese Energy and Carbon Dioxide Trends at the Turn of the Century*. Seattle, WA: Pacific Northwest National Laboratory.
- Lorentzen P.L., Landry P.F., Yasuda J.K. (2010). *Transparent Authoritarianism? An Analysis of Political and Economic Barriers to Greater Government Transparency in China*. Berkeley, CA: University of California Press.
- Loughlin M., Scott C. (1997). The regulatory state. In P. Dunleavy, A. Gamble, I. Holliday, G. Peele, eds., *Developments in British Politics* 5 (pp. 205-219). London: Palgrave.
- Lovell H. (2009). The role of individuals in policy change: The case of UK low-energy housing. *Environment and Planning C: Government & Policy* 27, 491–511.
- Low N.P. (1994). Growth machines and regulation theory: The institutional dimension of the regulation of space in Australia. *International Journal of Urban and Regional Research* 18, 451–469.
- Lu J., Weber I. (2007). State, power and mobile communication: A case study of China. *New Media & Society* 9, 925.
- Lu X. (1999). From rank-seeking to rent-seeking: Changing administrative ethos and corruption in reform China. *Crime, Law and Social Change* 32, 347–370.
- Lu X. (2000). Booty socialism, bureaupreneurs, and the state in transition: Organizational corruption in China. *Comparative Politics* 273–294.
- Lubel, M., Scholz J.T. (2001). Cooperation, reciprocity, and the collective-action heuristic. *American Journal of Political Science* 45(1), 160–178.
- Ma C., Stern D.I. (2008). China's changing energy intensity trend: A decomposition analysis. *Energy Economics* 30, 1037–1053.
- Ma H., Oxley L., Gibson J. (2010). China's energy economy: A survey of the literature. *Economic Systems* 34, 105–132. <https://doi.org/10.1016/j.ecosys.2009.12.001>
- Ma X. (2008). *National Oil Company Reform from the Perspective of its Relationship with Government: The Case of China*. PhD thesis, University of Dundee.
- Ma X., Andrews-Speed P. (2006). The overseas activities of China's national oil companies: Rationale and outlook. *Minerals & Energy - Raw Materials Report* 21(1), 17-30.
- Ma X., Ortolano L. (2000). *Environmental Regulation in China: Institutions, Enforcement, and Compliance*. Lanham, MD: Rowman & Littlefield.
- Mace G. (1972). The antidemocratic character of judicial review. *California Law Review* 60, 1140–1149.
- Macedo S. (1999). *Deliberative Politics: Essays on Democracy and Disagreement*. New York, NY: Oxford University Press.
- MacIntyre A., Naughton B. (2005). The decline of a Japan-led model of the East Asian economy. In Pempel T.J., Hawkins C.O., eds., *Remapping East Asia: The Construction of a Region* (pp. 77–100). Ithaca, NY: Cornell University Press
- Makkai T., Braithwaite J. (1992). In and out of the revolving door: Making Sense of regulatory capture. *Journal of Public Policy* 12(1), 61-78.
- Makkai T., Braithwaite J. (1994). The dialectics of corporate deterrence. *Journal in Research on Crime and Delinquency* 31, 347–73

- Makkai T., Braithwaite, J. (1996). Procedural justice and regulatory compliance. *Law and Human Behavior* 20, 83–98.
- Manning P.K. (1992). *The Social Organization of Policing*. Cambridge, MA: MIT Press
- Mansbridge J. (2006). Conflict and self-interest in deliberation. In Besson S., Martí J.L., eds., *Deliberative Democracy and its Discontents* (pp. 107–132). Aldershot: Ashgate.
- Mansbridge J., Bohman J., Chambers S., Estlund D., Føllesdal A., Fung A., Lafont C., Manin B. (2010). The place of self-interest and the role of power in deliberative democracy. *Journal of Political Philosophy* 18, 64–100.
- Mansbridge J.J. (1990). *Beyond Self-Interest*. Chicago, IL: University of Chicago Press.
- Martinot E. (1998). Energy efficiency and renewable energy in Russia: Transaction barriers, market intermediation, and capacity building. *Energy Policy* 26, 905–915.
- Martinot E. (2001). World Bank energy projects in China: Influences on environmental protection. *Energy Policy* 29, 581–594.
- Mavroudeas S. (1999). Regulation theory: The road from creative Marxism to postmodern disintegration. *Science & Society* 63, 310–337.
- May P. (2005). Regulation and compliance motivations: Examining different approaches. *Public Administration Review* 65(1), 31-44.
- May P.J. (2004). Compliance motivations: Affirmative and negative bases. *Law & Society Review* 38, 41.
- May P.J., Burby R.J. (1998). Making sense out of regulatory enforcement. *Law & Policy* 20, 157.
- May P.J., Winter S. (2000). Reconsidering styles of regulatory enforcement: Patterns in Danish agro-environmental inspection. *Law & Policy* 22, 143.
- Mazmanian D.A., Kraft M.E. (2009). *Toward Sustainable Communities: Transition and Transformations in Environmental Policy*. Cambridge, MA: MIT Press.
- McAllister L.K., van Rooij B., Kagan R.A. (2010). Reorienting regulation: Pollution enforcement in industrializing countries. *Law & Policy* 32, 1–13.
- McCubbins M.D., Noll R.G., Weingast B.R. (1987). Administrative procedures as instruments of political control. *Journal of Law, Economics, and Organization* 3, 243.
- McElroy M.B. (1998). Industrial growth, air pollution and environmental damage: Complex challenges for China. In M.B. McElroy, C.P. Nielsen, P. Lydon, eds., *Energizing China: Reconciling Environmental Protection and Economic Growth*. Cambridge, MA: Harvard University Press.
- McKinsey Global Institute. (2017). China's renewable energy revolution. McKinsey & Co. <https://www.mckinsey.com/mgi/overview/in-the-news/china-renewable-energy-revolution> (accessed 4.15.18).
- McMillan J., Naughton B. (1992). How to reform a planned economy: Lessons from China. *Oxford Review of Economic Policy* 8, 130.
- McNally C.A. (2008). The institutional contours of China's emergent capitalism. In C.A. McNally, ed., *China's Emergent Political Economy: Capitalism in the Dragon's Lair* (pp. 105-125). Abingdon: Routledge.
- Meckstroth T.W. (1975). 'Most different systems' and 'most similar systems': A study in the logic of comparative inquiry. *Comparative Political Studies* 8(2), 132-157
- Mei C. (2006). *Get Promoted: Political Incentives and Policy Implementation of China's Local Officials in China*. Manuscript, Department of Government and Politics, University of Maryland.
- Mei C. (2007). *Rules of Political Game: Cadre Evaluation and Appointment System in China*. Manuscript, Department of Government and Politics, University of Maryland.
- Mei C. (2009). *Brings the Politics Back in: Political Incentive and Policy Distortion in China*. PhD dissertation. College Park, MD: University of Maryland.
- Mei C., Pearson M.M. (2014). Killing a chicken to scare the monkeys? Deterrence failure and local defiance in China. *China Journal* 72, 75–97.
- Meidan M. (2016a). *The Structure of China's Oil Industry: Past Trends and Future Prospects*.

- Oxford: Oxford Institute for Energy Studies. <https://doi.org/10.26889/9781784670573>
- Meidan M., Andrews-Speed P., Xin M. (2009). Shaping China's energy policy: actors and processes. *Journal of Contemporary China* 18, 591–616. <https://doi.org/10.1080/10670560903033885>
- Mertha A. (2008). *China's Water Warriors: Citizen Action and Policy Change*. Ithaca, NY: Cornell University Press.
- Mertha A. (2009). 'Fragmented Authoritarianism 2.0': Political pluralization in the Chinese policy process. *The China Quarterly* 200, 995–1012.
- Michelson E. (2007). Lawyers, political embeddedness, and institutional continuity in China's transition from socialism. *The American Journal of Sociology* 113, 352–414.
- Michelson E. (2011). Lawyers, political embeddedness, and institutional continuity in China's transition from socialism. In Y. Dezalay, B. Garth, eds., *Lawyers and the Rule of Law in an Era of Globalization* (pp. 39–66). London: Routledge.
- Milgrom P.R., North, D.C., Weingast, B.R. (1990). The role of institutions in the revival of trade: The medieval law merchant, private judges, and the champagne fairs. *Economics and Politics* 2(1), 1-23.
- Mill J.S. (1843). *A System of Logic, Ratiocinative and Inductive: Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation*. London: John W. Parker.
- Ming Y. (2008). China's energy efficiency target 2010. *Energy Policy* 36, 561–570. <https://doi.org/10.1016/j.enpol.2007.09.032>
- Ming-ying F.A.N., Xiang D. (2008). Consultative democracy: My reflections on the practical value of pushing inner-party political democracy in the CPC. *Shenzhen University Journal (Humanities & Social Sciences)* 4.
- Minton E.A., Kahle L.R. (2013). *Belief Systems, Religion, and Behavioral Economics: Marketing in Multicultural Environments*. New York, NY: Business Expert Press.
- Montinola G. Qian Y., Weingast B.R. (1995). Federalism Chinese style: The political basis for economic success in China. *World Politics* 48(1), 50-81.
- Morgan D.L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research* 1(1), 48–76
- Mourougane A. (2010). *Phasing Out Energy Subsidies in Indonesia*. OECD Economics Department Working Papers 808. OECD Publishing.
- Muraven M., Baumeister R.F., Tice D.M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *The Journal of Social Psychology* 139, 446–457.
- Muraven M., Baumeister R.F., Tice D.M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *Journal of Social Psychology*, 139(4), 446-458.
- Murphy R. (2004) Turning peasants into modern Chinese citizens: 'Population quality', discourse, demographic transition and primary education. *The China Quarterly* 177, 1– 20
- Nahapiet J., Ghoshal S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review* 23, 242–266.
- Nathan A.J. (2003). China's changing of the guard: Authoritarian resilience. *Journal of Democracy* 14(1), 6-17.
- National Bureau of Statistics (2007). *China Statistical Yearbook*. Beijing: National Bureau of Statistics.
- Naughton B. (1987). The decline of central control over investment in post-Mao China. In Lampton D.M., ed., *Policy Implementation in Post-Mao China* (pp. 51–80). Berkeley, CA: University of California Press.
- Naughton B. (1988). The third front: Defense industrialization in the Chinese interior. *China Quarterly* 115, 351–386.
- Naughton B. (1990). China's experience with guidance planning. *Journal of Comparative Economics* 14, 743–767.

- Naughton B. (1992). Implications of the state monopoly over industry and its relaxation. *Modern China* 18, 14–41.
- Naughton B. (1993). Deng Xiaoping: The Economist. In Shambaugh D., ed., *Deng Xiaoping: Portrait of a Chinese Statesman* (pp. 83–106). Oxford: Oxford University Press.
- Naughton B. (1994a). *Reforming a planned economy: Is China unique? From Reform to Growth: China and other Countries in Transition in Asia and Central and Eastern Europe*. Development Centre Documents OECD 49–74.
- Naughton B. (1994b). Chinese institutional innovation and privatization from below. *The American Economic Review* 84, 266–270.
- Naughton B. (1995). China's macroeconomy in transition. *The China Quarterly* 144, 1083–1104.
- Naughton B. (1996). *Growing Out of the Plan: Chinese Economic Reform, 1978-1993*. Cambridge; Cambridge University Press.
- Naughton B. (1998). *China's Financial Reform: Achievements and Challenges*. BRIE Working Paper 112. Berkeley, CA: Berkeley Roundtable on the International Economy.
- Naughton B. (2002a). China's economic think tanks: Their changing role in the 1990s. *The China Quarterly* 171, 625–635.
- Naughton B. (2002b). Provincial economic growth in China: Causes and consequences of regional differentiation. In Renard M-F., ed., *China and its Regions* (pp. 57–86). Cheltenham: Edward Elgar.
- Naughton B. (2003a). The State Asset Commission: A powerful new government body. *China Leadership Monitor* 8, 1–10.
- Naughton B. (2003b). How much can regional integration do to unify China's markets? In Hope N., Yang D., Li M.Y., eds., *How Far Across the River? Chinese Policy Reform at the Millennium* (pp. 204–232). Stanford, CA: Stanford University Press.
- Naughton B. (2008). A political economy of China's economic transition. In L. Brandt, T. Rawski (Eds.), *China's Great Economic Transformation* (pp. 91–135). Cambridge: Cambridge University Press.
- Naughton B.J. (2007). *The Chinese Economy: Transitions and Growth*. Cambridge, MA: MIT Press
- Naughton B.J., Yang D.L., eds. (2004). *Holding China Together: Diversity and National Integration in the Post-Deng Era*. Cambridge: Cambridge University Press.
- Nee V., Ingram P. (1998). Embeddedness and beyond. In M.C. Brinton, P. Nee, eds, *The New Institutionalism in Sociology* (pp. 19-45). Stanford, CA: Stanford University Press.
- Newell P., Phillips J., Purohit P. (2011). The political economy of clean development in India: CDM and beyond. *IDS Bulletin* 42, 89–96. <https://doi.org/10.1111/j.1759-5436.2011.00226.x>
- Ng M.K., Xu J. (2000). Development control in post-reform China: The case of Liuhua Lake Park, Guangzhou. *Cities* 17, 409–418.
- Niederberger A.A., Brunner C.U., Dadi Z. (2006). Energy efficiency in China: Impetus for a global climate policy breakthrough? Woodrow Wilson International Center for Scholars. *China Environment Series* 8, 85-86.
- Niemeyer S. (2004). Deliberation in the wilderness: displacing symbolic politics. *Environmental Politics* 13, 347–372.
- Noam E.M. (1989). Network pluralism and regulatory pluralism. *New Directions in Telecommunications Policy* 1, 66–91.
- North D.C. (1990), *Institutions, Institutional Change and Economic Performance*. Cambridge, Cambridge University Press.
- NRDC (Natural Resources Defense Council) (2009). *Cutting Through the Fog with China's First Pollution Information Transparency Index (PITI)*. New York, NY: NRDC-IPE.
- Nyland C., Smyth R.L., Zhu C.J. (2006). What determines the extent to which employers will comply with their social security obligations? Evidence from Chinese firm-level data. *Social Policy and Administration* 40(2), 196 - 214.
- O'Brien K.J., Li L. (2005). Popular contention and its impact in rural China. *Comparative Political Studies* 38(3), 235–259. <https://doi.org/10.1177/0010414004272528>

- O'Brien K.J. (2013). Rightful resistance revisited. *The Journal of Peasant Studies* 40(6), 1051-1062.
- O'Brien K.J., Li L. (1999). Selective policy implementation in rural China. *Comparative Politics*, 31(2), 167-86.
- OECD (2002). *Competitive Neutrality in Competition Policy*. <http://www.oecd.org/competition/competitive-neutrality.htm>
- OECD (2012). *Compendium of OECD Recommendations, Guidelines and Best Practices Bearing on Competitive Neutrality*. <http://www.oecd.org/competition/competitive-neutrality.htm>
- OECD. (2015). *Inventory of Competitive Neutrality Distortions and Measures*. <http://www.oecd.org/competition/competitive-neutrality.htm>
- OECD. (2016). *State-Owned Enterprises as Global Competitors: A Challenge or an Opportunity?* <http://www.oecd.org/competition/competitive-neutrality.htm>
- OECD. (2017). *For Globalisation to Work for All, You Have to Level the Playing Field First*. <http://www.oecd.org/competition/competitive-neutrality.htm>
- Oggioni G., Riccardi R., Toninelli R. (2011). Eco-efficiency of the world cement industry: A data envelopment analysis. *Energy Policy* 39, 2842–2854. <https://doi.org/10.1016/j.enpol.2011.02.057>
- Olivia S., Gibson J. (2008). Household energy demand and the equity and efficiency aspects of subsidy reform in Indonesia. *The Energy Journal* 29(1), 21–39.
- Opschoor H. (1994). Chain management in environment policy: Analytical and evaluative concepts. In J.B. Opschoor, R.K. Turner, eds., *Economic Incentives and Environmental Policies: Principles and Practice* (pp. 197-228). Dordrecht: Springer.
- Oquendo A.R. (2002). Deliberative democracy in Habermas and Nino. *Oxford Journal of Legal Studies* 22, 189.
- Orban E., Chen X., Koehn P. (2003). Great-power decentralization and the management of global/local economic policy and relations: Lessons in fluidity from the People's Republic of China. *International Review of Administrative Sciences* 69, 235–258.
- Orts E.W. (2002). Environmental law with Chinese characteristics. *William & Mary Bill of Rights Journal* 11, 545.
- Osborne D., Gaebler T. (1992). *Reinventing Government: How the Entrepreneurial Spirit is Transforming Government*. Reading, MA; Addison Wesley.
- Outhwaite O.M., Black R., Laycock A.M. (2007). The pursuit of grounded theory in agricultural and environmental regulation: A suggested approach to empirical legal study in biosecurity. *Law & Policy* 24, 493-528.
- Pacudan R., de Guzman E. (2002). Impact of energy efficiency policy to productive efficiency of electricity distribution industry in the Philippines. *Energy Economics* 24, 41–54.
- Painter M. (2008). *Low Quality Government as a Development Strategy: Dilemmas of Governance in China and Vietnam*. Unpublished paper, City University of Hong Kong.
- Palmer W.B. (1992). *Electric Power Shortages and the Chinese Economy*. Madison, WI: University of Wisconsin.
- Panaiotov T. (1994). *Economic Instruments for Environmental Management and Sustainable Development*. Geneva: UNEP.
- Pargal S., Hettige H., Singh M., Wheeler D. (1997). Formal and informal regulation of industrial pollution: Comparative evidence from Indonesia and the United States. *The World Bank Economic Review* 11, 433–450.
- Park A., Du Y. (2003). *Blunting the Razor's Edge: Regional Development in Reform China*. Preliminary Draft. University of Michigan.
- Parker C., Nielsen V. (2011). *Explaining Compliance: Business Responses to Regulation*. Cheltenham: Edward Elgar Publishing.
- Parker C., Nielsen, V. (2009). The challenge of empirical research on business compliance in regulatory capitalism. *Annual Review of Law and Social Science* 5, 45–70.
- Patton M.Q. (1990). *Qualitative Evaluation and Research Methods* (2nd edn.). Thousand Oaks, CA: Sage Publications.

- Pearson M.M. (1997). *China's New Business Elite: The Political Consequences of Economic Reform*. Berkeley, CA: University of California Press.
- Pearson M.M. (2003). Mapping the rise of China's regulatory state: Economic regulation and network and insurance industries. Paper presented at Annual Meeting of the Association of Asian Studies, New York, NY.
- Pearson M.M. (2004) China's WTO implementation in comparative perspective: Lessons from the literatures on trade policy and regulation. *The Review of International Affairs* 3(4), 567-583,
- Pearson M.M. (2005). The business of governing business in China: Institutions and norms of the emerging regulatory state. *World Politics* 57, 296–322.
- Pearson M.M. (2007). Governing the Chinese economy: Regulatory reform in the service of the state. *Public Administration Review* 67, 718–730.
- Pearson M.M., Naughton, B., Tsai, K.S. (2015). State-owned business and party-state regulation in China's modern political economy. In editor, *State Capitalism, Institutional Adaptation, and the Chinese Miracle* (pp. 82–118). Cambridge: Cambridge University Press.
- Peck J., Miyamachi Y. (1994). Regulating Japan? Regulation theory versus the Japanese experience. *Environment and Planning D* 12, 639–639.
- Peck J.A., Tickell A. (1992). Local modes of social regulation? Regulation theory, Thatcherism and uneven development. *Geoforum* 23, 347–363.
- Peerenboom R. (2001). Economic and Social Rights: The Role of Courts in China. *San Diego International Law Journal* 12, 303 ff.
- Peerenboom R. (2001). Globalization, path dependency and the limits of law: Administrative law reform and rule of law in the People's Republic of China. *Berkeley Journal of International Law* 19, 161–428.
- Peerenboom R. (2001). Seek truth from facts: An empirical study of enforcement of arbitral awards in the PRC. *American Journal of Comparative Law* 49, 249–254.
- Peerenboom R. (2002). Social networks, rule of law and economic growth in China: The elusive pursuit of the right combination of private and public ordering. *Global Economic Review* 31, 1–19.
- Peerenboom R. (2008). *More Law, Less Courts: Legalized Governance Judicialization and Dejudicialization in China*. La Trobe Law School Legal Studies Research Paper No. 2008/10. Available at <http://ssrn.com/abstract=1265147>.
- Peerenboom R. (2009). The future of rule of law: Challenges and prospects for the field. *Hague Journal on the Rule of Law* 1, 5–14.
- Peerenboom R.P. (2002). *China's Long March Toward Rule of Law*. Cambridge: Cambridge University Press.
- Peerenboom R.P. (2007). *China Modernizes: Threat to the West or Model for the Rest?* New York, NY: Oxford University Press.
- Peerenboom R.P. (2010). *Judicial Independence in China: Lessons for Global Rule of Law Promotion*. Cambridge: Cambridge University Press.
- Pendse D.R. (1980a). Energy crisis and its impact on energy consumers in third world: I. *Economic and Political Weekly* 15, 107–116.
- Pendse D.R. (1980b). Energy crisis and its impact on energy consumers in third world: II. *Economic and Political Weekly* 15, 175–184.
- Philip A.-S. (2009). China's ongoing energy efficiency drive: Origins, progress and prospects. *Energy Policy* 37, 1331–1344. <https://doi.org/10.1016/j.enpol.2008.11.028>
- Pieke F. (2009). The production of rulers: Communist Party schools and the transition to neo-socialism in contemporary China. *Social Anthropology* 17(1), 25-39
- Piff P.K., Dietze P., Feinberg M., Stancato D.M., Keltner D. (2015). Awe, the small self, and prosocial behavior. *Journal of Personality and Social Psychology* 108, 883.
- Piff P.K., Kraus M.W., Côté S., Cheng B.H., Keltner D. (2010). Having less, giving more: The influence of social class on prosocial behavior. *Journal of Personality and Social Psychology* 99, 771.

- Potter P.B. (1999). The Chinese legal system: Continuing commitment to the primacy of state power. *The China Quarterly* 159, 673–683.
- Potter P.B. (2004). Legal reform in China: Institutions, culture, and selective adaptation. *Law & Social Inquiry* 29, 465–495.
- Power M. (1997). *The Audit Society: Rituals of Verification*. Oxford: Oxford University Press
- Price L. (2005). Voluntary agreements for energy efficiency or GHG emissions reduction in industry: An assessment of programs around the world. In *Proceedings of the 2005 ACEEE Summer Study on Energy Efficiency in Industry* (pp. 112). Available at https://www.ecee.org/library/conference_proceedings/ACEEE_industry/2005/
- Price L., Worrell E., Sinton J., Yun J. (2001). *Industrial Energy Efficiency Policy in China*. Paper presented at the 2001 ACEEE Summer Study on Energy Efficiency in Industry. <https://china.lbl.gov/sites/all/files/aceee-industrial-ee-policiesjuly-2001.pdf>
- Pringle T.E., Frost S.D. (2013). The Absence of Rigor and Failure of Implementation. *International Journal of Occupational and Environmental Health* 9(4), 309-319.
- Putnam R.D. (2002). *Making Democracy Work*. Princeton, NJ: Princeton University Press.
- Putnam R.D., Leonardi R., Nanetti R. (1994). *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ: Princeton University Press.
- Pye, L.W. (1992). The Chinese approach to negotiating. *Thunderbird: International Business Review* 34(6), 463-468.
- Qian K., Wu J., Chan E. (2006). Policy deficiencies in promoting building energy efficiency in mainland China. *Proceedings of CRIOCM 2006 International Research Symposium* (pp. 782–790).
- Qing-bing W. (2007). Deliberative democracy and party system. *Academic Exploration* 3.
- Qinghua Y., Guojun Y. (2008). On the democratic politics at the local level in Zhejiang Province. *Journal of Lishui University* 4, 1 ff.
- Raffin L. (2009). Peddling a paper tiger: Using regulatory theory to improve occupational health and safety in the Chinese mining industry. *Lawasia Journal* 2009, 127.
- Rechtschaffen C. (1997). Deterrence vs. cooperation and the evolving theory of environmental enforcement. *Southern California Law Review* 71, 1181.
- Reddy B.S., Assenza G.B., Assenza D., Hasselmann F. (2009). *Energy Efficiency and Climate Change: Conserving Power for a Sustainable Future* New Delhi: SAGE Publications India.
- Reiss Jr A.J. (1984a). Consequences of compliance and deterrence models of law enforcement for the exercise of police discretion. *Law & Contemporary Problems* 47, 83.
- Reiss Jr A.J. (1984b). Selecting strategies of social control over organizational life. In K. Hawkins, J.M. Thomas, eds., *Enforcing Regulation* (pp. 23–35). Boston, MA: Kluwer-Nijhoff.
- Ribot J.C. (2007). Representation, citizenship and the public domain in democratic decentralization. *Development* 50, 43–49.
- Richardson J.J. (1982). *Policy Styles in Western Europe*. Sydney: Allen & Unwin.
- Rodrik D. (2004). *Institutions and Economic Performance—Getting Institutions Right*. CESifo DICE Report 2. Munich: CESifo Group/Database for Institutional Comparisons in Europe.
- Rose R. (1978). *Ungovernability: Is There Fire Behind the Smoke?* Centre for the Study of Public Policy, University of Strathclyde.
- Rosen D.H., Houser T. (2007). *China Energy: A Guide for the Perplexed*. Washington, DC: Peterson Institute for International Economics.
- Rosenberg S. (2005). The empirical study of deliberative democracy: Setting a research agenda. *Acta Politica* 40, 212–224.
- Rosenblum V.G. (1962). *Law as a Political Instrument*. New York, NY: Random House.
- Rossman G.B., Wilson B.L. (1985). Numbers and words: Combining quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review* 9(5), 627–643. <https://doi.org/10.1177/0193841X8500900505>
- Rostow E.V. (1952). The democratic character of judicial review. *Harvard Law Review* 66, 193–224.
- Rozelle S., Ma X., Ortolano L. (1993). Industrial wastewater control in Chinese cities: Determinants

- of success in environmental policy. *Natural Resource Modeling* 7, 353–378.
- Ryfe D.M. (2005). Does deliberative democracy work? *Annual Review of Political Science* 8, 49–71.
- Saidur R., Mahlia T. (2011). Impacts of energy efficiency standard on motor energy savings and emission reductions. *Clean Technologies & Environmental Policy* 13, 103–109. <https://doi.org/10.1007/s10098-009-0275-7>
- Sapio S. (2009). *Modelling the Distribution of Day-Ahead Electricity Returns: A Comparison*. LEM Papers Series 2009/21, Pisa: Laboratory of Economics and Management (LEM), Sant'Anna School of Advanced Studies.
- Saslow L.R., Willer R., Feinberg M., Piff P.K., Clark K., Keltner D., Saturn S.R. (2013). My brother's keeper? Compassion predicts generosity more among less religious individuals. *Social Psychological and Personality Science* 4, 31–38. <https://doi.org/10.1177/1948550612444137>
- Sathbye J., Sinton J., Heller T. (1999). Doing better with less energy [fuel-efficient power generation]. *Spectrum* 36, 42–49.
- Saygin D., Patel M.K., Worrell E., Tam C., Gielen D.J. (2011). Potential of best practice technology to improve energy efficiency in the global chemical and petrochemical sector. *Energy* 36, 5779–5790. <https://doi.org/10.1016/j.energy.2011.05.019>
- Schaede U. (2000). *Cooperative Capitalism: Self-Regulation, Trade Associations, and the Antimonopoly Law in Japan*. New York, NY: Oxford University Press.
- Schell-Busey N., Simpson S.S., Rorie M., Alper M. (2016). What works? A systematic review of corporate crime deterrence. *Criminology & Public Policy* 15(2), 387–416.
- Schipper L., Meyers S. (1992). *Energy Efficiency and Human Activity: Past Trends, Future Prospects*. Cambridge: Cambridge University Press.
- Schmidt C.W. (2002a). Economy and environment: China seeks a balance. *Environmental Health Perspectives* 110, A517–A522.
- Schmidt V.A. (2002b). Does discourse matter in the politics of welfare state adjustment? *Comparative Political Studies* 35, 168–193.
- Schmidt V.A. (2008). Discursive institutionalism: The explanatory power of ideas and discourse. *Annual Review of Political Science* 11, 303–326. <https://doi.org/10.1146/annurev.polisci.11.060606.135342>
- Schmidt V.A. (2008a). Discursive institutionalism: the explanatory power of ideas and discourse. *Political Science* 11, 303.
- Schmidt V.A. (2008b). Discursive institutionalism: The explanatory power of ideas and discourse. *Annu. Rev. Polit. Sci.* 11, 303–326.
- Schmidt V.A. (2010a). Taking ideas and discourse seriously: Explaining change through discursive institutionalism as the fourth 'new institutionalism'. *European Political Science Review* 2, 1–25.
- Schneider B.R. (2008). *Comparing Capitalisms: Liberal, Coordinated, Net- work and Hierarchical Varieties*. Manuscript, Northwestern University.
- Schnellenbach J. (2007). Public entrepreneurship and the economics of reform. *Journal of Institutional Economics* 3 (2), 183–202.
- Scholz J. T., Gray W.B. (1997). Can government facilitate cooperation? An informational model of OSHA enforcement. *American Journal of Political Science* 693–717.
- Scholz J.T. (1984a). Cooperation, deterrence, and the ecology of regulatory enforcement. *Law and Society Review* 18(2), 179–224.
- Scholz J.T. (1984b). Voluntary compliance and regulatory enforcement. *Law & Policy* 6, 385–404.
- Scholz J.T. (1991). Cooperative regulatory enforcement and the politics of administrative effectiveness. *The American Political Science Review* 85(1), 115–136.
- Scholz J.T., Feiock R.C., Ahn T.K. (2006). *Policy Networks and Institutional Collective Action: A Research Agenda*. Working Paper. Working Group On Interlocal Services Cooperation. Available at https://digitalcommons.wayne.edu/interlocal_coop/16/
- Scholz J.T., Gray W.B. (1990). OSHA enforcement and workplace injuries: A behavioral approach to risk assessment. *Journal of Risk and Uncertainty* 3, 283–305.

- Scholz J.T., Wang C.L. (2006a). Cooptation or transformation? Local policy networks and federal regulatory enforcement. *American Journal of Political Science* 50, 81–97.
- Scholz J.T., Wang C.L. (2009). Learning to cooperate: Learning networks and the problem of altruism. *American Journal of Political Science* 53, 572–587.
- Scott C. (2004). Regulation in the age of governance: The rise of the post-regulatory state. In editor, *The Politics of Regulation: Institutions and Regulatory Reforms for the Age of Governance* (pp. 145–74). Cheltenham: Edward Elgar Publishing.
- Scott C. (2004a). Regulation in the Age of Governance: The Rise of the Post-Regulatory State, in: *The Politics of Regulation*. <https://doi.org/10.4337/9781845420673.00016>
- Scott C. (2004b). Regulation in the Age of Governance: The Rise of the Post-Regulatory State, in: *The Politics of Regulation*. Edward Elgar Publishing. <https://doi.org/10.4337/9781845420673.00016>
- Scott J. (2000). Rational choice theory. In G. Browning, A. Halcli, F. Webster, eds., *Understanding Contemporary Society: Theories of the Present* (pp. 126-138). London: Sage Publications.
- Sen A.K. (1977). Rational fools: A critique of the behavioral foundations of economic theory. *Philosophy & Public Affairs* 6(4), 317–344.
- Shambaugh D. (2007). China's propaganda system: Institutions, processes and efficacy. *The China Journal* 25–58.
- Shambaugh D. (2008). Training China's political elite: The Party school system. *The China Quarterly* 196, 827–844.
- Shambaugh D.L. (2008). *China's Communist Party: Atrophy and Adaptation*. Berkeley, CA: University of California Press.
- Shapiro J. (2001). *Mao's War against Nature: Politics and the Environment in Revolutionary China* (Studies in Environment and History). Cambridge: Cambridge University Press.
- Shapiro S.A., Rabinowitz R.S. (1997). Punishment versus cooperation in regulatory enforcement: A case study of OSHA. *Administrative Law Review* 49, 713.
- Shearing C., Wood J. (2003). Nodal governance, democracy and the new 'denizens'. *Journal of Law and Society* 30(3), 400-419.
- Sheehan P., Sun F. (2007). *Energy Use in China: Interpreting Changing Trends and Future Directions*. Working Paper. Melbourne: Victoria University.
- Shirk S. (1993). *The Political Logic of Economic Reform in China*. Berkeley, CA: University of California Press.
- Shirk S.L. (2007). Changing media, changing foreign policy in China. *Japanese Journal of Political Science* 8, 43–70. <https://doi.org/10.1017/S1468109907002472>
- Simon H.A. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics* 69, 99.
- Simon H.A. (1997). *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. New York, NY: Free Press.
- Simon H.A., Barnard C.I. (1976). *Administrative Behavior*. Cambridge: Cambridge University Press.
- Sims H. (1999). One-fifth of the sky: China's environmental stewardship. *World Development* 27, 1227–1245.
- Sinton J., Fridley D. (2000a). *Status Report on Energy Efficiency Policy and Programs in China: Recent and Related Developments*. Place: Lawrence Berkeley National Laboratory.
- Sinton J., Levine M., Fridley D., Yang F., Lin J. (1999). *Status Report on Energy Efficiency Policy and Programs in China*. Energy Analysis Department, Lawrence Berkeley National Laboratory.
- Sinton J.E., Fridley D.G. (2000b). What goes up: Recent trends in China's energy consumption. *Energy Policy* 28, 671–687.
- Sinton J.E., Levine M.D., Qingyi W. (1998). Energy efficiency in China: Accomplishments and challenges. *Energy Policy* 26, 813–829.
- Sinton J.E., Stern R.E., Aden N.T., Levine M.D., Dillavou T., Fridley D., Huang J., Lewis J., Lin J., McKane A. et al. (2005). *Evaluation of China's Energy Strategy Options*. China Energy

- Group. Lawrence Berkeley National Laboratory.
- Siwei L., Huang Y.J. (1993). Energy conservation standard for space heating in Chinese urban residential buildings. *Energy* 18, 871–892. [https://doi.org/10.1016/0360-5442\(93\)90065-L](https://doi.org/10.1016/0360-5442(93)90065-L)
- Smart A. (1993). Gifts, bribes, and guanxi: A reconsideration of Bourdieu's social capital. *Cultural Anthropology* 8, 388–408.
- Smil V. (2004). *China's Past, China's Future*. New York, NY: RoutledgeCurzon.
- Smith Z.A. (1992). *The Environmental Policy Paradox*. Upper Saddle River, NJ: Prentice Hall.
- Solomon P.H. (2008). Courts and judges in authoritarian regimes. *World Politics* 60, 122–145.
- Song J. (2007). China's judiciary: Current issues. *Maine Law Review* 59, 141.
- Sorrell S. (2015). Reducing energy demand: A review of issues, challenges and approaches. *Renewable and Sustainable Energy Reviews* 47, 74–82. <https://doi.org/10.1016/j.rser.2015.03.002>
- Sovacool B. (2011). An international comparison of four polycentric approaches to climate and energy governance. *Energy Policy* 39, 3832–3844. <https://doi.org/10.1016/j.enpol.2011.04.014>
- Sparrow M.K. (2000). *The Regulatory Craft: Controlling Risks, Solving Problems and Managing Compliance*. Washington, DC: Brookings Institution Press.
- Stavins R.N. (2003a). Experience with market-based environmental policy instruments. *Handbook of Environmental Economics* 1, 355–435.
- Steenbergen M. R., Bachtiger A., Spornli M., Steiner J. (2003). Measuring political deliberation: a discourse quality index. *Comparative European Politics* 1, 21–48. <https://doi.org/10.1057/palgrave.cep.6110002>
- Steenhof P.A. (2006). Decomposition of electricity demand in China's industrial sector. *Energy Economics* 28(3), 370–384.
- Steinmetz G. (1994). Regulation theory, post-Marxism, and the new social movements. *Comparative Studies in Society and History* 36, 176–212.
- Stern J., Cubbin, J. (2005). *Regulatory Effectiveness: The Impact of Regulation and Regulatory Governance Arrangements on Electricity Industry Outcomes*. New York, NY: World Bank.
- Stern R.E. (2013). *Environmental Litigation in China: A Study in Political Ambivalence*. Cambridge: Cambridge University Press.
- Stigler G.J. (1971). The theory of economic regulation. *The Bell Journal of Economics and Management Science* 2(1), 3–21.
- Suli Z. (2006). Political parties in China's judiciary. *Duke Journal of Comparative & International Law* 17, 533.
- Tam W., Yang, D. (2005). Food safety and the development of regulatory institutions in China. *Asian Perspective* 29, 5.
- Tao R. (2009). Barriers and drivers for process innovation in the petrochemical industry: A case study. *Journal of Engineering and Technology Management* 26, 285–304. <https://doi.org/10.1016/j.jengtecman.2009.10.004>
- Tate C.N., Haynie, S.L. (1993). Authoritarianism and the functions of courts: A time series analysis of the Philippine Supreme Court, 1961–1987. *Law & Society Review* 27, 707–740.
- Taylor R.P., Bank W. (2008). *Financing Energy Efficiency: Lessons from Brazil, China, India, and Beyond*. New York, NY: World Bank Publications.
- Teets, J. C., & Hasmath, R. (2020). The evolution of policy experimentation in China. *Journal of Asian Public Policy*, 13(1), 49–59.
- Teubner G. (1982a). Substantive and reflexive elements in modern law. *Law & Society Review* 17, 239.
- Teubner G. (1984). Autopoiesis in law and society: A rejoinder to Blankenburg. *Law and Society Review* 291–301.
- Teubner G. (1986). The transformation of law in the welfare state. In G. Teubner (ed.), *Dilemmas of Law in the Welfare State* (pp. 3–10). Berlin: De Gruyter.
- Teubner G. (1995). De collisione discursuum: Communicative rationalities in law, morality, and

- politics. *Cardozo Law Review* 17, 901.
- Teubner G. (2000). Contracting worlds: The many autonomies of private law. *Social and Legal Studies* 9, 399–418.
- Teubner G., Farmer L., Murphy D. (Eds.) (1994). *Environmental Law and Ecological Responsibility: The Concept And Practice Of Ecological Self-Organization*. New York, NY: Wiley.
- Teubner N. (1983). Substantive and reflexive elements in modern law. *Law and Society Review*, 17, 239-285
- Thaler R.H. (1990). Anomalies: Saving, fungibility, and mental accounts. *Journal of Economic Perspectives* 4(1), 193-205.
- Thaler R.H. (2008). Commentary—mental accounting and consumer choice: Anatomy of a failure. *Marketing Science* 27(1), 12-14.
- Thaler R.H. (2015). *Misbehaving: The Making of Behavioral Economics*. New York, NY: W.W. Norton & Co.
- Thompson D.F. (2008). Deliberative democratic theory and empirical political science. *Annual Review of Political Science* 11, 497–520.
- Thornton D., Gunningham N.A., Kagan R.A. (2005). General deterrence and corporate environmental behavior. *Law & Policy* 27, 262–288.
- Thornton D., Kagan R.A., Gunningham N. (2008). Compliance costs, regulation, and environmental performance: Controlling truck emissions in the US. *Regulation & Governance* 2, 275–292.
- Thornton D., Kagan R.A., Gunningham N. (2009). When social norms and pressures are not enough: Environmental performance in the trucking industry. *Law & Society Review* 43(2), 405-436
- Thornton J.L. (2006). China’s leadership gap. *Foreign Affairs* 133–140.
through the energy justice metric. *Energy Policy* 87, 168–176.
- Tietenberg T.H. (1990). Economic instruments for environmental regulation. *Oxford Review of Economic Policy* 6, 17–33.
- Tinker A. (1984). Theories of the state and the state of accounting: Economic reductionism and political voluntarism in accounting regulation theory. *Journal of Accounting and Public Policy* 3, 55–74.
- Toke D. (2000). Policy network creation: The case of energy efficiency. *Public Administration* 78, 835–854.
- Tsai K.S. (2006). Adaptive informal institutions and endogenous institutional change in China. *World Politics* 59, 116–141. <https://doi.org/10.1353/wp.2007.0018>
- Tsang S. (2009). Consultative Leninism: China’s new political framework. *Journal of Contemporary China* 18, 865–880.
- Tsou T. (1968). *China in Crisis: China’s Policies in Asia and America’s Alternatives*. Chicago, IL: University of Chicago Press.
- Tuler S., Webler, T. (1999). Designing an analytic deliberative process for environmental health policy making in the US nuclear weapons complex. *Risk* 10, 65.
- Tung H.H. (2019). *Economic Growth and Endogenous Authoritarian Institutions in Post-Reform China*. Berlin: Springer International.
- Turner J.L., Zhi L. (2006) Building a green civil society in China. In L. Starke, ed., *State of the World 2006: A Worldwatch Institute Report on Progress Toward a Sustainable Society* (pp. 152–170). New York, NY: W.W. Norton & Co.
- Turner K., Opschoor H. (1994). Environmental economics and environmental policy instruments: Introduction and overview. In J.B. Opschoor, R.K. Turner, eds., *Economic Incentives and Environmental Policies: Principles and Practice* (pp. 1–38). Dordrecht: Springer.
- Tylecote A. (2010). The technology imperative. *Prometheus: Critical Studies in Innovation* 28(3), 291-292.
- Uggen C., Manza J. (2002). Democratic contraction? Political consequences of felon disenfranchisement in the United States. *American Sociological Review* 67, 777–803. <https://doi.org/10.2307/3088970>
- Upham F.K. (2005). Who will find the defendant if he stays with his sheep? Justice in rural China.

- Yale Law Journal* 114(7), 1675–1718.
- van der Heijden J. (2013). Clashing validities in the comparative method? Balancing in-depth understanding and generalizability in small-n policy studies. SSRN Electronic Journal. https://www.researchgate.net/publication/256046555_Clashing_Validities_in_the_Comparative_Method_Balancing_In-Depth_Understanding_and_Generalizability_in_Small-N_Policy_Studies (accessed 7.1.16).
- van Rooij B. (2006). *Regulating Land and Pollution in China: Lawmaking, Compliance, and Enforcement. Theory and Cases*. Amsterdam: Amsterdam University Press.
- van Rooij B. (2010). Greening industry without enforcement? An assessment of the World Bank's pollution regulation model for developing countries. *Law & Policy* 32, 127–152.
- van Rooij B., Stern R.E., Fürst K. (2016). Understanding China's new environmental actors: Authoritarian logic of regulatory pluralism. *Regulation & Governance* 10, 3–13. <https://doi.org/10.1111/rego.12074>
- van Rooij S.W. (2009). Scaffolding project-based learning with the project management body of knowledge (PMBOK®). *Computers and Education*, 52, 210-219.
- Vedung E. (1998). Policy instruments: Typologies and theories. In Bemelmans-Videc M-L., Rist R.C., Vedung, E., eds., *Carrots, Sticks, and Sermons: Policy Instruments and Their Evaluation* (pp. 21–58). New York, NY: Routledge.
- Vig N.J., Kraft M.E. (2012). *Environmental Policy: New Directions for the Twenty-First Century*. Washington, DC: CQ Press.
- Vine E., Hamrin J., Eyre N., Crossley D., Maloney M., Watt G. (2003). Public policy analysis of energy efficiency and load management in changing electricity businesses. *Energy Policy* 31, 405–430.
- von Moltke A., McKee C., Morgan T., Töpfer K. (2017). *Energy Subsidies: Lessons Learned in Assessing their Impact and Designing Policy Reforms*. London: Routledge.
- Voslensky M. (1984). *Nomenklatura: The Soviet Ruling Class*. Trans. E. Mosbacher. Garden City, NY: Doubleday.
- Waller M. (1981). *Democratic Centralism: An Historical Commentary*. Manchester: Manchester University Press.
- Wang A. (2006). Role of law in environmental protection in China: Recent developments. *Vermont Journal of Environmental Law* 8, 195.
- Wang A.L. (1999a). *A Comparative Analysis of the 1997 Energy Conservation Law of China and the Implementing Regulations of Shandong, Zhejiang, and Shanghai*. Seattle, WA: Pacific Northwest Laboratories.
- Wang B. (2007). An imbalanced development of coal and electricity industries in China. *Energy Policy* 35, 4959–4968. <https://doi.org/10.1016/j.enpol.2007.04.022>
- Wang C.L., Scholz J.T. (2003). *Networks and Fragmented Authority: The Role of Local Policy Networks in Federal Regulatory Enforcement*. Working paper.
- Wang F., Huang F. (2011). An analysis of Chinese traditional energy industry's strategic development under the background of new energy industry development. In *2011 International Conference on Applied Social Science (ICASS 2011)* (pp. 59–61).
- Wang H., Chang Y., Liu C., Sun J. (2007). Research on government behaviour in building energy efficiency. In *Proceedings of 2007 International Conference on Construction & Real Estate Management* (pp. 1757–1761).
- Wang H.H. (2010). *The Chinese Dream: The Rise of the World's Largest Middle Class and What It Means to You*. Brande: Bestseller Press.
- Wang J. (2014). The political logic of corporate governance in China's state-owned enterprises. *Cornell International Law Journal* 47(3), article 5.
- Wang Q. (2011). The 'state of the state' in reform-era China. *Asian Perspective* 35, 89–110.
- Wang S. (2006). Regulating death at coalmines: Changing mode of governance in China. *Journal of Contemporary China*, 15(46), 1–30
- Wang Y., Cao H., Yuan Y., Zhang R. (2020). Empowerment through emotional connection and

- capacity building: Public participation through environmental non-governmental organizations. *Environmental Impact Assessment Review* 80, 106319.
- Wang Y., Liu J., Hansson L., Zhang K., Wang R. (2011). Implementing stricter environmental regulation to enhance eco-efficiency and sustainability: A case study of Shandong Province's pulp and paper industry, China. *Journal of Cleaner Production* 19, 303–310. <https://doi.org/10.1016/j.jclepro.2010.11.006>
- Watson J., Byrne R., Stua M., Ockwell D., Zhang X., Zhang D., Zhang T., Zhang X., Ou X., Mallett A. (2011). *UK China Collaboration on Low Carbon Technology Transfer: Final Report*. Sussex Energy Group, University of Sussex. <http://sro.sussex.ac.uk/id/eprint/41797/> (accessed 11.18.11).
- Wee K. (2012). China's latest energy consumption data reveals new opportunities and challenges. China FAQs (5 November). <http://www.chinafaqs.org/blog-posts/chinas-latest-energy-consumption-data-reveals-new-opportunities-and-challenges-0> (accessed 6.25.16).
- Wei C., Ni J., Sheng M. (2011). China's energy inefficiency: A cross-country comparison. *The Social Science Journal* 48, 478–488. <https://doi.org/10.1016/j.soscij.2011.05.004>
- Wei Y-M, Liao H., Fan Y. (2007). An empirical analysis of energy efficiency in China's iron and steel sector. *Energy* 32, 2262-2270.
- Weiguo W. (2009). Review on the issue of democracy since China's reform and opening up. *Journal of Graduate School of Chinese Academy of Social Sciences* 5.
- Wei-xing H.E. (2007). Importance of deliberative democracy to China's political development. *Journal of Xiangfan Vocational and Technical College* 3.
- Wenming L., Landell-Mills N., Jinlong L., Jintao X., Can L. (2002). *Getting the Private Sector to Work for the Public Good: Instruments for Sustainable Private Sector Forestry in China*. London: International Institute for Environment and Development.
- Wenqi C. (1996). China Energy Conservation Investment Corporation. *Energy for Sustainable Development* 3, 5–6. [https://doi.org/10.1016/S0973-0826\(08\)60187-8](https://doi.org/10.1016/S0973-0826(08)60187-8)
- Wheeler D., Pargal S. (1995). *Informal Regulation of Industrial Pollution in Developing Countries: Evidence from Indonesia*. World Bank Policy Research Working Paper No. 1416. Geneva: World Bank.
- White G. (1996). Corruption and market reform in China. *IDS Bulletin* 27(2), 40–47. <https://doi.org/10.1111/j.1759-5436.1996.mp27002006.x>
- Wiener J.B. (1998). On the political economy of global environmental regulation. *Georgia Law Journal* 87, 749.
- Wikipedia (n.d.). Mill's methods. https://en.wikipedia.org/wiki/Mill%27s_Methods (accessed 6.28.16).
- Williamson A., Fung A. (2004). Public deliberation: Where are we and where can we go? *National Civic Review* 93, 3–15.
- Williamson O. (2000). The new institutional economics: Taking stock, looking ahead. *Journal of Economic Literature* 38(3), 595-613.
- Wison C.A. (2000). Policy regimes and policy change. *Journal of Public Policy* 20(3), 247–274. <https://doi.org/10.1017/S0143814X00000842>
- Womack B. (2005). Democracy and the governing party (执政党): A theoretical perspective. *Journal of Chinese Political Science* 10, 23–42.**
- Woodard K. (1980). *The International Energy Relations of China*. Redwood City, CA: Stanford University Press.
- Woolcock M. (1998). Social capital and economic development: Toward a theoretical synthesis and policy framework. *Theory and Society* 27, 151–208.
- Woolcock M., Narayan D. (2000). Social capital: Implications for development theory, research, and policy. *The World Bank Research Observer* 15, 225.
- Worrell E., Galitsky C., Price L., Martin N., Ruth M. (2006). *Energy Efficiency Improvement Opportunities for the Petroleum Refining Industry*. Berkeley, CA: Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory

- Xiao-lin W.U., Gao-shan Z.U.O. (2009). On theory of deliberative democracy and development of democratic politics in China. *Teaching and Research* 4.
- Xie Z., Kuby M. (1997). Supply-side—demand-side optimization and cost–environment tradeoffs for China’s coal and electricity system. *Energy Policy* 25, 313–326. [https://doi.org/10.1016/S0301-4215\(96\)00135-8](https://doi.org/10.1016/S0301-4215(96)00135-8)
- Yang D. (2004). Economic transformation and state rebuilding in China. In B.J. Naughton (Ed.), *Holding China Together: Diversity and National Integration in the Post-Deng Era* (pp. 120–145). Cambridge: Cambridge University Press.
- Yang D.L. (2001). The great net of China. *Harvard International Review* 22, 64–69.
- Yang D.L. (2002). China in 2001: Economic liberalization and its political discontents. *Asian Survey* 42, 14–28.
- Yang D.L. (2006). *Remaking the Chinese Leviathan: Market Transition and the Politics of Governance in China*. Stanford, CA: Stanford University Press.
- Yang G. B. (2005) Environmental NGOs and institutional dynamics in China. *The China Quarterly* 181, 46–66.
- Yang M. (2008). China’s energy efficiency target 2010. *Energy Policy* 36, 561–570. <https://doi.org/10.1016/j.enpol.2007.09.032>
- Yang T. (2008). The emergence of global environmental Law. *Ecology Law Quarterly* 36, 615 ff.
- Yao R., Li B., Steemers K. (2005). Energy policy and standard for built environment in China. *Renewable Energy* 30, 1973–1988. <https://doi.org/doi: DOI: 10.1016/j.renene.2005.01.013>
- Ye Q., Li M., Huanbo Z. et al. (2008). Translating a global issue into local priority: China’s local government response to climate change. *The Journal of Environment & Development* 1, 4.
- Yeh E.T., Lewis J.I. (2004). state power and the logic of reform in China’s electricity sector. *Pacific Affairs* 77, 437–465.
- Yeo Y. (2007). *Regulating China's Industrial Economy: A Comparative Case Study of Auto and Telecom Industries*. PhD dissertation. College Park, MD: University of Maryland.
- Yeo Y. (2009). Remaking the Chinese state and the nature of economic governance? The early appraisal of the 2008 ‘super-ministry’ reform. *Journal of Contemporary China* 18, 729–743. <https://doi.org/10.1080/10670560903172808>
- Yeo Y., Pearson M. (2008). Regulating decentralized state industries: China’s auto industry. *China Review* 8(2), 231–259.
- Yeoh B.-S., Rajaraman R. (2004). Electricity in China: The Latest Reforms. *The Electricity Journal* 17, 60–69. <https://doi.org/10.1016/j.tej.2004.02.005>
- Young A. (2000). *The Razor’s Edge: Distortions and Incremental Reform in the People’s Republic of China*. Cambridge, MA: National Bureau of Economic Research.
- Yu J., Nu L., Yuan W. (2009). Model and mechanism of regional public governance: The case of Wuhan Metropolitan Area. In *Proceedings of the 2009 International Conference On Public Administration* (vol II, pp. 147–152). Available at <http://cstm.cnki.net/stmt/TitleBrowse/KnowledgeNet/GGLG200910002026?db=STMI8319>
- Zemin J. (2010). Energy development trends and major energy conservation measures. In J. Zemin, *Research on Energy Issues in China* (pp. 53–87). Singapore: Academic Press.
- Zha D. (2006). China’s energy security: Domestic and international issues. *Survival* 48, 179–190. <https://doi.org/10.1080/00396330600594322>
- Zhang H. (2019). Antinomic policy-making under the fragmented authoritarianism: Regulating China’s electricity sector through the energy-climate environment dimension. *Energy Policy* 128, 162–169
- Zhang H., Zhou D., Cao J. (2011). A quantitative assessment of energy strategy evolution in China and US. *Renewable and Sustainable Energy Reviews* 15, 886–890. <https://doi.org/10.1016/j.rser.2010.09.021>
- Zhang J. (2008). *Foreign Direct Investment, Governance, and the Environment in China: Regional Dimensions*. Birmingham: The University of Birmingham.
- Zhang L. (2012). *In Search of Paradise: Middle-Class Living in a Chinese Metropolis*. Ithaca, NY:

Cornell University Press.

- Zhang Y. (2009). The capture theory of regulation and its implication to the regulation of construction market. In *Proceedings of the International Conference on Future Computer and Communication, 2009 (FCC '09)* (pp. 247–249). IEEE. <https://doi.org/10.1109/FCC.2009.75>
- Zhang Y. (2011). The impact of financial development on carbon emissions: An empirical analysis in China. *Energy Policy* 39, 2197–2203. <https://doi.org/10.1016/j.enpol.2011.02.026>
- Zhang Z. (1997). Energy efficiency and environmental pollution of brickmaking in China. *Energy* 22, 33–42.
- Zhang Z.X. (1995). Energy conservation in China : An international perspective. *Energy Policy* 23, 159–166. [https://doi.org/doi: DOI: 10.1016/0301-4215\(95\)91419-D](https://doi.org/doi: DOI: 10.1016/0301-4215(95)91419-D)
- Zhao H. (2007). Nengyuan weiji: Shenhua yu xianshi [The energy crisis: Myth and reality]. *Xiandai Guoji Guanxi* [Contemporary International Relations] 9, 48.
- Zhao L., Gallagher K.S. (2007). Research, development, demonstration, and early deployment policies for advanced-coal technology in China. *Energy Policy* 35, 6467–6477. <https://doi.org/doi: DOI: 10.1016/j.enpol.2007.08.017>
- Zhao X., Ortolano L. (2010). Implementing China's national energy conservation policies at state-owned electric power generation plants. *Energy Policy* 38, 6293–6306. <https://doi.org/10.1016/j.enpol.2010.06.019>
- Zheng Y. (2010). *Politics of Modern China*. London: Routledge.
- Zhicheng C., Porter R. (2000). Energy management and environmental awareness in China's enterprises. *Energy Policy* 28, 49–63. [https://doi.org/doi: DOI: 10.1016/S0301-4215\(99\)00088-9](https://doi.org/doi: DOI: 10.1016/S0301-4215(99)00088-9)
- Zhou N., Levine M.D., Price L. (2010). Overview of current energy-efficiency policies in China. *Energy Policy* 38, 6439–6452.
- Zinn M.D. (2002). Policing environmental regulatory enforcement: Cooperation, capture, and citizen suits. *Stanford Environmental Law Journal* 21, 81–345.
- Zongxin W., Zhihong W. (1991). Policies to promote energy conservation in China. *Energy Policy* 19, 934–939. [https://doi.org/10.1016/0301-4215\(91\)90112-2](https://doi.org/10.1016/0301-4215(91)90112-2)
- Zumbansen P. (2008). Law after the welfare state: Formalism, functionalism, and the ironic turn of reflexive law. *American Journal of Comparative Law* 56, 769–808.
- Zweig D. (2005). Guangdong: Preparing for the WTO Challenge by Joseph Y. S. Cheng. *Pacific Affairs* 78(4), 643-64
- Zweig D., Jianhai, B. (2005). China's global hunt for energy. *Foreign Affairs* 25–38.

Appendix 1. Questions and Interview Protocol

The world is interested and inspired by China's commitment to energy efficiency and I am interested in learning how China is setting and implementing the energy efficiency agenda at the local level. I am studying what factors have contributed to effectiveness in regulating and promoting energy efficiency.

SOE Leaders and Personnel

- ❖ What do you consider some of your successes in energy efficiency implementation?
 - When did those successes occur? In what arena were they: technical, organizational, capacity related? What obstacles did these successes overcome? Who were the key people involved and responsible for these successes? What were the factors that facilitated these successes? What have been the catalysts? How is success defined and measured? Who defines and measures it for you?
- ❖ Where do you look for your direction/orders in terms of energy efficiency? i.e. How is your agenda set and how is it executed?
 - Is the agenda set by laws, regulations, superiors, cadres, visiting officials from HQ? Is it guided by technical/political/economic input? In what form is it given: formal/informal, written/spoken, explicit/implied? Epistemic communities? Foreign corporations and their technology? Social pressures?
- ❖ What are the consequences of compliance/non-compliance? Which government authorities do you work with or think about in connection with energy efficiency?
 - Is there an escalation process in applying sanctions? Are there lines of communication and is communication robust and productive? How do you handle non-compliance when it occurs (gaming/ignoring/hiding/engaging/confronting/lobbying)?
- ❖ How is learning and experience collected and processed?
 - How do locals and subordinates within the ranks interpret and apply state policy and provincial policy? How do they innovate local solutions and implementation measures and practices? Where are the gaps between law and practice, between government and industry regulation?

Government authorities

- ❖ What do you consider some of your successes in regulating energy efficiency and in promoting better practices? And to what do you attribute these successes?
 - What is the role of your department in promoting or supporting such success? What factors are standard across all (state/local) departments? Are there any that are indigenous or innovative? Have there been any contextual or unusual factors? Who are the government stakeholders that are responsible for the success? What have been the catalysts of success?
 - When did those successes occur? In what arena were they: technical, organizational, capacity related? What obstacles did these successes overcome? Who were the key people involved and responsible for these successes? What were the factors that facilitated these successes? How is success defined and measured? Who defines and measures it for you?
 - How do you interact with X plant in your city? Is there a dedicated person/team? Do you have a liaison from their side? How are communications managed at different levels?
- ❖ How do you promote and enforce energy efficiency? What instruments are available to you and which do you use most frequently? Which are the most effective and why?
 - Canvass: social license, regulatory license, economic license, and political license. Identify the form the instruments take: written, implied, through dialogue, etc.
 - Are expectations and consequences detailed and clear? How do you determine what targets to set (top down/bottom up)? How do you monitor/track progress? What does the inspection process look like?
 - How often do you have to resort to penalties/punishments and how are they implemented? What is the reaction/experience? How much flexibility autonomy do you have?
- ❖ What does collaboration with other government agencies look like?
 - Which agencies? How often? To what ends? Are there holy and unholy combinations?
 - Within the same city? Within the province? For purposes of learning and sharing? For purposes of implementation?
 - Where do you draw new ideas from? How are regulatory methods innovated? Epistemic communities? Foreign enterprises? Enthusiastic leaders?
- ❖ How do you manage your relationship with x plant in terms of closeness and distance?
 - Regulatory capture vs. insight and influence? Technical exchanges? Governance processes and know how?

Stakeholders

- ❖ How do you participate in the regulation of energy efficiency?
 - Financial interest? Technical know how? Social or advocacy interest?
 - Through lobbying, sales, training and information?

Appendix 2. Interview Participant Characteristics and Coding

Code	City	Position	Sector	Administrative level
BP-HA	Beijing	Manager	Consulting/Advisor y	Global
PS-YZR	Beijing	Director	Government	National
UF-AX	Beijing	Officer	Government	National
MC-ZJ	Beijing	Director	Government	National
MC-ZZ	Beijing	Director	Government	National
SHP-SN	Beijing	Manager	Industry	Global
BSIN-MS	Beijing	Manager	SOE	Central
BSIN-JZ	Beijing	Manager	SOE	Central
BSIN-LZ	Beijing	Manager	SOE	Central
LPEC-JSW	Luoyang	Director	Design Insitute	National
LNDRC-WK	Luoyang	Director	Government	Local
LRC-YZ/ LYCAL-YZ	Luoyang	Engineering	Industry	Local
LRC-CZ	Luoyang	Engineering	Industry	Local
LCAL-SZ	Luoyang	Manager	Industry	National
LSIN-CKZ	Luoyang	Manager	SOE	Local
LSIN-ZKZ	Luoyang	Manager	SOE	Local
LSIN-WC	Luoyang	Manager	SOE	Local
NNDRC-WZR	Ningbo	Director	Government	Local
ZHSIN-CZ	Ningbo	Manager	SOE	Local
ZHSIN-WZ	Ningbo	Manager	SOE	Local
ZHSIN-SZ	Ningbo	Manager	SOE	Local
ZHSIN-HZ	Ningbo	Manager	SOE	Local
HI-HZ	Ningbo	Manager	Industry	National
JD-MV	Shanghai	Lawyer	Consulting/Advisor y	National
DW-KM	Shanghai	Lawyer	Consulting/Advisor y	National
DW-RW	Shanghai	Lawyer	Consulting/Advisor y	National
TX JXW	Shanghai	Official	Government	Local
CELA-ZLS	Shanghai	Official	Government	Local
AS-XSG	Shanghai	Manager	Industry	National
EU-PC	Shanghai	Director	NGO	International
JSIN-ZZ	Shanghai	Manager	SOE	Local
JSIN-JZ	Shanghai	Manager	SOE	Local
SNDRC-ZZR	Shanghai	Director	Government	Local
JSIN-YZ	Shanghai	Manager	SOE	Local
PN-ARES	Shanghai	Lawyer	Investor	International
SASS-YKJ	Shanghai	Official	Government	Local
XNDRC-CH	Xi'an	Director	Government	Local
XCG-CL	Xi'an	Official	Government	Local
XSS-YZ	Xi'an	Manager	Industry	Local

XCQPC-SUO	Xi'an	Technology and Equipment Manager	SOE	Local
XSIN-WC	Xi'an	Energy Efficiency Manager	SOE	Local

Appendix 3. Energy efficiency related laws in China since 1989

Title	Year	Policy Status	Policy Type	Policy Target
The 13th Five-Year Plan For Economic And Social Development Of The People's Republic Of China (2016-2020)	2017	In Force	Policy Support, Regulatory Instruments, Economic Instruments, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Transport, Residential Appliances, Multi-Sectoral Policy, Commercial/Industrial Equipment, Energy Utilities
Energy Efficiency Leader Scheme	2015	In Force	Information and Education	Multi-Sectoral Policy
Action Plan for retrofitting and upgrading coal-fired power plants (2014 - 2020)	2014	In Force	Regulatory Instruments	Energy Utilities>Electricity, Energy Utilities>Electricity>Generation, Energy Utilities
Strategic Action Plan for Energy Development (2014 - 2020)	2014	In Force	Policy Support>Strategic planning, Regulatory Instruments, Research, Development and Deployment (RD&D)	Buildings, Commercial/Industrial Equipment, Industry, Transport, Multi-Sectoral Policy
Plan for accelerating the development of energy conservation and environmental protection related industries	2013	In Force	Research, Development and Deployment (RD&D), Policy Support>Strategic planning, Information and Education, Policy Support	Multi-Sectoral Policy
Subsidies for Efficient Household Appliances	2012	Ended	Economic Instruments>Fiscal/financial incentives>Grants and subsidies	Residential Appliances
Notice on vehicle and vesse tax reduction for energy saving and new energy automobiles	2012	In Force	Economic Instruments>Fiscal/financial incentives>Tax relief	Transport>Vehicle type>Passenger vehicles, Transport>Vehicle type, Transport>Vehicle type>Public transport
Energy saving and new energy automotive industry development plan 2012-2020	2012	In Force	Policy Support>Strategic planning, Regulatory Instruments	Transport

The 12th Five-Year Plan For Economic And Social Development Of The People's Republic Of China (2011–2015)	2011	Superseded	Policy Support>Strategic planning	Multi-Sectoral Policy
China Urban Transport Development Strategy and Partnership Demonstration Projects (CUTPP)	2011	Ended	Economic Instruments>Direct investment>Infrastructure investments, Policy Support>Strategic planning, Research, Development and Deployment (RD&D)>Demonstration project, Policy Support, Regulatory Instruments>Monitoring, Regulatory Instruments, Regulatory Instruments>Codes and standards, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Transport>Transport systems>Infrastructure, Transport>Transport systems>Land-use planning, Transport>Transport systems>Modal shift
Demand-Side Management Implementation Measures	2010	In Force	Regulatory Instruments>Other mandatory requirements, Policy Support, Regulatory Instruments, Policy Support>Strategic planning, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes	Energy Utilities>Demand-side management/End-use services
Hong Kong - Tax Incentives for Environmentally Friendly Commercial Vehicles	2008	In Force	Economic Instruments>Fiscal/financial incentives>Tax relief, Policy Support, Regulatory Instruments, Policy Support>Strategic planning, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Transport>Vehicle type>Light-duty vehicles, Transport>Vehicle type>Heavy-duty vehicles, Transport>Vehicle type>Passenger vehicles, Transport>Scope, Multi-Sectoral Policy
China's National Climate Change Programme	2007	In Force	Policy Support>Strategic planning	
Market Transformation Programme - Partnership with the UK	2006	In Force	Regulatory Instruments>Codes and standards, Information and Education>Advice/Aid in Implementation, Policy Support>Strategic planning, Voluntary Approaches>Public	Residential Appliances, Residential Appliances>Home entertainment, Residential Appliances>Space cooling, Lighting,

			Voluntary Schemes, Research, Development and Deployment (RD&D)>Research programme	Residential Appliances>Refrigeration, Residential Appliances>Cooking & Laundry
Top 1000 Industrial Energy Conservation Programme	2006	In Force	Voluntary Approaches>Negotiated Agreements (Public-private sector)	Industry>Industrial subsectors>Cross-industry
Enhanced Efficiency Monitoring and Auditing: Development of Efficiency Centers	2006	In Force	Regulatory Instruments>Other mandatory requirements, Information and Education>Advice/Aid in Implementation, Economic Instruments>Direct investment>Funds to sub-national governments, Policy Support>Institutional creation, Economic Instruments>Direct investment>Infrastructure investments	
Energy Conservation in Government	2006	In Force	Regulatory Instruments, Information and Education>Advice/Aid in Implementation, Economic Instruments>Direct investment>Procurement rules, Economic Instruments>Direct investment>Infrastructure investments, Research, Development and Deployment (RD&D), Research, Development and Deployment (RD&D)>Demonstration project	Transport>Vehicle type>Passenger vehicles, Buildings>Building Type>Non-residential
Strategic Plan for Industrial Efficiency	2006	In Force	Policy Support>Strategic planning, Research, Development and Deployment (RD&D)>Research programme >Technology development	Industry>Industrial processes
Energy Conservation in Buildings	2006	In Force	Regulatory Instruments>Codes and standards, Information and Education>Information provision, Policy Support>Strategic planning, Economic Instruments>Direct investment>Infrastructure investments, Research, Development and Deployment (RD&D)>Research programme >Technology development	Buildings>Building Type>Non-residential, Buildings>Building Type>Residential

Efficiency Upgrade for Appliance Production and Public Lighting	2006	In Force	Regulatory Instruments>Other mandatory requirements, Information and Education>Information provision, Research, Development and Deployment (RD&D), Research, Development and Deployment (RD&D)>Research programme >Technology development	Lighting
General Work Plan for Energy Conservation and Pollutant Discharge Reduction	2006	In Force	Policy Support, Regulatory Instruments, Policy Support>Strategic planning, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Other mandatory requirements, Regulatory Instruments>Obligation schemes	Lighting, Buildings, Energy Utilities>Demand-side management/End-use services
The 11th Five-Year Plan For Economic And Social Development Of The People's Republic Of China (2006–2010)	2006	Superseded	Policy Support, Regulatory Instruments, Policy Support>Strategic planning, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Commercial/Industrial Equipment, Buildings, Multi-Sectoral Policy, Residential Appliances, Lighting, Industry
Conversion of Exhaust Heat and Pressure	2006	In Force	Regulatory Instruments>Other mandatory requirements, Economic Instruments>Direct investment>Infrastructure investments	Industry>Industrial products
Vehicle Fuel Economy Standards	2005	In Force	Regulatory Instruments>Codes and standards	Transport>Vehicle type>Light-duty vehicles, Transport>Vehicle type>Passenger vehicles
China Energy Label Law	2005	In Force	Information and Education>Advice/Aid in Implementation, Information and Education>Performance Label>Comparison label, Policy Support, Regulatory Instruments, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Auditing, Policy Support>Strategic planning, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Multi-Sectoral Policy, Energy Utilities, Residential Appliances, Residential Appliances>Cooking & Laundry, Residential Appliances>Home entertainment, Residential Appliances>Other, Residential Appliances>Refrigeration

Medium and Long-term Plan of Energy Conservation: 10 Energy Conservation Programmes	2004	In Force	Regulatory Instruments>Codes and standards, Policy Support>Strategic planning, Regulatory Instruments>Monitoring, Economic Instruments>Direct investment>Procurement rules, Economic Instruments>Direct investment, Regulatory Instruments>Other mandatory requirements	Transport>Fuel, Industry>Industrial equipment>Motors, Buildings>Building Type>Non-residential, Buildings>Building Type>Residential, Industry>Industrial processes, Transport>Vehicle type>Light-duty vehicles, Transport>Vehicle type>Passenger vehicles, Lighting
The Trial Implementation of Differential Pricing Policy in 6 High Energy-intensive Industries(2004-2012)	2004	In Force	Economic Instruments>Fiscal/financial incentives, Policy Support, Regulatory Instruments, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements, Policy Support>Strategic planning	Energy Utilities>Demand-side management/End-use services, Energy Utilities, Multi-Sectoral Policy
Management Method for Certification of Energy-saving Products	2004	In Force	Regulatory Instruments, Regulatory Instruments>Codes and standards, Regulatory Instruments>Codes and standards>Product standards, Regulatory Instruments>Codes and standards>Sectoral standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Commercial/Industrial Equipment>Kitchens & Laundry, Commercial/Industrial Equipment>Other, Energy Utilities>Demand-side management/End-use services, Industry>Industrial equipment, Lighting, Lighting>Commercial, Lighting>Residential, Residential Appliances, Residential Appliances>Computers, Residential Appliances>Cooking & Laundry, Residential Appliances>Home entertainment, Residential Appliances>Other, Residential Appliances>Refrigeration
The 10th Five-Year Plan For Economic And Social Development Of The People's Republic Of China (2001-2005)	2001	Ended	Policy Support, Regulatory Instruments, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Buildings, Commercial/Industrial Equipment, Energy Utilities, Industry, Multi-Sectoral Policy, Residential Appliances, Transport

National Energy Conservation Law of China (中华人民共和国节约能源法)	1997	In Force	Policy Support, Regulatory Instruments, Policy Support>Strategic planning, Regulatory Instruments>Codes and standards, Regulatory Instruments>Monitoring, Regulatory Instruments>Obligation schemes , Regulatory Instruments>Other mandatory requirements	Multi-Sectoral Policy, Commercial/Industrial Equipment>Refrigeration, Commercial/Industrial Equipment>Other, Residential Appliances, Residential Appliances>Cooking & Laundry, Residential Appliances>Home entertainment, Residential Appliances>Other, Residential Appliances>Refrigeration
Excise Tax based on car engine size	1994	In Force	Economic Instruments>Fiscal/financial incentives>Taxes	Transport>Vehicle type>Light-duty vehicles, Transport>Vehicle type>Passenger vehicles
Minimum Energy Performance Standards (MEPS)	1989	In Force	Regulatory Instruments>Codes and standards, Regulatory Instruments>Other mandatory requirements, Policy Support	Residential Appliances, Commercial/Industrial Equipment, Residential Appliances>Refrigeration, Residential Appliances>Space cooling, Residential Appliances>Water heating, Lighting, Lighting>Commercial, Lighting>Residential, Industry>Industrial equipment>Motors, Industry>Industrial equipment>Compressors, Industry>Industrial equipment>Boilers, Industry>Industrial equipment>Pumps, Industry>Industrial equipment>Distribution transformers, Industry>Industrial equipment, Residential Appliances>Cooking & Laundry