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Citation: Chen, G. C. & Lees, C. (2019). Political Recentralisation and the Diffusion of Solar Energy in China. *Europe-Asia Studies*, 71(7), pp. 1162-1182.
doi: 10.1080/09668136.2019.1619669

This is the accepted version of the paper.

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Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/35993/>

Link to published version: <https://doi.org/10.1080/09668136.2019.1619669>

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Political Recentralisation and the Diffusion of Solar Energy in China

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Abstract

This article uses principal-agent theory to examine the governance of solar energy in China and question the notion of 'fragmented authoritarianism' in Chinese governance. It demonstrates that the governance of solar energy in China operates on two levels, with 'police patrol' control and monitoring mechanisms at the meso– or sectoral level combined with 'fire alarm' modes of political control at the micro-level. Drawing on original interview material, we argue that this two-level model and distinct set of supervisory institutions have allowed China, as a relatively late entrant into the solar energy sector, to address the growing environmental emergency within China and catch up technologically with the West.

Keywords:

China, Principal-Agent Theory, Governance, Solar Energy

Word count:

Main text, endnotes and references: 10681 words

Introduction

The recent development of China's renewable energy sector and domestic expansion in the installation and consumption of wind and solar power generation has been unprecedented. As a latecomer to the sector, China has moved from a standing start to overtake front-runners in Western Europe and the USA (Lewis 2012; Mathews and Tan 2015; Hopkins and Li 2016). Contrary to expectations, the authoritarian Chinese state has deployed solar energy domestically with focus and determination. Figure 1 shows the cumulative increase in China's installed solar photovoltaic (PV) capacity. In 2015, China surpassed former front-runner Germany, becoming the biggest national solar market in the world, in which total PV capacity accounts for approximately 19 per cent of global market share (REN21 2016, p. 60).

[Figure 1 about here](#)

This article draws upon principal agent theory to contribute to our understanding of China's emergence as a world leader in non-hydro renewable energy and shed new light on the dynamics of central–provincial government relations in the governance and growth of the sector. Many scholars who study policy making in China (in particular working on energy and environmental protection) have commented on what they see as China's limited implementation and monitoring capacities (*e.g.* Downs 2008; Economy 2010; Jiang and Sinton 2011; Xu 2014; Shen and Xie 2017). The fragmented governance system that emphasizes negotiations and consensus building limits the ability of the central state to intervene in other energy sectors, which to some extent

restrains China from becoming a globally recognised leader in climate politics (Kong 2011). However, we suggest that orthodox assumptions of weak steering capacity cannot explain the rapid expansion of solar energy over the past decade in China and the central Chinese state's role in cultivating it. We believe that by analysing the new governance pattern of emerging industries that appears to be distinct compared to most other policy areas in China, we are able to analyse its particularities at the meso and micro levels of governance structure and then seek to use it as a new policy template for other governance practitioners to reference.

This article analyses China's governance of its solar energy sector, drawing on original interview data from sectoral stakeholders, and builds on and modifies current academic understanding of Chinese governance. Our key method of the research is elite interviewing. Goodman (2009) usefully pointed out that to probably better understand the change in the central-provincial relationships in Chinese politics, it may only be seen through the investigation of the localities. In this vein, we focused on exploring the governance structure unknown to outsiders from the inside-out perspective, seeking to identify a pattern of provincial political interaction (Bo 2015, p. 103). We originally conducted field work in Jiangsu Province between 9 February and 31 April 2013. We first sought out the targeted informants through friends' networks, extensive phone contacts, and other snowballing techniques. We conducted face-to-face interviews with 15 senior decision makers at their organisations who were responsible for renewable energy-related affairs. Six of the senior government decision makers were located at either the Deputy Department (*Fuchu*, 副处长) or Deputy Bureau

(*Futing*, 副厅长) levels and dealt with renewable energy affairs in Jiangsu Province as part of their daily routine. In addition, the interviewees also included executives from industry associations, NGOs, multinational corporations, and private and state-owned companies. Questionnaires covered but were not limited to the process of political and economic actors' participation in the formulation of policy making, the development of and changes to the sector over the last 15 years, the relationship between central and provincial governments, patterns of interaction between government agencies within the province, the existence of conflicts and contradictions, and corresponding solutions. Semi-structured interviews generated an average of 40 minutes of interview material per expert. Where the use of tape recorders was not permitted, we used note-taking to record the discussion. In addition to elite interviews, we drew upon sources such as central and local government policy documents, research reports published by governments and think tanks, domestic and international press publications.

We argue that supervision mechanisms embedded within China's solar energy industry at the meso-level belong to a tradition of centralised governance that often pre-dates the current Communist state, including 'police patrol' controls (McCubbins and Schwartz 1984)¹ carried out through the National Development and Reform Commission (NDRC). Provincial Development and Reform Commissions (PDRCs) augment the NDRC's surveillance function at the provincial and local levels, buttressed by government-coordinated industry associations. These associations perform a 'fire alarm' function for the NDRC, monitoring and coordinating the voices of local actors to mitigate the information gap between central and provincial policy makers, part of the

governance dilemma in such a territorially large and diverse system. We identify and explain the way in which the NDRC took back and re-integrated powers for discretionary decision making from provincial government. We argue that such a 'recentralisation' of control mechanisms has been successful in cultivating the diffusion of solar energy in China and has also made the governance of the non-hydro renewables sector quite distinct from the more fragmented modes of governance that are familiar in other sectors.²

We use principal–agent theory (McCubbins and Schwartz 1984; Weingast 1984; Banks and Weingast 1992; Pollack 1997; 2002; 2003; Hawkins *et al.* 2006) to isolate the problem of information asymmetry within the sector and describe how central government used the NDRC to achieve oversight over local actors. We explore issues of co-ordination, along with the mechanisms through which the centre-as-principal seeks to manipulate incentives and supervise the local-as-agent through a process of political recentralisation. In our view, principal–agency theory is capable of conceptualising the governance mechanisms used by the central state to facilitate the compliance of local agents. It also provides useful tools for us to analyse how the compliance mechanisms have (or have not) been deployed at the provincial level. In particular, we use this theory to explain how political control mechanisms are effectively implemented in the field of solar energy while they have unfortunately failed in other areas.

The structure of the article is as follows. First, we set out the principal-agent model and briefly examine how it has been applied elsewhere, particularly in analysis

of US congressional oversight and the processes of EU supranational governance. We then describe the broad governance system in China before introducing new empirical material, including our interview data, on the governance of the solar sector in Jiangsu Province, a highly industrialised administrative unit just north of Shanghai. We use the insights revealed from our discussion of principal-agent theory to understand the political control mechanisms in the province and its implications for the governance of the sector. In doing so we also contribute to the empirical interrogation of principal-agent theory, through its application to a non-democratic state such as China, and in conclusion we suggest one possible route for further research.

Principal-Agent Theory, Information Asymmetry and the Supervisory Dilemma

Principal-agent theory enables us to explain how political control mechanisms help solve China's governance dilemma. We look at the 'agency costs' (the costs to the principal in order to ensure that the agent acts in its interests) and the degree of 'agency loss' (the difference between desired outcomes and the actual outcomes of agents' actions) in the sector.

Principal-agent problems arise when a principal appoints a bureaucrat-as-agent to act on her behalf in a situation where disparate interests result in divergent actions and attitudes toward risk (Pollack 2003; Hawkins *et al.* 2006; Dür and Elsig 2011; Peters 2012; Elsig and Pollack 2014). Principal-agent theory assumes that institutional

actors are rational and that agents appointed by principals are utility maximisers and inclined to privilege their own interests over the principal's preferences (Homström 1982; Shepsle and Weingast 1995; Schmitz 2013a; 2013b). Information asymmetry is problematic as it allows a better-informed agent to abuse the principal's mandate (Byman and Kreps 2010; Elsig 2010; Dunlop 2010), leading to bureaucratic slippage and policy drift (Hacker 2005)³, contingent only on the constraints imposed by the principal (Verhoeff and Niemann 2011; Niemann and Huigens 2011). China is strongly hierarchical and in similar systems, such as Russia or the Ukraine, research has shown that principals can exert control by shaping the interests of agents (Sokolowski 2001) or by skewing information flows in order to reverse the usual principal-agent dynamics (Markus 2012).

At the heart of the principal-agent dilemma is the assumption that it is costly in time and resources for the principal to survey or control an agent's performance. Theorists have identified two types of potential response from the principal. The first is to create *ex ante* mechanisms: both as positive incentives for good behaviour and/or as negative constraints on opportunism. Thus principals can distribute the benefits of good behaviour to agents, aligning the agents' motives with the principal's goals (Vabulas and Snidal 2013), or deploy police patrol mechanisms that reduce agents' informational advantages and discretion (Mitnick 1980).

The agency costs of such police patrol activities are potentially significant but difficult to gauge, given the nature of public goods. In another major study, Weingast and Moran (1983) examined how a congressional committee sought to contain an

agent's activities under conditions of asymmetric information. Their contribution is substantial in that it challenged existing assumptions that the congressional surveillance system was ineffective (Miller 2005). They found that, despite the absence of a costly monitoring system, members of Congress as the principal exercised effective political control over the bureaucracy as agent through a system of embedded *ex ante* incentives and *ex post* sanctions, such as public hearings, site visits, recurring investigation reports, and regulatory intervention. Under the 'law of anticipated reactions' (McCubbins 1999, p. 33), bureaucrats understood the limits on their behaviour, constraining opportunism and incentivising them to pursue congressional interests. It has been shown that outcome-based incentives are observably more efficient for influencing an agent's behaviour (Weingast and Moran 1983).

McCubbins and Schwartz (1984) and McCubbins, Noll, and Weingast (1989) subsequently sharpened the analytical distinction between police patrol and fire alarm modes of oversight. Thus whilst the former refers to centralised surveillance of the executive agency for the purpose of preventing any deviation from legislative goals (Sobol 2015), the latter is a less intrusive system in which formal mechanisms and informal practices allow citizens or interest groups access to information and input. Police patrol control mechanisms allow the principal to actively intervene in the policy-making process based on this input from stakeholders. McCubbins and Schwartz (1984) argue that members of Congress preferred fire alarm mechanisms to reveal slippages in executive institutions as they involved fewer agency costs. As later studies confirmed, fire alarm oversight mechanisms rely on 'cooperation between both

governmental and non-governmental actors' (Jensen 2007, p. 456). If that co-operation is in place, the relative costs of the police patrol mechanism mean that in most instances *ex post* fire alarm modes of political control are more attractive to principals (McCubbins *et al.* 1987).

Subsequent empirical research has further explored the use of police patrol and fire alarm modes of oversight, both in the United States Congress and the European Parliament (Aberbach 1990; Pollack 1997; Huber *et al.* 2001; Tallberg 2002; Jensen *et al.* 2013; McGrath 2013). In the EU context, McCubbins and Schwartz (1984) categorised comitology procedures as police patrols that allow member states to actively monitor the behaviour of the Commission, whereas the provisions of Treaty Articles 173-175 functioned more as a fire alarm system that granted member states, institutions, and individuals the right to raise complaints against the Commission's actions. Pollack (1997) applied the concept of police patrol and fire alarm mechanisms to a rich empirical analysis of political control mechanisms within EU institutions. In his study of the Commission, Pollack identified various decentralised police patrol and fire alarm mechanisms, including appointment and removal powers over bureaucrats, new legislation to overthrow local actors who derail the principal's interests, tight budget control, and so on. However, unlike some parsimonious rational choice scholarship, Pollack carefully avoided narrowing assumptions and used detailed case studies to empirically explore the principal-agent model. Our research aims to provide the same kind of analytical narrative in the Chinese context.

Understanding Mechanisms of Political Control in China

Faced with China's growing environmental emergency, policy makers needed a new policy template that generated swift policy outcomes in a country with vast territories, a large population, and a generally fragmented governance system (Lieberthal and Oksenberg 1988; Mertha 2009), in which central government was often considered incapable of radical change (Andrews-Speed 2012). In short, China could not afford the high levels of agency loss found in other sectors.

In this section, we use the principal–agent model as a heuristic to explain the relationship between the central state as principal and the subsidiary tiers of government as agent. In the existing literature, scholars indicated that the effectiveness of policy design and implementation within China's governance system depends on and is constrained by the overlapping administrative channels created by a mix of vertical and horizontal institutions (Mertha 2009; Eaton and Kostka 2017; Shen and Xie 2017). This system is one of the central features of the model of fragmented authoritarianism that has long been associated with Chinese policy making. In this model, both policy design and dispute resolution are inevitably carried out or at least coordinated by the central government. As Lieberthal and Oksenberg observe: 'only at the State Council level do all the lines of authority come together, and short of referring inter agency disputes to the State Council for resolution, a great deal of time and effort must be expended on trying to achieve a working consensus among the various involved units' (Lieberthal and Oksenberg 1988, pp. 141–142). The State

Council, as the mediator of major policy negotiations, frequently introduces final policy documents for provincial governments to implement in full and also requests them to cascade these instructions down to their subordinate levels of administration (Donaldson 2010, p. 27). This bureaucratic layer of governance installed at the top level of the hierarchical structure is similar to that in the era of the Empire (Zheng 2010; Chung 2011; 2017). Solingers usefully described its vertical specifications back in 1991:

This is a bureaucracy whose hierarchical rankings, status system, and officials' appointment procedures are structured meticulously from the State Council with its dozens of ministries and commissions down to the provincial and then urban subordinate offices of these agencies. Cadres at each level in the hierarchy, as historically was the case, continue to be held responsible for the appointment and the behaviour of those at the level below within their areas of functional and geographic jurisdiction' (1991, p. 35).

Even after years of organizational restructuring, the State Council still has the ultimate ability to set the agenda for interagency activity, a capability that many observers have overlooked (Lampton 2014, p. 89). However, there are multiple competing institutions at the highest level of Chinese government that could be considered as 'principal' under our theoretical model for certain policies. As Lampton points out, institutions such as the NDRC, the Ministry of Finance, or the Ministry of Industry and Information Technology can be considered as 'cross-system integrators' (Lampton 2014, p. 85).

In this article, the NDRC is conceived as being a constituent and active element of the principal. This is because the NDRC articulates and operationalises the broad objectives particularly related to renewable energy set out by central government's State Council (Hochstetler and Kostka 2015, p. 84; Chen and Lees 2016, pp. 578-581)⁴ and we are interested in how the principal ensures compliance after this articulation process has taken place. In addition, the NDRC is a key intermediary in macroscopic planning delegated by the State Council to coordinate provincial governments for planning and implementing policy experiments such as 'macro-regional programming' and has been innovatively set as the key government apparatus since the Hu-Wen administration (Heilmann and Melton 2013, p. 585 and p. 593). The targets and policy goal-setting by this central agency has been linked with the cadre appraisal system of provincial and local officials since 2006 and has formed the most powerful state control mechanisms over party members and state civil servants in the bureaucratic system in China (Heilmann and Melton 2013, pp. 608–609). However, as we touch upon in the conclusion to this article, an alternative application of the principal-agent heuristic and potentially fruitful direction for future research would be to conceive of the NDRC as the agent and examine its relationship with the State Council as the principal.

In this article we also seek to identify how the principal ensures compliance from individuals as well as from organisations. In the Chinese governance system, central government as the principal has developed a number of mechanisms to avoid adverse selection⁵ by individuals as agents. The most obvious means are directly held powers

of appointment and removal of provincial governors, the First Secretary, military leaders, and the top executives of state-owned enterprises (Lieberthal and Oksenberg 1988, p. 348; Qian 1996; Lieberthal 2004; Li 2016). This nomenklatura system allows the central state as principal to control individuals' as agents' future careers and gives it considerable leverage over them (Lieberthal and Oksenberg 1988; Huang 1996; Kou and Zang 2014). Nomenklatura is exercised through rigorous control over all levels of party-state relations (Adam and Tomšič 2002), allowing the central state to influence the personal decisions of cadre at all levels of government or state-owned enterprises (Burns 1994; Breslin 1996; Chan 2004; Brødsgaard 2017, pp. 46–52; Leutert 2018).

One of the most important means of control over individuals is the 'cadre evaluation system' (*Ganbu kaohe*, 干部考核) (Heberer and Trappel 2013), established in 1979. Cadre evaluation is managed by the Organisation Department of the Communist Party of China Central Committee (*Zhongguo gongchandang zhongyang zuzhibu*, 中国共产党中央组织部), which performs a detailed annual assessment of party cadres' political records through performance evaluation and canvassing of subordinates (Burns and Wong 2010; Heilmann and Melton 2017, p. 608–610). These annual assessments are consulted by central government when deciding on promotions and other aspects of an individual's career progression (Huang 1996; Edin 2003; Schubert and Ahlers 2012; Chen *et al.* 2015).

The cadre evaluation system deters and punishes non-compliance (Zhang 2009; Li 2016), whilst material rewards incentivise compliance. These material incentives are subject to a one-vote veto evaluation process. This means that when the completion

of a scheduled task does not meet the required standard, the overall annual work performance is ranked at zero and the official forfeits all reward (Zhang 2009, pp. 90-91). Rewards include 'upgrading of career ladder' (*Tiji*, 提级), and 'merit increase pay' (*Tizi*, 提资), whilst the term 'transfer before the due time' (*Xianqi diaoli*, 限期调离) is a sign of failure.

Sanctions are applied to individuals if local officials at the provincial level appear to be either too arbitrary in policy implementation or demonstrate too much autonomy (Schwartz 2004; Naughton 2010, p. 456). This reduces *ex ante* opportunism under conditions of asymmetric information, and is also an incentive mechanism encouraging officials to adopt what the party would consider to be appropriate ethical standards.

The impact of this target-focused scrutiny of individuals inevitably scales up into practices of compliance at the organisational level. These practices are further enforced by police patrol mechanisms to reduce informational asymmetry between the principal and organisations as agents. Although most of the day-to-day decision-making power for economic affairs has been re-allocated to localities, the 'commanding heights' of the economy are still firmly held in check by central government (Taylor 2014, pp. 138–141). So resources fundamental to the economic life of provinces, such as electricity distribution, coal extraction, railways, and water resources, are still subject to central government direction (Brødsgaard 2012). This is consistent with Huang's (1995) argument that, although China has decentralised economic decision-making to the localities since the beginning of the reform process

in the late 1970s, central government has explicitly offset this by increasing its political control and strengthening central government's capability for policy implementation.

As already touched upon, many compliance mechanisms owe a great deal to the legacy of traditional Chinese governmental structures, emerging long before the current regime, which have been augmented by more modern investigative instruments developed by the Chinese Communist Party regime (Chung 2011; Wang 2014, pp. 94-117). These old practices are part of the institutionalised 'Tiao' (vertical channels) system designed for collecting information and passing intelligence from the localities to central government (Chung 2015, pp. 51-53). The Tiao system, based on traditional China's direct line of control from Magistrate to Prefect to Governor to Emperor, allowed for effective information flows and prevented typical problems that often occur in states with large territories, such as ignoring negative reports, procrastination, or simple elite capture.

In addition to these long-established and often ancient police patrol functions, in the same way that ancient Chinese Emperors would visit their territory, the leaders of the Chinese Communist Party, from Mao Zedong to Deng Xiaoping to Jiang Zemin to Hu Jintao to Xi Jinping, frequently visit certain key territories in China to monitor policy practices and strengthen political control (Chung 2017, pp. 76-86). From time to time, the central state also creates state-led or party-led investigating groups (e.g. *Zhongyang xunshizu*, 中央巡视组, the Chinese Communist Party's central inspection teams and *Guowuyuan diaochazu*, 国务院调查组, State Council' ad hoc work

investigating teams) to inspect key regions and audit the implementation of policy (Breslin 1996, Yeo 2016).

Since 2013, three specific *ex-post* supervisory mechanisms — ‘routine inspections’ (*Changgui xunshi*, 常规巡视), ‘special inspections’ (*Zhuanxiang xunshi*, 专项巡视) and ‘turnaround investigations’ (*Huitoukan*, 回头看)⁶ — have been regularly deployed by the party’s Central Commission. In principal-agent terms, these informal inner-party supervisory practices work in the interests of the principal and are carried out by supervisors that are vertically managed and as a rule have no direct interests intertwined with the localities under inspection. The party can order more extended stays by working groups, called ‘squat on a point’ (*Dundian*, 蹲点), when a richer and more specific flow of information is required (Chung 2011, p. 306). These police patrol mechanisms are designed to provide *ex ante* prevention and *ex post* sanction of agents and more systemic forms of slippage in the Chinese governance system.

Supervising the Growth of Solar Energy Industry at the Provincial Level

In this section we focus more specifically on the police patrol and fire alarm mechanisms embedded within the solar energy sector, examining the dynamics of interaction between central and local actors. In doing this we focus on the specific case of Jiangsu Province.⁷ The typical Chinese province is an administrative unit tasked to

introduce measures appropriate to local conditions under the mandate of the central state. Central government facilitates this process through the collection from and disbursement to the provinces of funds.⁸ In addition to centrally distributed funds, local governments can also seek supplementary funding to assist in the implementation of renewables-related measures.⁹ The provincial governments provided support for the PV equipment manufacturing industry to help accelerate the development of the solar energy sector with the financial aid, which was either directly or indirectly provided by central government.¹⁰ This support (Hochstetler and Kostka 2015, p. 87), especially the support of local government, has directly helped to update the domestic equipment manufacturing industry in China to the internationally competitive level. As Nahm usefully indicated:

Local governments enabled the development of knowledge-intensive skills in commercialization and scale-up through the provision of financial support for manufacturing expansion at a time when financial markets in Europe and the United States were reluctant to lend to emerging green energy industries (2017, p. 718).

Drawing on the insights of principal-agent theory, we assume that the role of central government as paymaster helped prevent moral hazard (Rogerson 1985)¹¹ *a priori* by giving financial incentives to ensure its agents remain aligned with central government wishes. This assumption was to some extent confirmed in interview by Cao Gengsheng, the Secretary-General of Jiangsu Renewable Energy Association.¹²

Figure 2 demonstrates the structure of solar energy governance in China and how

supervisory mechanisms have been deployed to control organisations as agents in the solar sector.

Figure 2 about here

The concept and practice of 'hook responsibility' (*Guagou zeren*, 挂钩责任) is central to understanding the functioning of central-local relations in China. Under hook responsibility, responsibility and liability are hierarchically allocated downwards from the central to the provincial to the municipal tiers of government, and then on to the individual township governments.¹³ Again, one of our interviewees confirmed the leading role of central government in maintaining oversight and control of the process: 'the NDRC exercises the most power over the province's renewable energy policy-making, because the organisation is in charge of renewable energy development, including its promotion. It introduces policies on behalf of the central government in the development of renewable energy; our other departments, including the Quality Supervision Bureau, the Economic and Information Technology Committee, power and state-grid companies, Department of Commerce, the Environmental Protection Bureau, work around the PDRC to coordinate and introduce relevant policies'.¹⁴ A similar picture was painted by some of our other interviewees, one of whom stated that 'In this policy area central government issues a document, (and) local government ought to develop specific rules. Combined with their own characteristics, the policy makers of provincial government must set the tone consistent with national policy'.¹⁵ Our interviewees indicated that the hook responsibilities was deployed by the central

state with the aim of preventing *ex post* opportunism and ensuring effective policy implementation.

In the deployment and diffusion of solar energy, the NDRC ensures the participation of state-owned enterprises in the sector, through its power of approval for new large-scale projects, its ability to set energy prices, and its power over the regulatory framework that directs subsidies to stakeholders. We found that the level of apparent compliance downstream was striking. As one of our interviewees claimed, when there is potential disagreement among different stakeholders, actors at all levels regard their primary role as ensuring the authority of central government. As one interviewee, who wished to remain anonymous, told us: 'While central government policy should always be carried out, the province is to add some additional clauses to facilitate the implementation of the policy...because, after all, the central government has more policy means at hand to push forward the industry than local governments'.¹⁶ As might be expected under the law of anticipated reactions (McCubbins 1999) described earlier, companies and individual entrepreneurs felt compelled to keep themselves informed about official documents, familiarise themselves or be 'read into' the most important policies, and work to anticipate central government ambitions for the sector.¹⁷

An interview with senior executives at a branch of the NDRC's provincial arm, the PDRC¹⁸, described four primary means of implementation of government policies. These were: (1) orthodox legal measures; (2) economic instruments, such as differentiated tariffs; (3) media monitoring; (4) central assessment through deploying

environmental supervisory agencies to local administrative units. Let us look at these four measures in more detail.

First, in terms of orthodox legal measures, central government has codified a set of penalty mechanisms for government officials if noncompliant behaviour has taken place. These sanctions, described earlier, impact directly on officials' personal and career prospects.¹⁹

Second, moving on to the use of economic instruments, the ability to monopolise and direct economic incentives is crucial to the central state's steering capacity over such a vast territory and diverse population. One important (and often complained about) measure is the uniform classification of tariffs (Chen 2016). This ensures minimal differences of interest between principal and agent through central control of appropriate reward and penalty measures to prevent local governments' avoidance of their responsibilities or slippage in their execution of them.

The third and fourth means of control, media monitoring and central assessment, are intended to overcome the asymmetries of information that are to be found in all principal-agent relationships. In fact, the central state has very effective channels of information at its disposal on local environmental and energy management. Paradoxically, this is partly because the media landscape in China has changed in recent years and no longer exclusively serves the party's propaganda interests (Stockmann 2013; Chung 2017, p. 82). Thus we have seen more private media, albeit still subject to considerable censorship, together with the official media, take the lead in reporting issues of underlying environmental pollution (Economy 2010, pp.171–

174). The irony is that the decline in the Chinese state's ability to control the media message has boosted the depth and richness of information flows, reduced information asymmetries, and enhanced the deployment of fire alarm mechanisms. The increasing mobilisation of public opinion not only provides an outlet for political pressures that might otherwise build up in China's authoritarian system but also helps central government identify and steer responses to local problems across its territory.

In addition to these four measures, the Chinese Communist Party has created other mechanisms to garner relevant local information and knowledge. In our interviews with senior policymakers involved in the development of the sector in Jiangsu, more than one interviewee raised the importance – already touched upon in this article - of professional associations in performing a bridging role between the government, public and private enterprises, and other stakeholders. The organisation is often commissioned by the local energy industry to collect raw data on renewable energy operations,²⁰ allowing local companies to express their needs to the PDRC's provincial energy bureau.²¹ In particular, the central state prioritised the participation of large domestic enterprises in the expanding solar energy sector²² and ensured that through the 'state-led' industrial associations 'the cooperation of business — between the upper and lower industrial chains and among the various networks — could be better promoted... especially when facing the debt crisis in the EU. Such state-enterprises cooperation implies an encouragement of a close cluster for development including key large corporations'.²³

This focus on the larger domestic enterprises led to the complaint that small businesses often seemed to be excluded from the consultation process.²⁴ As size seems to matter when it comes to being listened to by the central state, smaller companies now forge collective links through the state-led associations in order to pool expertise and make sure their voice is also heard by central government. In Jiangsu, a key example of this kind of state-led association is the Photovoltaic Industry Association. It works as a semi-official agency, collecting information and reporting upwards in a classic police patrol function, but also operating as a fire alarm institution, working as a voice through which local enterprises can file complaints on solar energy related problems and also provide immediate responses to steers from further up the chain. The effectiveness of this association in the pooling of expertise has helped Jiangsu to rapidly grow its solar energy industry. Stakeholders use this network to both give a voice to their views and also to quickly adjust their business strategy in accordance with new information or steers from the centre.

However, it is noteworthy that the success of the governance mechanisms described above in ensuring compliance is, to some extent, rare in the Chinese energy sector. Moreover, successful institutional configurations are not easily transferred across policy areas. For instance, the Chinese state has long provided financial and logistical support to the oil and gas industries, which are critical to China's 'pillar industry' strategy (Andrews-Speed 2012; Wu 2014). Central government has intervened in the oil and gas market by intensively re-allocating resources towards the sector and formulating favourable industrial policies to support its development. The

commitment to oil and gas is codified in *The State Council's Energy Development Strategy 2014–2020* and *The Policy of Natural Gas Utilization* (NDRC 2012; 2014). As in the renewables sector, central and local governments provide financial subsidies to facilitate the deployment of natural gas in order to reduce and eventually replace the consumption of coal (NEA *et al.* 2016, pp. 31–39; NEA 2017a). Centralized oil and gas SOEs remain as the leading economic actors in the sector (NDRC 2016b, p. 20; Grünberg 2017). Nevertheless, the governance of the oil and gas sectors retains the familiar features of fragmented authoritarianism and this makes it relatively costly for the Chinese state to maintain *ex ante* or *ex post* disciplinary management of the sector. These problems are particularly acute with regard to the behaviour state-owned enterprises in the fossil fuel energy sector (Fan *et al.* 2016; see also Kostka 2016, p. 67; Eaton and Kostka 2017). Similar problems exist in the nuclear power sector (Xu 2010, p. 86 and pp. 91–95; also Xu 2014).

One of the insights of this article is that the Chinese state's management of the non-hydro renewables sector has taken a different path to elsewhere. We argue that this is a reflection of the Beijing government's attempt to solve the problem of insufficient capacity that plagues the effectiveness of central government in other sectors (Kong 2009, p. 809; 2011, pp. 52–56). In particular, the target-based incentivisation of individual officials – described in detail earlier in this article – scales up to the organisational level in such a way that pushes forward the deployment of the renewable energy industry across China. We argue that this is an attempt to reduce the number of veto players so as to mitigate the default problem of information

asymmetry and create conditions of 'strong governance' despite the wider institutional constraints of fragmented authoritarianism.

So, in the process of the promotion of photovoltaic diffusion, the NDRC sets out its targets in its five-year development plans, which are referred to in more detailed individual plans and projects, along with associated metrics and proxy indicators. For instance, in the *Thirteenth Five-Year Guidelines of Solar Energy Development*, central government stated that 'by the end of 2020, the installed capacity of solar power shall be more than 110 million kilowatts, of which, the installed capacity of photovoltaic power shall reach 105 million kilowatts'. In preparation for transposing the plan to local conditions, central government sets further differentiated targets for the key administrative areas. Jiangsu Province, for example, was tasked with the instalment of photovoltaic power plants to a generating capacity of 800 million kilowatts by 2020 (NDRC 2016a, Article 2.3). All indicators, real or proxy, are re-assessed every five years and provinces must supply detailed information to inform this process (NDRC 2016a, Article 3.6).²⁵ Such a police-patrol evaluation system is consistent with the growth of what Heilmann and Melton call the 'plan-cadre nexus', in that:

Procedures [of the supervision of the planning of the development] have effectively raised the political status of national and regional Development and Reform Commission and increased the political weight of their plan prescriptions [within] the cadre system, that is, the core pillar of the political hierarchy (2013, p. 610).

According to one of our private sector interviewees, in the past the uncertainty of national policy was an obstacle that limited the deployment of solar energy in China. However, since the publication of the key policy document, the *Opinions Regarding Connection Services of Distributed Photovoltaic Power Generation* (2013), investors (including the financial industry) have been assured that long-term investment will be able to get a return and, crucially, that officials at levels of the chain of delegation are incentivised to facilitate this.²⁶ For instance the document instructed state grid companies to develop a pathway for electricity producers to develop grid-connected projects, providing network services for producers to connect, transmit, and distribute generated electricity, enabling entrepreneurs to participate in photovoltaic investment to both save costs and reduce market risk. Such a decree accommodating the economic actors' business activities goes beyond a simple police patrol mechanism and creates a potential convergence or even shaping of mutual interest between actors. In 2015, for instance, the National Energy Administration in the NDRC released a policy document, *The Notice on the Implementation of the Information Management of Renewable Energy Generation Project*, which set out detailed regulations about management of the renewable energy tariff subsidy, and how individuals and organisations should submit information to the monitoring platform. This clear police patrol mechanism was an attempt to limit opportunism in direct response to previous problems of fake subsidy applications (CNREC 2016) and once again was designed to reduce information asymmetry and agents' ability to exercise discretion in compliance with the principal's instructions.

As we move towards the conclusion of this article, any discussion of the Chinese state's currently formidable array of political control mechanisms in the solar sector should recognise that the effectiveness of current oversight arrangements has been hard won. Our field research amongst stakeholders indicates that oversight and control were both far more problematic in the past. For instance, an anonymous interviewee pointed out that, earlier in the development of the solar sector, the Chinese authorities seemed to lack effective tools for dealing with, for instance, the issue of poor corporate conduct. Inevitably, this led to inferior or corrupt businesses being protected at the expense of good corporate citizens. The cultivation of state led industrial associations helped address that particular issue in that they were tasked to not only act as a mediated channel for information collection from below but, as already noted, they could also communicate steers from above. So the voices of Chinese enterprises were indeed heard, as our interviewees pointed out, but these industrial associations – along with the other mechanisms of political control described in this article - were also a means for the central state to communicate to errant enterprises and even particular individuals the central state's displeasure when necessary.²⁷

Discussion and Conclusions

This article explores how the process of the diffusion and deployment of new renewable energy sources in China was driven by the central state. The article

demonstrates that the central state's strategy in creating and leveraging its mechanisms of political control can be framed as that of the principal in a classic principal-agent relationship.

We show how the Chinese central state has effectively moved to constrain and discipline individuals and organisations as agents and ensure that their actions remain aligned with the principal's interests. In doing so, the article demonstrates the extent to which the orthodox notion of 'fragmented authoritarianism' found in other sectors has been replaced by a more directed system of top-down hierarchical control in the solar energy sector: hence the 'recentralisation' in the title of this article. In doing so the article also adds to our empirical understanding of the principal-agent relationship by extending the application of the established theoretical framework to an authoritarian state like China.

We demonstrate how this process of political recentralisation often draws on top-down traditions that predate the modern Chinese state, such as the 'Tiao' model of vertical channels (Chung 2015). In addition, the footprint of the modern state is also visible in mechanisms such as 'cadre evaluation' and other performance assessments embedded within the nomenklatura system (Burns 1994, Chan 2004, Zheng 2010, Heberer and Trappel 2013, Schubert and Ahlers 2013, Li 2016), as well as spot checks and more extended inspections (Breslin 1996, Chung 2011; 2017). Many party institutions play a role in this system of political control but the key organisation is the NDRC.

We have demonstrated how the NDRC (and its provincial arm, the PDRC) intervenes on the central state's behalf, liaising with all stakeholders in the sector. The article describes how the NDRC uses legal measures, economic instruments, media monitoring, and the deployment of supervisory teams to local administrative units to ensure compliance. Through the NDRC the Chinese state has decisively addressed its principal-agent problem with subsidiary tiers of governance across China's vast and diverse territory.

What this article does *not* do is address any potential principal-agent issue with the NDRC itself. We have described how the NDRC is the key actor in China's practice of 'hook responsibility', with tasks hierarchically allocated down from the central to provincial to municipal levels, and eventually down to the individual township governments. At each level down from the central state, the NDRC assumes increasingly more discretion and autonomy. So, at the local level, the Energy Bureau of the local PDRC – and not normally local party elites – is responsible for translating broad guidelines into detailed policy drafts, albeit in consultation with local stakeholders. In turn, the PDRC conducts police patrol and fire alarm supervision on behalf of NDRC, which has built a narrow informational channel between corporations, selected professional associations, and other liaison organs such as the provincial Economic and Information Technology Commission. It goes without saying that this concentration of information, expertise, and policy amending power, within the NDRC and its provincial arm the PDRC provides at least the latent potential for moral hazard, opportunism, agency loss and slippage. However, as the NDRC is tasked with

articulating the specifics of central government policy aspirations, it is an analytical and empirical challenge to identify where agency loss and slippage is taking place.

To conclude, this article asserts with confidence that the distinct mode of governance found in China's solar sector differs significantly from the orthodox notion of fragmented authoritarianism and that it has cultivated a series of national champions and empowered them to catch up with and even surpass the traditional Western environmental leaders. In addition, China has managed this process of catch-up in less than twenty years and with the apparent alignment of all tiers of government to the task set by the central state. The agency costs associated with this explicitly recentralised model of governance are potentially significant. This is because it is strongly reliant on police patrol control and monitoring mechanisms at the meso- or sectoral level, albeit combined with fire alarm modes of political control at the micro-level. However, the costs incurred seem to have paid off. The degree of agency loss looks to be small and the actions of the central state's agents appear to be strongly aligned with the two key goals of the principal: to address the growing environmental emergency within China and to catch up technologically with the West.

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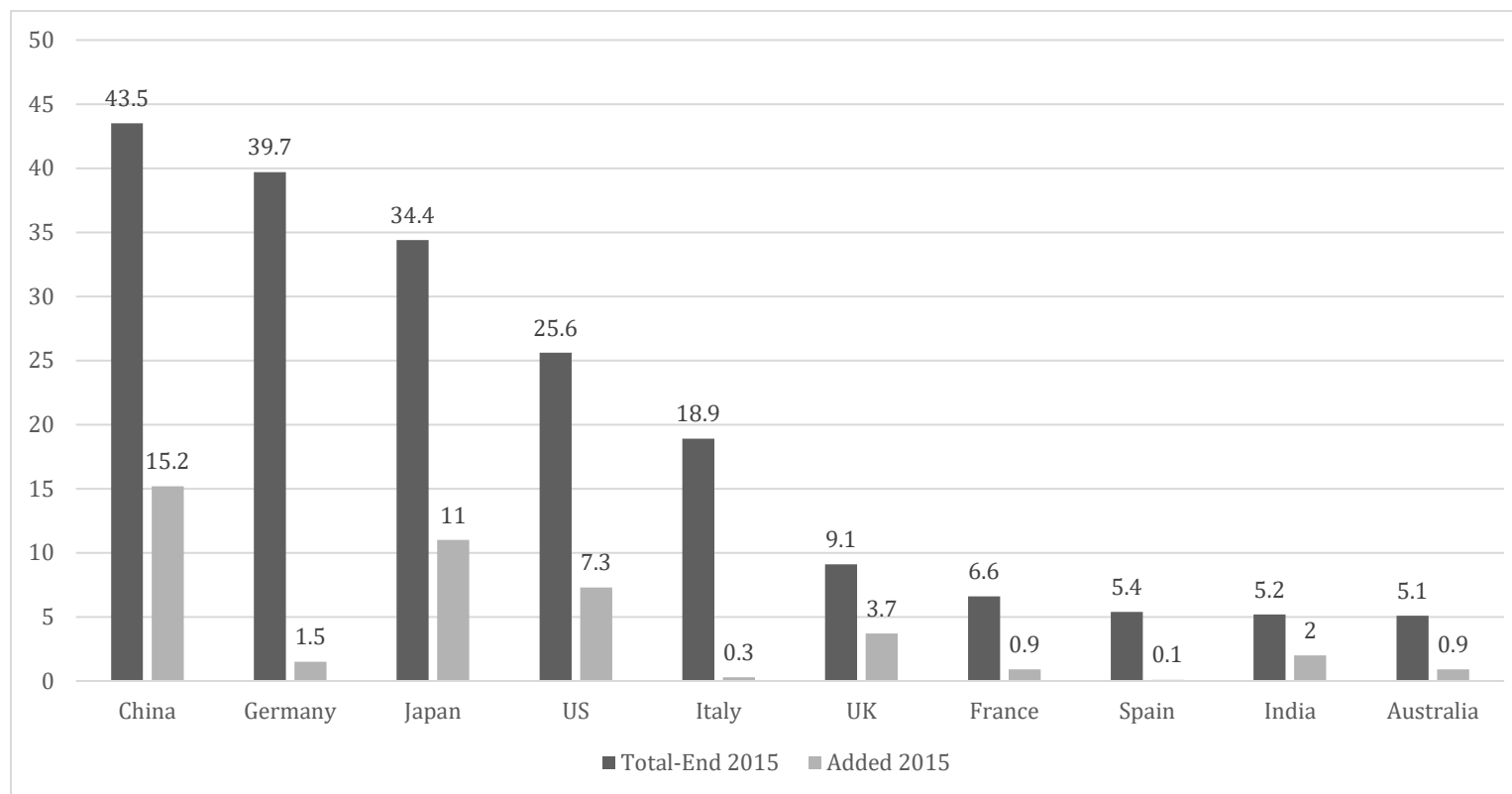


Figure 1. Cumulative installed solar power capacity in top ten countries, 2015 (Gigawatts)

Source: adapted from REN21 2016, p. 14

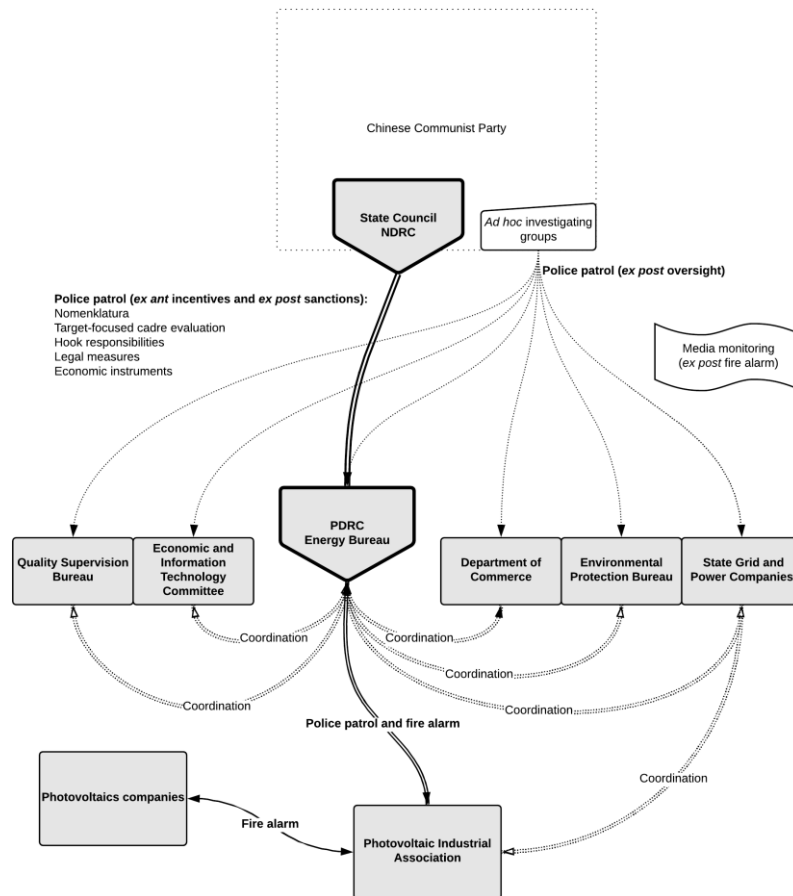


Figure 2. Political control mechanisms of solar energy development in Jiangsu Province, China

Source: Authors

Endnotes

¹ ‘Police patrol’ oversight involves the routine scrutiny of policy implementation in order to ensure that bureaucrats are working towards intended policy goals. In the literature, police patrol practices are contrasted with ‘fire alarm’ mechanisms, which often rely on outside actors to raise issues about the implementation and administration of policy. The former tend to be more centralised than the latter, which by their nature rely on a degree of decentralisation and active stakeholder involvement.

² Those conventional fossil fuel energy fields such as oil, gas, and coal-fired plants still suffer from ineffective policy implementation embedded in the old governance system, which is fragmented authoritarianism (Andrews-Speed 2012; Kostka 2016).

³ Bureaucratic slippage or policy drift refers to the phenomenon by which policies change over time through constant reinterpretation. Jacob Hacker (2005) argues that policy drift is an almost inevitable outcome of institutional stasis. If not corrected this can lead to substantive changes in the scope and outcomes of policies without any explicit policy reforms taking place. The implication is that active monitoring and correction of policy implementation and subsequent adjustment is required if the objective is to ensure that the original objectives of a particular policy or set of policies are to be secured.

⁴ Shen and Xie (2017) describe the reality of the attribution of responsibility sharing among major agencies in the development of renewable energy in China. Similar observations are found in our interview material, with interviewees such as Wu Lei (Jiangsu Economic and Information Technology Commission, Interview on 24 April 2013) and Wang Pei-hong who pointed out that according to different policy needs, government and economic actors must, according to their tasks, coordinate with many different provincial departments. However, our findings indicate that the distribution of responsibilities did not mean that the *power* in the localities is similarly shared among different stakeholders. On the contrary, when asking who was the most influential actor in the development of renewable energy, all respondents pointed out that the NDRC is the key influencer in this field who holds more power of policy influence over decision making in the sector. And the NDRC, according to the interviewees, hold more power than local government officials in this regard. These sentiments inspired us to consider treating the NDRC as the principal in our initial theoretical discussions.

⁵ Adverse selection occurs under conditions of information asymmetry where the principal is able to ‘rig the market’ or make decisions that are not necessarily in the interests of the principal (Dionne *et al.* 2001).

⁶ Central inspection teams undertake inspection tasks in localities, which would normally be stationed in selected areas and welcome any sort of reporting or appealing activities from local residents. Apart from routine or special issue inspections, at times, the teams would pretend to leave one area they had been previously stationed, then turning back again to the area for a further investigation assuming the potential suspects slacken their vigilance.

⁷ Jiangsu Province is chosen because it recently emerged as one of the biggest hubs for global solar energy production. The province is home to 70 per cent of solar PV manufacturing capacities in China, producing one fourth of solar PV equipment in the world (Zhou and Zhang 2010, p. 83). The province also plays an influential role in terms of solar energy consumption; its accumulative capacity of distributed solar energy ranked first among all Chinese administrative unites in 2015 (CNREC 2016, p. 59).

⁸ Interview with an anonymous informant at Jiangsu PDRC, 26 April 2013.

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ Moral hazard refers to situations where the one actor (normally the agent in Principal-Agent theory) takes risks because the potential costs of such behavior will be carried by another actor (normally the principal). This kind of behavior takes place under conditions of information asymmetry and the concept is therefore related to the concept of adverse selection.

¹² Interview with Gengsheng Cao, 27 February 2013.

¹³ Interview with an anonymous informant, 26 April 2013.

¹⁴ Interview with Qian Zhang, Deputy Director General of Jiangsu Provincial Bureau of Quality and Technical Supervision, 27 March 2013.

¹⁵ Interview with Pei-hong Wang, Secretary-General of Energy Research Association of Jiangsu Province, 1 March 2013.

¹⁶ Interview with an anonymous informant, 26 April 2013.

¹⁷ Interview with Andy Zhong, 1 April 2013.

¹⁸ Interview with an anonymous informant, 26 April 2013.

¹⁹ This top-down maintenance of accountability is very different from having a constituency of voters to satisfy in Western democracies but has, to a considerable extent, maintained the continuity of the governing system in China.

²⁰ Interview with the anonymous informant, 19 March 2013.

²¹ Interview with Will Sun, Project Director of Jiangsu PV Power Station, China Sunergy Co. Ltd, 1 April 2013.

²² Interview with Qian Zhang, 27 March 2013.

²³ Interview with Ruiling Xu, Secretary-General of Jiangsu PV Industry Association, 4 March 2013.

²⁴ Interview with Jinwei Zhu, Legal Director of ET Solar Corporation, 13 March 2013.

²⁵ As for the development of photovoltaic power, this target firstly set a national assessment target after five years onwards: the scale in 2020 shall reach 105 million kilowatts to replace the annual amount of the consumption of coal (NDRC 2016a, Article 3.6).

²⁶ Interview with Will Sun, 1 April 2013.

²⁷ It should be noted that information flows to and from central government from the provinces are framed within the constraints of what remains a highly authoritarian political system. The fact that many of our interviewees insisted on speaking off the record (or even remaining anonymous) indicates the kind of constraints that individual actors continue to operate under in China.