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# Norms and flexibility: Comparing two mitigation policies implemented in Shanghai

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ABSTRACT

China has stepped up its efforts on abating pollution, saving energy and reducing emissions. Local government involvement is crucial. In the 12th Five-Year Plan period (2011–2015), Shanghai municipality's two main mitigation policies were the carbon-market pilot (emissions-trading scheme, ETS) and the 10,000 Enterprises Energy-Saving and Low-Carbon Actions (10,000 Programme). The ETS pilot achieved full compliance, whereas 15–17% of the 10,000 Programme's target entities fell short each year. This article compares how the government implemented the policies, seeking factors that can explain the outputs. The structured and focused comparison employs a policy-implementation process model, using data from written sources and semi-structured interviews in Shanghai and Beijing, 2015–2017. The government's normative power emerged as a major factor: the local ownership of the ETS pilot sent strong normative signals to target entities that it was important to complete the tasks required of them. Further, policy requirements for determining output were more detailed and less flexible in the 10,000 Programme than the ETS pilot, making full compliance difficult.

## 1. Introduction

During China's 12th Five-Year Plan period (2011–2015), attention to air pollution grew, as illustrated by State Council's 2013 Action Plan on Air Pollution (Ministry of Environmental Protection, 2013). Climate change had been declared a national priority in 2007, and energy-saving policies were important in the 11th Five-Year period (2006–2010) (Li & Wang, 2012). Fossil fuels are sources of both ambient pollutants such as PM, $NO_X$ and $SO_2$ and greenhouse gas (GHG) emissions (Gu e al., 2018). Although not all measures to improve air quality will also mean a reduction in GHG emissions, GHG curbing measures such as improving energy efficiency and fuel substitutions bring lower ambient pollutant emissions (Wang & Hao 2012).

In line with the stricter national policies and targets for controlling emissions and curbing energy use, the 12th Five-Year Plan aimed for 17% reduction of carbon emissions/GDP (carbon intensity) and 16% reduction of energy use/GDP (energy intensity). Further, the Plan announced that a carbon emissions trading market would be established (12th Five-Year Plan, 2011). China's national emissions-trading scheme (ETS) was the first policy-tool where carbon emissions were the 'currency'. Seven jurisdictions, including Shanghai, were chosen as ETS pilot for testing local carbon-markets before the national market commenced in 2017.[1] A major national energy-saving policy was 10,000 Programme (in full: '10,000 Enterprises Energy-Saving and Low-Carbon Actions'), mainly targeting industry.

Shanghai, a megacity with more than 20 million residents, is China's financial centre, but still has considerable industry, accounting for about 63% of carbon emissions (Pan et al., 2017). During the 12th Plan period, Shanghai implemented various measures for saving energy, reducing emissions and improving air quality, like speeding up the replacement of old production equipment and replacing coal fired boilers. This article focuses on how the Shanghai government approached enforcement of the 10,000 Programme and the ETS pilot in the 12th Plan period.

Both policies were important for supporting the local reduction targets of carbon and energy intensities of 19% and 18% between 2011 and 2015 (Shanghai government, 2011). However, they differed in policy output – the extent to which companies met the requirements from these policies. All companies participating in the ETS surrendered the stipulated amount of allowances by the deadline, achieving full compliance every year: Shanghai was the only of the seven pilots to achieve this. In the 10,000 Programme, however, some 15% to 17% of companies failed to fulfil the requirements – whereas the two neighbouring provinces Jiangsu and Zhejiang had over 1,100 companies in the 10,000 Programme each, with only a 2–8 % annual failure rate (Table 1).

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[1] The other pilots were Beijing, Chongqing, Shenzhen and Tianjin municipalities, and the two provinces Guangdong and Hubei.

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**Table 1**
Shanghai: Output of the 10,000 Programme and the ETS, 12th Five-Year Plan Period (2011–2015). Source: Author's compilation.

| Policies' output rates/ *Year* | *2012* | *2013* | *2014* | *2015* |
|---|---|---|---|---|
| 10,000 Programme: Number of target entities not achieving target / total number[†] | 42/269 | 43/253 | 38/248 | N/A[*] |
| Output percentage | (84.4%) | (83.0%) | (84.7%) | |
| ETS: Number of entities not complying / total number | Policy not yet in effect | 0/191 | 0/191 | 0/191 |
| Output percentage | | (100%) | (100%) | (100%) |

[†] The number of companies covered fell, due to terminations and relocations.
[*] 2015 details not released by the central or Shanghai authorities.

There was some overlap: some companies were covered by both policies; and some which managed to fulfil the ETS requirements did not fulfil their 10,000 Programme obligations. As the ETS pilot was a new policy mechanism and the 10,000 Programme policy requirements were more familiar to implementing agencies and target entities, results might have been expected to be the converse. To explain the output, this article focuses on what the government did to enforce requirements, and on government–company interactions. Employing a policy-implementation model to organize the comparison, it asks: *What factors can help to explain the two outputs in Shanghai?*

The article contributes empirical data about low carbon policies implemented in China. The purpose here is not to test or refine models, but to take the model as a starting-point in exploring which factors may drive or impede implementation.

## 2. Method and research design

This study began in 2015 with interest of what local governments in China, cities in particular, were doing to curb GHG emissions. Relevant for choosing Shanghai as the city of study is that it is a forerunner in several areas, including economic development, energy statistics and peaked its coal consumption in 2011 (Pan et al., 2017). Shanghai's developments may provide lessons for other parts of China (Yang et al., 2018). Reviewing the annual lists of energy-saving and emissions-reduction tasks for 2014 and 2015, I found many tasks took the form of 'promoting the integration of information technology and industrialization' (Shanghai DRC, 2015a). Strengthening the direction of industrial development is important – but how to determine the degree of policy output? I chose the ETS pilot and the 10,000 Programme, as both are concrete in measures and output and therefore more suitable for comparison than policies which goals were to 'strengthen' or 'improve' without stipulated measurable outputs. The two policies differ – one focused on carbon-emissions allowances, the other on energy-saving – but this is not a question of comparing 'apples and oranges', as both policies contribute to reducing emissions. As most of Shanghai's energy comes from fossil fuels, energy saved means emissions saved. Both policies were put on the same list by the Shanghai government, signalling that the government sees them as means to the same end: to reduce emissions.

This study employs a combination of document analyses of written sources like official documents and news articles, and semi-structured interviews. Documents from the national and Shanghai governments, as well as the Shanghai implementing agencies, proved central for understanding the policy processes. Further, I followed specialist international news-channels like Carbon Pulse online, and the Chinese-language specialist magazines *Shanghai Energy Conservation* and *Energy Conservation and Environmental Protection*. Important additional information and assessments came from individuals directly involved with or who closely observed the two polices. I conducted 23 semi-structured interviews with stakeholders in Shanghai and experts in Beijing, aiming to speak with at least one person from implementing agencies, target entities, third-party verifiers, government advisors, academics and consultants (see Appendix). I also benefitted from participation and informal communication with stakeholders at seminars and conferences on topics ranging from low-carbon development in China in general, to more Shanghai-specific matters. Fieldwork was conducted in March–November 2015, May–November 2016 and March 2017.

The comparison is structured and focused. This method requires asking the same questions about the policies for structure, and is focused by dealing with selected aspects only (George & Bennett, 2005). Armed with an in-depth understanding of both policies, I turned to the theory literature on policy-processes and implementation to formulate the analytical framework presented in section 4.

## 3. Previous research

Scholars have mapped Chinese efforts to improve air quality and mitigate GHG (Gu et al., 2018; Tambo et al., 2016), and cities' efforts here (Liu et al., 2016; Pan et al., 2017). Several have documented the 'implementation gap' where local enforcement of national environmental policies deviates from national intentions (Kostka & Mol, 2013; Ran, 2013). Studies have focused on low-carbon development (Cai et al., 2012) and specific projects like eco-cities (de Jong et al., 2016). This article offers a comparison of mitigation policies implemented within a single city. Studies of China's ETS pilots have focused on allocation rules and other design elements, not implementation (Pang & Duan, 2016; Wu et al., 2014). The 10,000 Programme has emerged in a larger landscape of energy-saving policies (Lo, 2014), and as a case for discussing authoritarian environmentalism (Lo, 2015). This article addresses the gap as regards comparative studies of enforcing these two key policies.

Few implementation studies on environmental and energy-saving policies in China have ventured into modelling or theory-building applicable here. Recent decades of political studies in China have relied on the seminal 'Fragmented Authoritarianism' model, which sees authority as highly fragmented, beyond the formal hierarchy of the bureaucracy and state (Lieberthal et al., 1992). Lieberthal (1997) saw the organization of the political system, with vertical and horizontal lines of authority, as a reason for the poor implementation of environmental policies. Seeking to amend the model with new knowledge, Mertha (2009) has argued that inclusion of actors outside the bureaucracy and the practice of establishing Leading Groups have opened possibilities for policy entrepreneurs in policy-making. As helpful as these insights are, this literature covers a broad field of politics, not the implementation process per se. Searching for alternatives to explain the chosen policies, I found an implementation-process approach based on Van Meter and Van Horn (1975), further informed by others (Jänicke, 1997; Sabatier, 2005).

## 4. The policy-implementation process model

Van Meter and Van Horn's (1975) model represents an influential addition to implementation studies, and later contributions have sought to rectify perceived shortcomings in its top–down approach (Sabatier, 2005). This article's theoretical contribution is expanding the application of the theoretical framework. To the author's knowledge it has not been employed on policy processes in China before. Originally formulated for the US federal democratic context, with some adjustments it can also be applied here: The 1975 model emphasized inner workings

of the implementing agencies: I have simplified some aspects. Furthermore, the model has a two-layer national–federal government structure. This I have shifted downwards, so that the levels are the municipal government and the targeted entities. This is a step towards a more bottom–up approach to policy-processes, such as Sabatier's Advocacy Coalition Framework (2005), but is also necessary for explaining the policies. Ignoring interactions with, or the attitudes and reactions of the companies involved would obscure important explanatory factors.

One may understand the policy process as dynamic, but with an anticipated order of how factors impact on each other and on policy implementation (Van Meter and Van Horn, 1975). The factors expected to influence the policy-output are:

### 4.1. Policy

Output assessment starts with the policy itself, two aspects in particular:

1) *Regulations and objectives:* What were they? How difficult was it to fulfil them? The objective may be measurable, like number of coal-fired boilers switched to less-polluting fuels. The nature of the policy problem may indicate how simple or difficult it is to resolve (Jänicke, 1997). A local river may be easier to clean up than a border-crossing river. I expect output to be more readily achieved when there are fewer criteria to be met.
2) *Origin:* Does the policy originate locally, or is it a top–down measure? Given China's top–down implementation gap (Kostka & Mol, 2013; Lo, 2014), I expect a policy which is initiated locally to be more likely to be achieved.

### 4.2. Policy resources

Funding and other resources allocated for the policy, including improving the expertise and numbers of implementing agency staff, are relevant. Available funding and incentives may make implementing agencies and target entities more positive towards the policy (Van Meter and Van Horn, 1975). Here I relied mainly on documents from the implementing agencies themselves, combined with interviewees' evaluations.

### 4.3. Communication and enforcement activities

Implementation depends on understandable policy objectives, so that those involved know what is expected of them. How policies are communicated by implementing agencies likely affects execution (Van Meter and Van Horn, 1975). Two types of enforcing activities are expected to be important: 1) *assistance and technical advice* to ensure that organizations executing the policy are qualified and informed; 2) *rewards* or *punishments*. The power of the enforcing agencies may be *normative*, *remunerative* or *coercive*. Normative power in the policies studied here would appear as the Shanghai government placing symbolic importance on a policy and 'socialization, persuasion and cooptation' (Van Meter and Van Horn, 1975).

### 4.4. Economic, political and social conditions

These conditions can influence all stages of implementation. Does the policy encounter support or opposition from interest groups or elites? If a policy will have sizeable impacts on social or economic conditions, that may affect implementation (Jänicke, 1997; Sabatier, 2005; Van Meter and Van Horn, 1975). I assessed this factor based on news and other documents, as well as interviews, public speeches and observations made at conferences and events, emphasizing the monetary pros and cons, expecting that to have particular effect on implementation.

### 4.5. Target entity responses and strategies

Depending on the above-mentioned factors, the attitude of the entities covered by the policy may influence implementation. How they perceive the policy, and how strongly they feel about it, will probably influence implementation (Jänicke, 1997; Van Meter and Van Horn, 1975). If an entity disagrees deeply with a policy, it might try to stop or delay implementation. If attitudes are neutral, implementation may hinge on the perceived costs of implementation and potential conflicts with other priorities. Unable to consult all companies involved, I relied on interviews and news to get an understanding of company responses and strategies.

Successful implementation is normally the result of a complex of factors, not one single factor (Jänicke, 1997). The above factors may be thought of linearly, but reality is probably less streamlined, with feedback loops where factors impacting on each other.

## 5. The ETS pilot

### 5.1. Policy

The initiative for carrying out an ETS came from the Shanghai government itself (Stensdal et al., 2018). After the National Development and Reform Commission (NDRC) in November 2011 approved the Shanghai pilot, along with seven others (NDRC, 2011b) the Shanghai government started preparing its ETS. All the chosen local governments had asked NDRC to be selected as pilots. Being the primary implementing locations was seen as a means to obtain first mover advantages, such as being considered for hosting the national exchange. Furthermore, as local officials now are evaluated on both economic and ecological performances, the ETS seemed like a policy which caters to both concerns (Stensdal et al., 2018). There were examples outside China to study,[2] but no carbon-market predecessor in China. Rules and regulations were created locally, not issued by the national government.

In November 2013, the municipal government issued a decree setting the main layout and rules for the ETS pilot (Shanghai government, 2013). That this document was signed by the mayor sent normative signals: this policy was a priority-area. The other regulatory documents were issued by the Shanghai Development and Reform Commission (DRC).

The general objective of emissions trading is to employ market mechanisms to control emissions, the rationale being that trading schemes stimulate forces that would not become active with other policy measures. An ETS makes emissions rights a commodity, thereby promoting economic activity (GDP) and possibly creating installation upgrading and technological innovations.

Shanghai's ETS covered industrial and non-industrial sectors. For industrial sectors, the threshold for participation was emissions above 20,000 tons of carbon annually 2009–2011, and 10,000 tons for non-industry sectors. With these criteria, 197 compliance entities were covered from the outset. Emissions 2009–2011 were registered and verified in 2012. From this information, the pilot government allocated emissions allowances for free to the compliance entities, each allowance giving the right to emit one ton of carbon. Allocation was done once at the beginning for 2013, 2014 and 2015, with some 160 million allowances issued each year. Allowances not used in one year could be saved and used towards the following year's requirement ('banking'), but borrowing from future years' allowances was prohibited. The rules stipulated punitive measures for various breaches of rules, ranging from 10,000 to 100,000 RMB. Other possible punitive measures included withdrawal of funding for energy-saving and emissions-reduction

[2] For more about this process in Shanghai, the other pilots and the national market, see Stensdal et al. (2018).

projects, as well as a maximum three-year restriction of eligibility for such funding (Shanghai government, 2013).

Considerable time and resources went into knowledge-building and formulating the rules. There was a focus on communicating with potential compliance companies, from larger hearings to meetings with individual companies. Asked for their opinion, companies argued according to their specific situations. Those facing the prospect of having to buy allowances engaged more actively than those which did not. While most companies accepted the policy, ten companies from different sectors initially refused to be included, all arguing that the additional economic burden would be too great. They all eventually came around after informal talks and consultations with the pilot management. It was important for the pilot management to gain acceptance from the companies, as they were the ones that would eventually carry out the work.

### 5.2. Implementation

At the launch ceremony in August 2012, top officials from NDRC participated, adding prestige to the event (Shanghai DRC, 2015b). The Shanghai DRC was the main responsible agency for the ETS. The municipal government established a Leading Group, headed by then-deputy mayor Yang Xiong, who became mayor in 2013. A supporting Expert Committee consisting of local experts and scholars was also formed. The DRC was the Leading Group's secretariat. As with NDRC nationally (Stensdal et al., 2018), however, it lacked staff to manage the ETS pilot, and delegated tasks to other organizations: the Shanghai Information Office's Centre for Low-carbon Economy and Addressing Climate Change, the Shanghai Environment and Energy Exchange, and the Shanghai Energy Saving and Emission Reduction Centre (Shanghai DRC, 2015b). My interviewees agreed that the implementing agencies in Shanghai were highly competent, actively working to make the ETS a success. My own contact with the agencies confirmed this (interviews 1-6, 8, 14, 16, 18-20, 22). That the mayor headed the Leading Group sent strong normative signals to the rest of the bureaucracy, the companies involved and society that this policy was important and should be supported.

The implementing agencies provided assistance and technical advice. Training and meetings were held several times a year, some with vice-mayors present (Shanghai DRC, 2015b). Furthermore, to facilitate company inquiries, contact-points were established at the Information Office, the Exchange and the Energy-Saving and Emissions-Reduction Centre. The rules and objectives were available online, but interviewees noted that companies with no prior experience of market mechanisms needed time to comprehend and get used to the scheme. Larger companies with previous experience of the Kyoto Protocol's Clean Development Mechanism or ETS outside China were generally quicker to embrace the system. Six companies shut down or moved out of Shanghai, so when the market opened there were 191 compliance companies.

During the first compliance cycle, companies had to report their 2013 emissions by 31 March 2014. April was set aside for third-party verifiers to verify the reported emissions, and by the end of May the government declared the number of allowances each compliance company was to surrender. The total distributed 160 million allowances were estimated to cover all emissions, but power producers received fewer allowances than needed, as an incentive to spur greater efficiency. However, they were not able to reduce emissions, and had to buy allowances on the market. Problematically, there were too few allowances for sale in the market: those with a surplus had decided to 'bank' the allowances instead of selling them. In response, the government hosted informal talks urging the companies to start trading. The Exchange also arranged an event for matching sellers with buyers – but no matches were made, and the companies present complained about the allocation process. Trade picked up, but the government also announced it would hold a once-off auction on the deadline day, to give companies a chance to buy needed allowances. By the 30 June deadline, only seven companies had yet to surrender their allowances. 100% compliance was achieved without the government having coerced anyone, simply playing on its normative power. For the power-producers who needed to buy extra allowances at around 40 RMB each, it would have been cheaper to accept the maximum fines. However, compliance was deemed more important than money. The 2014 and 2015 compliance processes went more smoothly, both achieving 100% compliance.

The ETS pilot was initially scheduled for 2015. After it was announced that the national market would start in 2017, the seven pilots added a 2016 cycle. For 2016 Shanghai added more sectors such as harbours, increasing the number of compliance-entities from 191 to 315. The total allowances were reduced from 160 to 155 million (Chen and Reklev, 2016). In July 2017 DRC announced that all companies but one, Alcatel-Lucent Shanghai, complied on time in June 2017; after receiving a letter from DRC, Alcatel-Lucent completed the necessary compliance tasks in July (Shanghai DRC, 2017a).

### 5.3. Economic, political and social conditions

Politically, China is moving towards greater marketization, as with the national ETS. This made the ETS pilot important, for DRC, the supporting agencies in Shanghai, and the top municipal government. With NDRC approval and the mayor's backing, the tone was normatively set. Those most negatively affected by the policy were the compliance companies. Otherwise, no major opposition was voiced. Rather, actors and organizations not included in the pilot expressed interest, such as carbon consultancies. Several banks joined the Exchange as members. Investors were allowed to trade in the pilot from 2014; initially there were six investors, which grew to 26 by 2015 and to 146 by 2016. In 2016 the investors conducted 63% of the trade (SHEEEX, 2017). This interest was also confirmed by my interviews, informal meetings and event participation. Challenges were acknowledged, but the tone was positive. The revenue possibilities along with the future national market made the ETS pilot an attractive opportunity for businesses not enrolled in the pilot.

## 6. The 10,000 Programme

### 6.1. Policy

The 10,000 Programme followed the 11$^{th}$ Five-Year Plan's (2006–2010) 'Top-1,000 Energy-Consuming Enterprises Programme', which had been formulated quickly in 2006 to support the target of reducing energy intensity by 20%. It covered the 1,000 highest energy-consuming enterprises, in nine sectors. Companies were required to improve energy efficiency, to establish energy-saving organizations, and conduct energy audits (Price et al., 2011). The 10,000 Programme continued this effort, contributing to the 12$^{th}$ Five-Year Plan's carbon- and energy-intensity targets.

The main 10,000-Programme rules were issued by the NDRC in December 2011. The notice was signed by 11 ministries, commissions and administrations, including the ministries of finance and commerce (NDRC, 2011a). Later in 2012 NDRC provided specific rules, such as how to determine annual performances. This was a centrally initiated, top–down policy. The 10,000 Programme had a goal of cumulative energy-saving nationally of 250 million tons of standard coal equivalents. Each entity covered had to save energy, calculated by intensities; companies were urged to improve on energy-management and energy-saving technology (NDRC, 2011a).

The 10,000 Programme included those industry enterprises with a 2010 energy consumption of 10,000 tons of standard coal or higher. Enterprises of passenger and freight cargo, coastal and river ports would be included if they had an annual energy-consumption above 10,000 tons, or more than 600 vehicles, or cargo volume higher than 50

million tons. Hotels, restaurants, commercial buildings and educational institutions would be included if they in 2010 consumed more than 5,000 tons of standard coal, or covered an area greater than 80,000 $m^2$ (hotels), 50,000 $m^2$ (commercial buildings), or had more than 10,000 students (schools/ universities). In 2010, almost 17,000 entities came above this threshold nationally, accounting for 60% of China's energy consumption (NDRC, 2011a). In Shanghai, 269 entities were covered: 206 industrial companies, 36 transportation companies, 4 hotels, 10 commercial companies and 13 universities. The cumulative city-target for energy savings within the period was 658,700 tons of standard coal equivalents (NDRC, 2011a).

As the energy-saving potential was being maximized and further energy-saving would be difficult, it was important for the NDRC that companies should pay greater attention to energy management. In addition to saving energy, target entities were required to strengthen their energy management by forming small leading groups and creating energy-saving systems, using the Chinese standard GB/T23331, similar to the international ISO50001 standard. Companies were to self-report their progress every March to their local government (NDRC, 2011a). Following a detailed score-sheet, energy saved merited as much as 40% of the score; energy-management measures could account for up to 60% of the total score.[3] A score below 61 meant the entity had not passed the requirements that year. Province-level governments had to submit their results by the end of April each year to the national government (NDRC, 2011a).

Stipulated retributions for violations of programme requirements included revoking of sewage- and production licences, and ordering suspension of production. Punitive tariffs could be applied if energy-intensity from production exceeded the national standard. If energy-saving targets were not met, local governments were to conduct mandatory energy-audits. The 10,000 Programme encouraged using financial incentives and approaches like directing local, national and international funds to support local implementation of energy-saving measures (NDRC, 2011a).

Several interviewees criticized the 10,000 Programme's rules for calculating energy-savings: they were tailored for industry, and the calculation methods made it difficult for non-industrial sectors like hotels to achieve the required targets. Moreover, the methods were based solely on energy consumption, without considering changes in production due to market shifts, or the energy-saving potential. Some companies had already improved their efficiency, and found it very difficult to improve further.

### 6.2. Implementation

The 10,000 Programme stipulated a two-level management-system. NDRC had responsibility for coordinating and leading the programme nationally, while it was up to the province-level energy-saving authorities to implement and coordinate the programme locally (NDRC, 2011a). In Shanghai, the DRC has general responsibility for energy-saving efforts, but the Shanghai Economy and Informatization Commission (EIC) was the main agency responsible for this policy. It issued notices with instructions to the target entities. The EIC was supported by the Shanghai Energy Efficiency Centre (SHEEC) and Shanghai Energy Conservation Supervision Centre (ECSC) which performed energy-audits, on-site inspection and provided training. The two centres are energy-saving knowledge-bases with highly qualified staff – that was the impression of interviewees, confirmed by my own contact with the centres. The target entities reported annually to various parts of the municipal bureaucracy – all industry to the EIC, transport entities to the Bureau of Transport, etc.

The implementing agencies told me that training was held in Shanghai. Inviting industry companies with energy consumption above 5,000 tons annually, the ECSC held training for some 500–600 companies in Shanghai. All industrial companies in the 10,000 Programme were covered in the training, which brought up topics ranging from energy-auditing and reporting to inspection of old highly energy-consuming equipment. To facilitate communication and answer questions, the ECSC served as a contact-point, with designated contact-persons for each sector.

As the self-reporting showed that some entities were below the 61-pass threshold in 2013, the Shanghai government allocated funding and conducted mandatory energy-audits, as per the programme rules, for more than 20 entities. However, no punitive measures were employed.

The 10,000 Programme's target entities were encouraged to utilize Energy Performance Contracting and Energy Service Companies (ESCOs). It was also possible to apply for municipal funds for support of such work. Some interviewees felt that it was not easy for target entities to navigate among the many funding possibilities; others saw no problems here. Between 2011 and 2015, 388 contract projects obtained governmental funding, with a cumulative saving of 19.72 million tons of coal, but it is not clear how much of this was due to the 10,000 Programme (Shanghai DRC, 2017b).

Some interviewees noted that it was difficult for non-industrial entities to fulfil all the requirements, such as forming working-groups, because of insufficient manpower. Some indicated that many target entities were not overly concerned about the programme, as the energy-saving measures they implemented would probably have been taken regardless of programme participation. This indicates that the municipal government's power-use was quite modest in enforcing the programme. Had the policy been communicated differently, the target entities' responses might have been different. However, some companies that failed to achieve the target did contact the government to explain their situation. In 2014, the implementing agencies repeated mandatory energy-audits for around 20 entities which had not achieved pass scores, but again did not apply further punitive measures. On the national annual lists over entities that had not met the requirements, all Shanghai listings were accompanied with brief explanations, e.g. that market changes had led to a difference from expected production.

### 6.3. Economic, political and social conditions

The 10,000 Programme continued the line of energy-saving work intensified in 2006. Energy-saving had been a political goal for some time, as shown by the Energy-Conservation Law from 2005. Energy-saving contributes to creating the 'ecological civilization' and circular economy – ideals espoused by the government. Recent years have also seen a noticeable growth in the energy-service industry in Shanghai, encouraged by the government. From 2010 to 2015, Shanghai's energy-service industry quadrupled in estimated value to 39.98 billion RMB, encompassing over 400 companies. In the same period, 8.5 billion RMB was invested in energy-management contracts (Energy-Saving and Environmental Protection Magazine, 2016). While official documents stated the importance of implementing the 10,000 Programme in Shanghai, it was my impression that it did not have the same perceived importance as the ETS pilot among implementing agencies, target entities or observers. For instance, after I had a meeting with a renowned expert who regularly advised the Shanghai government on sustainability-issues, he suggested that I should concentrate on the ETS pilot and not waste time on this 'old-fashioned' policy. There was no major opposition to the programme in Shanghai, but neither were there any major proponents.

## 7. Comparison and analysis

The two policies had differences, as in origin, but also similarities, such as encountering problems during implementation. Comparison using the policy-implementation process model reveals the normative power of the ETS' local ownership as one key factor.

[3] For a detailed survey of the scoresheet and scores, see Lo (2015).

### 7.1. Policy

The nature of the policy-problem can influence policy output. Some issues are easier to handle than others (Jänicke, 1997). Different methods for addressing the same problem may affect the output. The workings of the ETS pilot were initially harder for companies to understand than the 10,000 Programme's requirements: the ETS was unlike previous 'control-and command' policies. Whereas many points were involved in completing the 10,000 Programme and achieving a successful output, it was really only the surrendering of allowances that counted in the ETS pilot. There, companies had the options of selling allowances or banking before submitting each compliance-cycle's allowances –several paths to positive output. The 10,000 Programme offered less leeway. Further, the ETS pilot's allocation of allowances was better tailored to the various sectors. The 10,000 Programme was 'one size fits all' as regards policy obligations, which also probably created difficulties with the energy-saving and the energy-management requirements. When the energy-saving target is based solely on previous energy-consumption, shifting market conditions can make targets hard to reach. It makes sense to establish a leading group on energy-saving if the company is a large energy-intensive industry, but not necessarily for a hotel with perhaps only one person in charge of energy-use as part of a portfolio of maintenance responsibilities.

Further, the ETS pilot originated locally. Having initiated it, the top municipal government displayed ownership to and attached prestige to the ETS pilot to a much larger degree than with the 10,000 Programme. That the rules were formulated locally also provided the municipal government with flexibility, such as hosting an auction – not possible under the top–down 10,000 Programme.

### 7.2. Policy resources

The implementing agencies were competent, and the responsible government commissions were supported by expert auxiliary agencies, which probably contributed considerably to facilitating implementation of both policies. That the ETS pilot was initiated locally was evident in the resources invested at each stage: in educating the implementing agencies, then in creating the rules and a mayor-headed leading group, hosting events attended by national dignitaries, and holding informal talks with companies to ensure trading. These actions also sent normative signals that it was important to complete the pilot successfully. With the 10,000 Programme there were more funding opportunities for energy-saving projects – but that did not seem to make target entities more positive.

### 7.3. Communication & enforcement activities

Both policies included offers of assistance with specific contact persons. The ETS pilot offered more training sessions, perhaps because it was a new policy instrument for most companies, and more instruction was needed. Regarding sanctions, in neither policy were punishments or coercive power employed. Prescribed mandatory audits were completed for entities that failed to fulfil their energy-saving targets in the 10,000 Programme, without further punitive measures. In the ETS pilot, informal talks were used to persuade target entities to change behaviour, and a letter in 2017.

There was a difference in the normatively communicated importance of the two policies. The ETS pilot's mayoral support, national-level officials attendance at events, as well as efforts to persuade companies to fulfil their obligations, together constituted the normative power employed by the government.

### 7.4. Economic, political and social conditions

Both policies were strongly supported by the national political level, as cornerstones in the national energy-saving and emissions-reduction undertaking. More money often means more support. During the implementation period, the 10,000 Programme can probably be linked to greater economic production than the ETS pilot. The reported value of trading permits and offset allowances at the exchange for the ETS pilot reached 621 million RMB for the three first compliance years. That is a considerable amount, but little in comparison to the 40 billion RMB energy-service sector in Shanghai which catered to the 10,000 Programme – if not direct causal links between the programme and the sector. Nevertheless, it was the ETS pilot that attracted more attention from non-targeted actors like investors and consultancies, despite the possibilities of revenue generation and economic activity was for the future and not immediate. The potential advantage for ETS-related businesses was backed by the central government's emphasis on the coming national market. One reason the central government started with the market mechanism was precisely the belief that there were limits to what top–down policies like the 10,000 Programme could achieve (Stensdal et al., 2018).

### 7.5. Target entity responses and strategies

Few target entities enthusiastically supported either policy. Although most target entities followed the requirements, some were negative. The ten initially unwilling companies had argued that the ETS pilot's costs would hinder profits. Perhaps more disagreement was voiced concerning the ETS pilot because it was a new and unfamiliar policy. The complaints were not voiced in the second compliance cycle: by then, the normative power had influenced the companies into acceptance. That the companies which didn't pass the 10,000 Programme's requirements themselves contacted the authorities to explain indicates that completion failure was not a disgruntlement strategy.

## 8. Concluding remarks

Considering how the government worked to enforce these emissions mitigation policies, one may wonder how much was achieved. High output without any effect on the policy issue has little value. To what extent the two policies contributed to reducing emissions is unclear, however. Shanghai reduced its carbon and energy intensities by 29% and 25% in the 12th Plan period, well ahead of the targeted 19% and 18% (Shanghai government, 2017), but comprehensive data are not publicly available. In 2014, the Shanghai government announced that in the first year of the ETS, 2013, the compliance-companies had together reduced their carbon emissions by 4.3 million tons, or 2.7 % compared to emissions in 2011 (SHEEEX, 2015). In 2017, the Exchange announced that compliance-companies' combined emissions fell from around 150 million tons CO2 in 2014 to around 141 million CO2 in 2015 (Chen & Reklev, 2017). How much of this reduction came directly from participation in the pilot was not mentioned in either statements. With the 10,000 Programme, the Shanghai government announced in 2017 that the combined energy-savings were 133% of the expected amount (Shanghai DRC, 2017a), or 874,095 tons of coal. Thus, although the 10,000 Programme did not achieve 100% fulfilment in terms of participation output, the collective energy-saving goal was surpassed. However, it is difficult to ascertain the energy-savings share of the 10,000 Programme separate from other energy-saving measures. Indeed, studies have found that Shanghai's energy intensity improvements carbon mitigation since 2000 to a large extent have been outweighed by the fast-growing energy consumption. The main reason behind curbed emissions since 2007 is the restructuring of Shanghai's economy from primary industry to the service sector (Yang et al., 2018). Nevertheless, governments are unlikely to cease implementing low carbon policies in favour of solely focusing on economic restructuring. Thus, it is still worth studying such policies, if with an uncertain amount effect on mitigating carbon emissions.

What lessons may be valuable for future implemented policies? The

two policies show that no single factor can fully explain output: it results from a combination of factors. Achieving greater output is easier when the policy can be adapted to differing circumstances and sectors rather than issuing 'one size' factors. The sector facilitations were also perceived as a more reasonable approach among the interviewees. Given that the two policies and others are partially overlapping, bundling and better coordinating related policies in the future may further streamline and facilitate companies' compliance burden. Moreover, that a policy needs accompanying resources, in financing and implementing-agency capacity to be implemented, is essential. Less immediately observable is that how a policy is communicated to stakeholders is important for how they respond. The ETS pilot was especially important to the Shanghai government, which employed normative power. The 'ownership' signalled normatively that the ETS pilot was a priority. It is not a guarantee against opposition, but may very well be the extra push companies need to comply. Equivalent national signals are building 'beautiful China's ecological civilization'. Linking chosen national prioritized policies to this principle may instil a similar perception of importance as with the ETS pilot in Shanghai. Such emphasis can only pertain to one or few chosen policies, though. If too many policies are stressed it dilutes their relative importance.

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## Appendix . Interviews

1. Expert & pilot administration employee, Shanghai, September 22, 2015.
2. Academic & advisor to the pilot, Shanghai, September 18, 2015.
3. Expert & pilot administration employee, Shanghai, October 19, 2015.
4. Third party verifier, Shanghai, October 15, 2015.
5. Academic & advisor to the pilot, Shanghai, November 10, 2015.
6. Experts & pilot administration employees, Shanghai, September 21, 2015.
7. Business representative, Shanghai, November 2, 2015.
8. Consultants, Shanghai, October 20, 2015.
9. International donor employee, Shanghai, August 27, 2015.
10. Scholar, Shanghai, September 18, 2015.
11. NGO employee, Shanghai, September 18, 2015.
12. Expert, Beijing, September 28, 2015.
13. Academic, Beijing, September 29, 2015.
14. Academic, Beijing, October 29, 2015.
15. Academic, Beijing, October 29, 2015.
16. ETS pilot administration employees, Shanghai, June 16 2016.
17. Manager of business' 10,000 Programme execution, Shanghai, June 21, 2016.
18. Experts & pilot administration employees, Shanghai, June 27, 2016.
19. Expert and 10,000 Programme implementing agency employee, Shanghai, June 28, 2016.
20. Academic &r advisor to Shanghai government on sustainability issues, Shanghai, 30 June, 2016.
21. Expert, Beijing, October 25, 2016.
22. Expert & 10,000 Programme implementing agency employee, Shanghai, November 12, 2016.
23. Business representative, Shanghai, March 23, 2017.

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