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Improving China's Environmental Performance through Adaptive Implementation—A Comparative Case Study of Cleaner Production in Hangzhou and Guiyang

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Abstract: This paper examines local policy implementation of Cleaner Production (CP) in China. As the major policy implementer, China's local government plays a crucial role in promoting CP. A better understanding of the factors affecting local government's incentives regarding CP and different strategies available to the local government can help policy makers and implementers improve CP practices and other environmental policy outcomes. This paper uses the cases of Hangzhou and Guiyang to demonstrate that local conditions of policy implementation have a direct impact on the success of CP promotion. Based on 35 in-depth interviews, statistical data and internal government reports, we find that the location-based incentives of local government strongly influence their implementation strategies; and that the choices of different strategies can bring out various policy results. From this study, the identified location-based incentives are affected by energy resource endowment, economic development stage and technological competence. The successful implementation strategies involve using different policy instruments synthetically, regulating CP service organizations by controlling their qualifications, differentiating CP subsidizations, and improving transparency of project progress and outcomes.

Keywords: cleaner production; incentive; implementation strategy; policy outcome

1. Introduction

Cleaner Production (CP) is considered as one of the most important preventive strategies to improve environmental performance of industries [1,2]. Generally, CP practices aim to reduce pollution and increase resource efficiency during industrial activities. As an attractive strategy for pollution prevention and cost-effective production, CP practice has been carried out for more than 20 years in many countries all over the world [3]. During the 1990s, the concept of CP was first introduced into China by the government and CP projects had been run under different programs for more than a decade before it was officially enacted by legislative authority [4]. The Cleaner Production Promotion Law of China (CPPLC) took effect on 1 January 2003 and marked the normative and legal management for CP practice, and it was further revised in March 2012 to update the new developments of CP regulations. This legislation of CP highlights China's green ambition on decoupling economic growth and its energy use from environmental deterioration. Nevertheless, the realization of these ambitions was, and still is, a great challenge for China [5]. How to improve policy implementation at the local level in order to promote CP practices is the key of the challenge.

One popular perspective to address how the CP implementation can be successfully achieved is to analyze the barriers of CP implementation focusing on the need of enterprises. A wide range of barriers have been identified, including the approaches of technology innovation, management strategies [1], market environment and organizational features [6–8]. Technology know-how and CP tools are insufficiently catered to the complexity of industries [9]; information dissemination and communications act as key roles in market promotion [10]; characteristics of firms influence CP outcomes [8]; internal organizational factors, including commitment, leadership, support, communication, staff involvement, and program design, affect CP practices [6,7]. Therefore, the success of CP practices is the result of breaking down the barriers of incentives and capacities of enterprises [8]. Consequently, a lot of CP policy recommendations focus on helping the entrepreneurs to break through the barriers and give detailed advice to public authorities on how to help those entrepreneurs. Nevertheless, many of the barriers-focused analyses are carried out in regions of relatively well-developed CP market environment, where entrepreneurs are the key players, while the government has little ambition or direct control on enforcing CP projects. The pitfall of such analysis is that it fails to consider the policy design and implementation under circumstances in which the CP market is not well-established and government exerts strong influence on CP promotion.

In current social economics of China where a sound free market for CP practices is lacking and government impact is significant, it is not surprising that the roles of state authority and governmental organization are more prominent in promoting CP programs and nurturing the formation of a CP program market [11]. Unlike other countries where CP was introduced as a voluntary participating program, the CP programs in China fall under voluntary and mandatory schemes, in which the latter is forcing designated enterprises to conduct CP projects [12]. Since the central CP policies are only promulgated with certain basic principles and general regulation, local governments become major

promoters in enforcing CP implementation. They are given high flexibility in directing local CP policies. As a result, local CP actions turn out to be quite different from one region to another [13]. Specifically, under the same central policy, innovative strategy and active implementation are found in some local governments while passive implementers applying little effort exist in other locations.

Previous studies explored influential factors in local CP policy implementation in China from the approaches of objective barriers and policy “prescriptions”. Many barriers exist in China’s CP promotion procedure, such as the lack of co-benefit calculation demonstration [14], low awareness and misconception of CP, inadequate institutional framework, constraints in technological facilities and financial support, limited market of CP services, internal conflicts of implementing agencies, and so on [13,15–17]. In order to overcome these barriers, regional government could improve coordination between stakeholders, provide subsidies and increase capacity-building programs [17]. In addition, government could also ensure the continuity and rigorousness of CP projects [13] and encourage enterprises by calculating their project’s profit-generating potential [13,18]. These arguments are mostly drawn from approaches of CP implementation barriers and corresponding policy recommendations. However, until now, little has been known about why and how the CP policies are reshaped at the local level, within China’s authoritarian regime. Therefore, the purpose of this paper is to examine local CP policy implementation and to explore the reasons why different localities act differently and have varied CP outcomes under the same central policy—by analyzing incentives and actions of local government.

To identify the incentives and strategies of local governments in CP promotions, this paper will analyze China’s governmental structure, local government’s incentive structure and implementation strategies of CP policies. The question we want to demonstrate is, under similar institutional arrangements, how local governments’ incentives and corresponding strategy choices influence local CP practices. We have selected Hangzhou and Guiyang as two comparable, yet quite different cases. They have similar institutional arrangements but different site-specific conditions, which lead to diversified implementing strategies by the local governments. The study is based on 35 interviews in Hangzhou, Guiyang and Beijing and a review of policy documents and statistical data, focusing on local implementing strategies and their outcomes.

The structure of the paper is as follows: after a brief review of the literature, an overview of CP implementation, including related actors, governmental structure and key process of CP policy will be given in Section 2. In Section 3 we will present the key concepts and the theoretical framework guiding the analysis, and in Section 4, we describe the methods and data used. In Sections 5 and 6, we present our analysis of the two city cases in detail. Finally, we will discuss the findings and conclusions in Section 7.

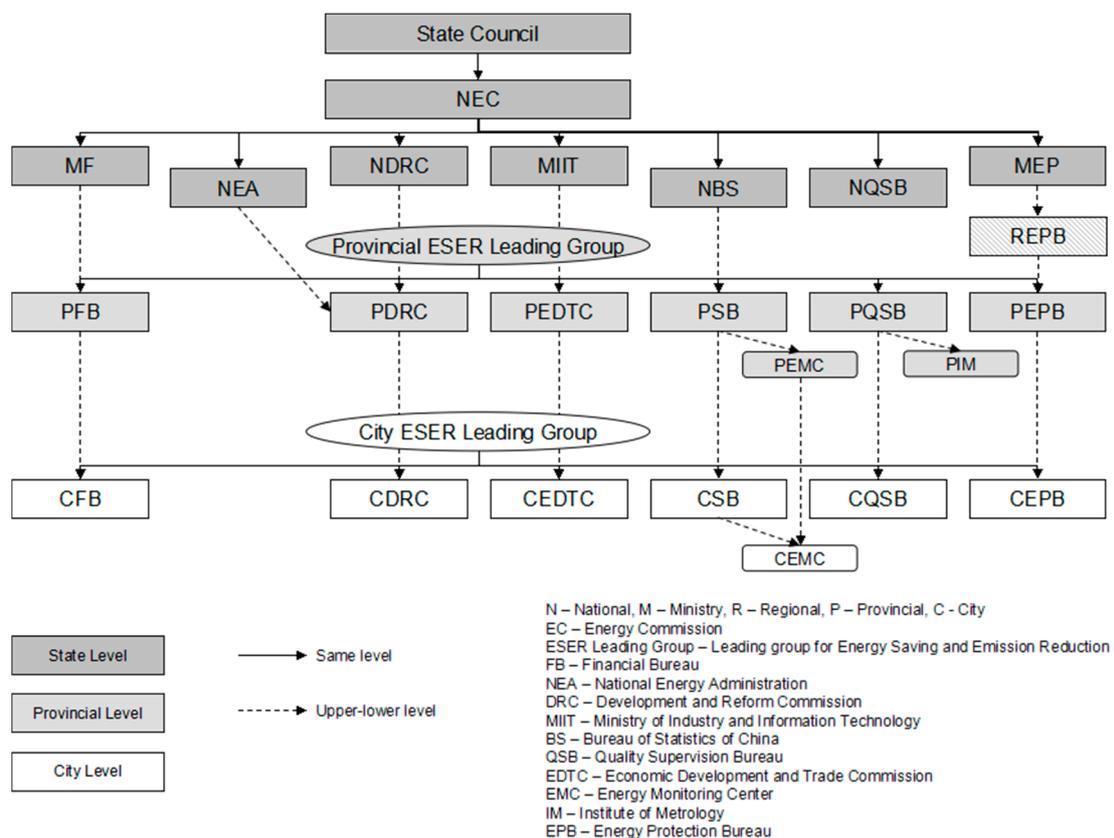
2. Overview of CP Implementation in China

Apart from central government’s guidance and scrutiny, successful CP practices at the local level in China rely on the endeavors of an array of actors and stakeholders: local government, enterprises, CP service organizations, and others such as research institutions and media. Local governments are responsible for providing information, announcing regulations/legislations, allocating financial support (optional), and supervising that mandatory enterprises practice CP. Although the duty of CP initiation belongs to the local government, enterprises are the actual executive body for carrying out the various

CP projects. As mentioned in Section 1, enterprises are either compulsorily or voluntarily implementing CP. According to Article 11 of CPPLC (2012), those enterprises with high energy consumption, overweight pollution or poisonous discharges are defined as targeted enterprises which must enroll in the mandatory scheme to undertake the CP project [19]. The third actor is known as “CP service organizations”, such as energy service companies and intermediary organizations. They are involved because they provide a broad range of energy-saving and pollution-reducing solutions and consultancy, including specific designs and detailed implementation for individual CP projects. Research institutes also play important roles—in the development of CP technologies. In addition, public media have some influence in promoting local CP practices by raising public awareness.

Among all these actors, governments are the policy initiators of CP projects. The governmental structure regarding CP policy implementation involves a variety of government departments at multiple levels (Figure 1). At the national level, the program is supervised by the National Energy Commission (NEC) under the State Council, and the overall implementation of CP policy and its target is in the charge of the National Development and Reform Commission (NDRC) and Ministry of Environmental Protection (MEP). Following the allocated quota and plans from central government, local governments are directly involved in the individual CP project, including project promotion, auditing, and evaluation. Specifically, under the local leading group for Energy Saving and Emission Reduction, the Environmental Protection Bureau and the Economic Development and Trade Commission are mainly responsible for CP policy implementation. They organize and coordinate the overall promotion of CP and the Bureau of Planning, Science and Technology, Construction, Water Resource and Quality and Technical Supervision all work together in the accordance with their own responsibilities [19].

Figure 1. Governmental structure of CP (Cleaner Production) policy implementation in China.



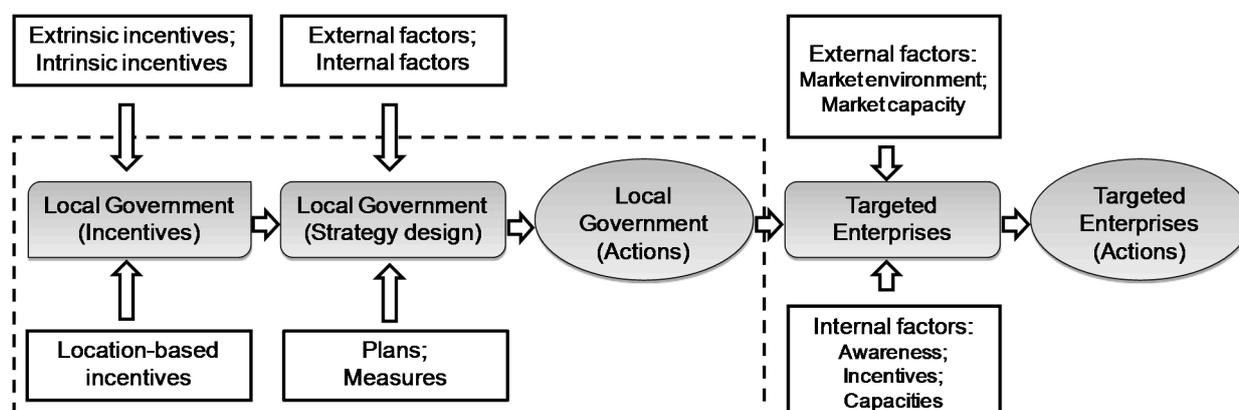
The strategy of local CP policy implementation varies in different areas; however, the implementation mode of mandatory CP projects has been formalized by CPPLC, which is composed of at least four stages (Appendix A). First of all, targeted enterprises are identified by the local government on the basis of the three conditions stated in the above paragraphs: those enterprises with high energy consumption, overweight pollution or poisonous discharges will be included. Then the list and basic information of these targeted enterprises is publicized in local newspapers or other influential media, to accept scrutiny from the public. These targeted enterprises, then, must conduct CP projects that are constituted by seven steps: planning and organizing, pre-assessment, assessment, development and screening measures, feasibility analysis, CP option implementation and sustaining CP [13]. Finally, these mandatory CP projects are reviewed and evaluated by an experts committee, which is organized by local governments.

Although this process description seems to indicate a rather directive implementation procedure, there is room for divergent CP promotion by local administration. Even for mandatory CP projects, local governments are given high discretionary powers to supervise the process, let alone the voluntary ones. Therefore, local governments have considerable decision-making power within their jurisdiction regions.

3. Framework for Analyzing Local CP Policy Implementation

Considering the high influence of local governments in CP promotion, city governments and bureaucracies are conceptualized as the “local governmental group”, taken as the main study object in this paper. We propose *a priori* that local government’s incentive is one of the most influential factors to the formations of local CP strategies; and varied strategies bring out different CP policy impacts and outcomes in various places. Adapted from conceptual framework by Oliver and Ortolano (2006) [17], which was designed for analyzing the implementation of the CP program, we focus the analytical framework on internal incentives and the corresponding implementation strategy of local government. Figure 2 shows our framework for an analysis of CP policy implementation at city level in Hangzhou and Guiyang. The actors of local government and targeted enterprises are involved. Overall, local governments must develop practical strategies for promoting local CPs to meet targets prescribed by higher authorities and by local interests. In order to achieve this, the cadres are expected to conduct policy experiments, create models, and advance policy innovations to promote CP [20].

Figure 2. Conceptual framework for analyzing local CP policy implementation.



By referring to the work of Heberer and Schubert about strategic groups [21], the given incentives of developing local strategies can be categorized into extrinsic and intrinsic types: (1) Extrinsic incentives strengthen the motivation of local cadres to improve their performance. One key interest for local leading cadres is promotion within the administrative hierarchy [20]. In addition, social standing and prestige (face “mianzi”), remuneration, bonus, and threat of punishment and demotion all belong to this category [21]; (2) Intrinsic incentives indicate the local cadre’s former position, socialization, and personal background. However, neither extrinsic nor intrinsic incentives can explain diverging patterns of local implementation strategy in a sufficient way [21]. Therefore, we define a third type of incentive: location-based incentive. These types of incentives are drawn from local conditions regarding geography, socio-economic development, culture and so on. This study examines which and how those site-specific conditional factors are affecting local CP promotion strategy and actions.

Another important aspect of local government implementation is the content of specific strategies for CP promotions. As mentioned above, central CP policies in China are formulated by enabling adaptive strategies, to allow more flexibility in local implementation. Paul Berman has argued that the local implementing strategy should be designed to match policy situations [22] (p. 2). Based on this concept, adaptive implementation, defined as “a process that allows policy to be modified, specified, and revised—In a word, adaptive—According to the unfolding interaction of the policy with its institutional setting” is considered to be crucial for promising policy outcomes [22] (p. 9). In terms of CP promotions, local implementation and initiative measures are developed and formalized by local cadres who are influenced by various external and internal factors. This investigation demonstrates CP promotion strategies of local government in Hangzhou and Guiyang, and analyzes the relationship between their strategies (*i.e.*, policy impact) and the CP policy outcomes.

The second set of actors in Figure 2 refers to enterprises that are listed in compulsory CP programs. Actions of these enterprises depend on external factors, including market environment and capacity; and internal factors, such as awareness, incentives and capacities within the organizations. As mentioned earlier, these enterprises are strongly influenced by local governments’ encouragements and regulations. CP actions of enterprises are measured by their saved energy, reduced waste and pollution, and generated profit.

Based on the framework for analyzing local CP policy implementation in Figure 2, this study concentrates on (1) location-based incentives of local government; and (2), the adapted local strategies (policy impact) for promoting CP practices in Hangzhou and Guiyang, respectively. The aim is to conclude implementation modalities and their effects based on observation and analysis. Further implications for CP policy design in China will be drawn.

4. Methodology

By analyzing the incentives and strategies of CP promotion with a focus on the above dimensions in a case comparison of two cities (Hangzhou and Guiyang), we seek for explanations for the different implementation strategies and their outcomes of CP promotion at the city level.

Hangzhou and Guiyang have been chosen as case cities due to their similar local leaders’ support, institutional arrangements, and different local site-specific conditions. Both Hangzhou and Guiyang have been ecological provincial capitals since the early 1990s, thus local leaders in both cities are

supportive for environmental policies. Consequently, the extrinsic incentives of local cadres to implement CP policy are similar. Moreover, treating the government officers as a group, we ignore the intrinsic incentives of individuals. Furthermore, similar institutional arrangements are found in these two cities as described in Section 2. The third incentive for local government is related to site-specific conditions, which are different in these two cities: (a) As shown in Table 1, Hangzhou's economy is more advanced than that of Guiyang. Despite a strong economic development in both cities, GDP per capita in Hangzhou is always more than triple that of Guiyang; (b) Resource endowments are fundamentally different. Hangzhou is in an area with scarce energy resources and, therefore, heavily dependent on energy imports, while Guizhou province, where Guiyang is located, is a resource-abundant area. Guizhou produced 170 million tons of coal in 2012 alone and it is also famous for mineral products, such as bauxite and phosphate rocks; (c) The two cities are quite different in terms of technology development. Hangzhou is a national center of technology innovation; it has 24 national research institutes and well-known universities, and many of these research entities are involved in environmental and energy-saving research [23]. In contrast, technology development related to energy and the environment is lacking in Guiyang.

Table 1. GDP per Capita in Hangzhou and Guiyang.

Year		2005	2006	2007	2008	2009	2010	2011	2012
GDP per capita (RMB)	Hangzhou	44,871	51,908	61,315	70,948	74,761	86,691	101,370	111,758
	Guiyang	14,934	17,025	17,732	20,638	22,832	26,209	31,712	37,822

Note: (Resource: Hangzhou Statistic Yearbook 2006–2013; Guiyang Statistic Yearbook 2006–2013).

The incentives of local government and specific strategies to promote CP practices in these two cities are described and analyzed based on our analytical model, shown in Figure 2. The analysis focuses on the incentives and decision-making of the local government group in the dashed line box: (a) the influence of local conditions on government group incentives; (b) adapted strategies and measures in Hangzhou and Guiyang respectively. The overall outcome of CP implementation is measured by the numbers of CP projects, the number of enterprises involved, and the results of these CP projects. Particularly, the “success” and “failure” standard of CP implementations is measured by three aspects: (a) the number of CP projects; (b) the cost-benefits of CP projects; (c) the rate of “passing” (or “failing”) rating by the expert-reviews of the CP projects. The analytical model identifies the influential aspects of local conditions and strategies used by local government with regard to these outcome measures.

The data and materials that we collected and analyzed are from government documents, publicly accessible, as well as internal government statistics, local newspaper articles, related documents from associations, and internal governmental reports. In addition, onsite fieldwork was conducted by the author: 35 governmental officers, experts, representatives of industrial companies, research institutes, and CP service organizations in Hangzhou and Guiyang were interviewed between October 2012 and April 2013 (Appendix B). The interviews were semi-structured and lasted for 1–2 h. The list of questions which have been covered in the interviews is shown in Appendix C.

5. Comparison of CP Policy Implementation in Hangzhou and Guiyang

The case comparison starts with a longitudinal overview of the development of implementation initiatives (impact) and results (outcome) in the two cities—followed by a case specific reconstruction of these differences (based on the interviews). CP had been introduced to Hangzhou and Guiyang since 2002 and 2006, respectively. About one decade since its launch, the effects (in terms of impact on local implementation arrangements) of CP promotions in these two cities varied a lot.

From 2002 to 2014, 57,422 projects with more than 2720 enterprises involved in Hangzhou have been conducted and the number of CP enterprises has soared dramatically in recent years [24]. (Some enterprises are calculated more than once as they conduct two or three rounds of CP projects). As shown in Table 2, the number of CP enterprises in Hangzhou has risen from 4 in 2002 to 322–542 per year in the latest three successive years. The total investment of CP projects in Hangzhou is a little short of RMB3 billion. And we are informed by the vice director from EDTC in Hangzhou that the local passing rate is relatively high, though the specific data was not available.

Table 2. Number of enterprises within CP program in Hangzhou and Guiyang.

Year		2002	2004	2007	2008	2009	2010	2011	2012	2013	2014
Number of CP	Hangzhou	4	16	239	264	314	228	184	542	322	356
Enterprises	Guiyang	/	/			20		4		17	

Note: Resources: data from [24,25].

In Guiyang, the first CP practices began in 2006 and only 1453 projects within 41 enterprises finished conducting CP projects until September 2014. Even considering the enterprises with still ongoing projects, there are only 55 more [25]. Moreover, CP projects in 19 enterprises failed to pass the expert-review due to site relocation, technology upgrade or closure [25]. The failing rate is roughly one third, excluding the ongoing CP projects. This high failing rate indicates that a high investment for CP projects is wasted as it produces no economic values. Such waste is a squeeze of the investment, because the effective investment is only roughly two thirds of total investment. The total direct investment is about RMB1.5 billion. Therefore, effective investment is only one billion [25]. Despite the relatively high investment in Guiyang, as the direct investment is about 55% of that in Hangzhou, the annual direct economic benefit in Guiyang is less than 5% of that compared to Hangzhou (Table 3). According to the longitudinal data, the annual economic benefits of RMB2400 million in Hangzhou in contrast to RMB173 million in Guiyang was produced, as summarized in Table 3 [24].

All these numbers indicate that the quantity and quality of CP projects in these two cities varied a lot. This also holds true for saved energy. Annual saved energy equals almost 450,000 tons of standard coal in Hangzhou (with its much higher GDP/capita), while it is not clear of the amount in Guiyang. No specific data was applied due to an unclear calculation method. Thus it is perhaps fair to conclude that CP policy implementation has received much better results (outcome) in Hangzhou compared to that in Guiyang.

Table 3. CP policy outcomes in Hangzhou and Guiyang.

City	Hangzhou	Guiyang
Year	2002–2014	2006–2014
Number of Finished CP Projects	57,422 projects with more than 2720 enterprises involved	1453 projects with 41 enterprises involved
Direct Investment (Million RMB)	2852	1577
Annual Economic Benefits of the Project (Million RMB)	2400	173
Annual Saved Energy (Standard Coal Equivalent (Tons))	449,480	Not Identified
Total City Governmental Subsidy (Million RMB)	90	Not Identified

Note: (Resources: data from [24,25]).

5.1. CP Policy Implementation in Hangzhou

The eagerness of the Hangzhou government to promote energy saving actions started from 2003 to 2004, when Hangzhou suffered serious power shortages. During the summer time, when demand peaks (due to the hot weather), this resulted in the establishment of a temporary power quota for enterprises and power cuts for residential areas. In response, the Hangzhou government was forced to put its effort into vigorous measures to tackle such problems as they are detrimental to local economy development. A severe challenge faced by the government is that Hangzhou depends heavily on energy import, which is difficult to grow quickly enough in a short time period to meet soaring demands - since it needs corresponding infrastructure, such as electric grid and power plants. Improving energy efficiency seems to be the only practical choice. As a result of this, Hangzhou initiated CP practices even earlier than the respective decisions taken by the central government.

Nevertheless, early impacts from CP were not promising, particularly the pilot projects. In 2002, only four projects were conducted in the whole province. During the initiating period, there is almost no CP market, mainly because of three challenges: (1) The technology support is limited because of insufficiency of intermediary organizations: in 2002, there was only one CP service organization under the Institute of Environmental Science Research & Design (ESRD) in the whole Zhejiang Province; (2) The cost of the project was too high: ESRD charged enterprises a minimum of RMB100,000 for each project. Without any government subsidies or direct profit generated from CP projects, the initial investment was too high and risky for enterprises to invest in CP, especially those small ones with limited resources; (3) There were very few examples at the beginning that benefited from successful CP projects in the region. Thus, investment in CP was not seen as rational strategies for the enterprises.

In response to these challenges, many measures were carried out. First, the quantity and quality of CP service organizations were improved by the Hangzhou government step-by-step. The first batch of CP service organizations were mainly persuaded by local government promotion. While more and more enterprises and service organizations got involved in CP practices [26], strict regulations on CP service organizations were issued by the Hangzhou government in order to promote quality of CP policy implementation. One of the basic regulations is that all the CP service organizations are required to sign a mandatory two-year contract with the Zhejiang Government. According to the contract, intermediary

organizations must meet many strict qualification requirements [27]. For example, each institution must have more than six full-time national clean production auditors, including at least two auditors who have more than five years of work experience and are familiar with energy and environmental issues, one full-time professional and technical personnel. With these explicit regulations, the development of CP service organizations was getting better gradually.

Besides, additional subsidies for CP projects were provided by the Hangzhou government at an early stage as incentives to encourage enterprises to join in CP practices. Later more detailed subsidy regulations were issued to regulate subsidy allocations more efficiently. From 2002, CP service organizations in the Energy Conservation Association were persuaded by the Hangzhou government to set the benchmark price as RMB50,000 for each project. As a result, in 2004, all of the CP service organizations, including the one under ESRD, reduced the minimum price of a CP project to RMB50,000. Meanwhile, the RMB50,000 subsidy for each CP project is provided by the Hangzhou government.

With successful initiation of CP, the Hangzhou government decided to change the way of subsidy allocation in order to promote the quality of CP policy implementation—starting from 2011. Specifically, the companies that passed the Clean Production Audit are divided into different groups according to the scores (remarks) they get during the audit process, which are allocated by an expert-review system. Projects with scores higher than 95 (included) will be rewarded RMB50,000; those with scores higher than 90 (90–94) will be rewarded RMB40,000; and for those marked from 85 to 90 will get RMB30,000. No rewards will be given if scores of projects are below 85. Consequently, the quality of CP projects has greatly improved ever since.

As a result of the measures above, since 2004, the enterprises were able to carry out CP projects under almost no cost because of the regulated price and government subsidies were the same, *i.e.*, RMB50,000. Enterprises started to be attracted to participate in CP practices, since the possibility of energy savings and waste recycling during the production process essentially lowers the production cost, thus increases the profit. As more and more enterprises involved into CP and got benefits from those projects, it became obvious that CP was economically a good practice for enterprises. Owing to these adaptive implementing measures of the Hangzhou's government, more and more enterprises got enrolled into this program. Even after 2011, when government subsidies became more restricted, the rising trend of enterprises that are willing to join in CP continues, indicating the popularity of CP practices among entrepreneurs. Until 2012, the number of enterprises soared to 542, ten times higher than 10 years ago, when CP was first initiated.

Based on our field work, two key aspects are prominent during CP implementation in Hangzhou: (1) the high internal incentives of CP promotion from the Hangzhou government and (2) well-adaptive implementing strategy executed by the government to promote CP projects. In spite of the exceptional results from CP practices, however, during our interviews, it was mentioned that many other problems still exist. For example, some interviewees reflect that CP service organizations are still behaving quite differently: some companies finish their projects carefully while others tend to temporize. In addition, fake companies that target the government's subsidies by fabricating CP projects with enterprises still exist.

5.2. CP Policy Implementation in Guiyang

The internal incentives of the Guiyang government to promote CP projects are vague at best. Due to easy access to energy and other natural resources, combined with a laggard economy, there is neither need nor the availability of financial resources for the Guiyang government to support CP. Consequently, the awareness of CP promotion among local government is low. Besides very few “Green-Promotion” leaders, most of the other cadres are much more in favor of “Economic-Promotion”. During our local interviews, we found that the Guiyang officers were, in a way, lacking incentives to implement CP policies. “We are already the poorest province in China and we have fallen extremely behind the national average level”, said a senior leader in DRC, “Honestly, we are desperately hungry for GDP, because our current (economic) condition is quite different from east (China)”. When we mentioned that CP can also help the enterprises have profitable and efficient development patterns, an officer from the Financial Bureau told us: “These kinds of programs are all long-term work. Because of current cadre turnover and cadre evaluation system, it is crucial for local leaders to have deliverable political accomplishments as soon as possible”. Similar views were recorded repeatedly during our fieldwork.

Nevertheless, with the law and policies enforced by the central government, CP promotion has to be tucked into local government agendas, regardless of the attitude of the Guiyang government. During the implementation of CP policy, Guiyang faces similar challenges as Hangzhou. First, Guiyang lacks sophisticated CP service organizations. The current situation is: (a) there are few existing qualified research institutes in Guiyang for CP; (b) newly-founded high-tech service organizations are facing many obstacles, such as insufficient government financial support, limited land, and other facilities; however, little willingness was shown by the Guiyang government to promote such service organizations because of it being such a daunting task that delivers no direct economic accomplishment. So far, neither specific local regulations nor provisional ones have been applied to tackle this issue. In fact, most of the completed CP projects in Guiyang are supported by institutes directly appointed by the local government or by the research and development centers of the enterprises themselves. For example, for one of the top resources-consuming enterprises, China Aluminum Corporation, their manufacturer only trusts and relies on its own research institute for CP technology innovation instead of service centers in Guiyang. As a local officer mentioned, “there are not many CP service organizations and most of them are of quite low quality. So they are hardly trusted by local enterprises. These enterprises also fear the leaking of their energy consumption data when taking part in CP, which are widely considered as commercial sensitive information. The lack of trust in the system is a fundamental problem”.

Second, active participation in the CP of local enterprises is rare because of the high cost of the CP project. The deadlock of new CP promotion at the initial stage was broken by strong government willingness and measures in Hangzhou. In contrast in Guiyang, hardly any effort was made to lower the cost of CP projects or provide strong financial support for CPP projects. Based on our review, Guiyang had no special financial support for CP until 2012. Enterprises can only conduct the CP projects by applying for subsidies under other categories, such as the technological upgrading subsidy and the technical innovation subsidy, the special subsidy for small enterprise, tax relief and so on. These subsidies are not easy to apply for because they target a wide spectrum of projects and the overall budgets are relatively limited, which means it is very competitive to get funded. Furthermore, applicants can hardly get the approved subsidies on time. “Part of the problem is that enterprises themselves find it is

hard to apply for government funds”. Even if they get the fund, they cannot get money on time for various reasons, especially for local special funds, “for example, some of our energy saving projects that were approved last year (2010), has not been fully funded until now and it is November 2011 already”, said an officer in district-level EDTC.

6. Summary of Case Comparison: Location-Based Incentives and Implementing Strategies

The outcomes of CP policy implementations in Hangzhou and Guiyang are quite different: the former enjoys the continuing boost of CP participators, while the latter is still struggling with limited pilot projects. Many initiatives and active measures were found in Hangzhou, but Guiyang implemented the policy passively and reluctantly. The reasons for these differences can be interpreted from two aspects: (1) incentives for CP promotions are much higher in Hangzhou, partly due to Hangzhou’s site conditions; (2) local implementing strategies are better in adjusting central policies into local conditions, in one word, being more “adaptive”, in Hangzhou than that in Guiyang.

With regard to incentives of local government for implementing CP, as mentioned in Section 3, the extrinsic incentives are almost the same for Hangzhou and Guiyang, and the intrinsic incentives can be minimized due conceptualizing local cadres as a group. The biggest difference between Hangzhou and Guiyang are location-based incentives, affected by varying site conditions. Particularly, based on the analysis of Section 5, the incentives of the local governments are affected by the following conditional factors: resource endowment, economic stage, and technology development.

First, resource endowment appears to have a direct impact on the priority of CP promotion on the local government agenda. After experiencing the severe power cut and limitation in 2003, the Hangzhou government had sufficiently realized the significance and urgency to deal with the power shortage in order to secure economic development. Promoting energy saving by CP is, therefore, a feasible choice for local policy makers. The scarce resource endowment became an internal driving force for the local government to actively promote CP practices. In contrast, richness in energy resources allows high energy consuming industries to grow fast continuously in Guiyang. Promoting CP may potentially impede the expansion of the energy-dependent economic sector in the short term, and slow down the economic growth. Therefore, it is comprehensible that, to some extent, resource abundant regions possibly lack incentives for CP promotion.

Second, the economic stage and government fiscal condition limit the options of local governments to subsidize CP projects, which further affect their incentive to promote these projects. A detailed discussion of the fiscal structure of these two cities is beyond the scope of this paper. Nevertheless, a close look at the overall governmental fiscal situation shows that Hangzhou has a much better fiscal position to support environmental policies compared to Guiyang. In 2012, the Hangzhou government (including city and county levels) had revenue of RMB86 billion against the expenditure of RMB78.63 billion, enjoying RMB8 billion surpluses [28]. In the same fiscal year, the Guiyang government revenue was RMB24.1 billion, while the expenditure was RMB35.1 billion, which indicates RMB9 billion deficits [29]. Therefore, allocating an extra budget for CP is an easy decision for the Hangzhou government because of the sufficient fiscal budget. While in Guiyang, increasing the financial support for CP projects means either budget cuts for projects of other purposes or more deficits for the local government; both options are not attractive to Guiyang government. As is shown in Table 3, the

Hangzhou government allocates 90 million for CP promotion while almost no special CP fund was found in Guiyang. Financial support for CP in Guiyang is all subsumed under “other fund” title and it is very hard to specify its amount.

Third, the development of technology and service organizations is also a key element to secure the success of CP. The high reputational group of people with CP expertise in Hangzhou is the backbone of CP service organizations and the expert committee. They are not only facilitating the accomplishment of an individual CP project but also ensuring high quality of the project. The best-practice cases, therefore, are more likely to gain a good reputation among entrepreneurs by generating economic values and drawing in further participants. The lack of technology development in Guiyang results in an inability to carry out high quality CP projects and this probably is part of the reason for the high failing rate and low economic benefits of CP projects. Consequently, CP lost government trust as well as entrepreneur’s support, which hinders its promotion.

Besides these location-based incentives of local government, the implementing strategies that are used at the local level are also fundamentally important for CP promotion. This study points to the conclusion that initiatives to CP promotion in Hangzhou and Guiyang are both processes of adaptive implementation. However, Hangzhou appears to have done a better job in policy redesigning and implementation, better customized central policy in local context, therefore leading to a better policy outcome, while Guiyang tends to implement passively, with little deliberateness in appropriating CP decisions into local conditions. The strategy of well-adaptive implementation drawn from the case of Hangzhou is summarized below.

A typical strategy of the Hangzhou government is to utilize a bunch of policy instruments, such as the command and control instrument, economic instrument, and communication instrument, in CP promotion. As mentioned in Section 2, CP is mainly promoted by China’s government through a hierarchal system. Therefore, in Hangzhou, annual CP targets were set and contracts were signed between government and targeted enterprises. Since these contracts were placed into the responsibility of enterprises’ leaders and local cadres, they have to commit themselves to achieve CP targets, otherwise their promotions will be affected. Along with these “sticks,” in order to kick off this new program, Hangzhou also provides a full subsidy for targeted enterprises. In addition, energy service organizations were persuaded to join the CP program. These multi-pronged efforts have successfully raised local CP awareness and stimulated CP practices.

Furthermore, recognizing many constrains in the CP market, detailed regulations for CP service organizations were issued to overcome CP market barriers. Since 2008, a two-year contract needs to be signed by all the CP service organizations with the Hangzhou government. The contract stipulates that all the CP service organizations must accept expert review and meet CP service requirements. Only with this contract can CP service organizations participate in a CP project; however, no regulations like this were identified in Guiyang. Although it also suffered from insufficiency and low-competence of CP service organizations, rare progress was made by the local government. The relative low competence of CP service organizations in Guiyang damages the reputation of CP among enterprises.

With more and more enterprises involved, differentiated CP subsidizations were introduced to Hangzhou’s CP subsidy system. Since 2011, stricter regulations were issued and different subsidies were provided for CP enterprises, based on the scores given by expert reviews of conducted projects. In order to get higher subsidies from the government, targeted enterprises are encouraged to improve the quality

of their projects. By introducing an expert review system, a fair and open competitive platform was provided for enterprises. Varied subsidization further promoted enterprises' enthusiasm for conducting CP projects.

Another pillar for improving CP practices is increasing transparency of project information. Although CP information publication has been claimed by the central government, local implementation seems to be quite different. For example, most CP information can be easily found on the official website in Hangzhou and subjected to public scrutiny, while much less information can be observed in Guiyang via similar channels. Some CP news in Guiyang was released, yet in a rather random and unsystematic way. Thus, it is perhaps difficult to inform and stimulate local enterprises' actions in Guiyang. Lack of transparency may create additional barriers for local enterprises to participate in CP. In Hangzhou, a fair and open process to distribute the funding gives more motivation to enterprises to ensure a high quality project. Contrastingly, the black box funding distribution in Guiyang hampered the enthusiasm of local enterprises.

7. Conclusions and Discussions

CP has been promoted in many countries and deemed as a powerful strategy to improve environmental performance. Unlike the voluntary-based CP program in western countries, China's government is the most important initiator and promoter for CP practices. Because of heavy intervention of governments, decision-making and execution of China's government is crucial for CP promotions. As local governments have enough flexibility to implement CP policies, they are apparently playing pivotal roles in initiating local CP practices. In order to uncover the influence of local government to CP implementations, this study takes the incentives and strategies of local governments as the main objectives and develops a conceptual framework for analyzing local CP policy implementation in China.

The results from this study suggest that unbalanced implementation of CP at the local level remains a challenge for policy makers. The differences of policy impacts and outcomes are highly dependent on local governments' motivations and implementing strategies. As mentioned previously, the incentives of local cadres include three types: intrinsic incentives, extrinsic incentives and location-based incentives. Due to existing similarities between Hangzhou and Guiyang, this study allows us to focus on the location-based incentives, and we find that this type of incentive is mainly affected by three conditional factors that are different from one region to another: resource endowment, economic stage, and technology development. Local government is more likely to be incentivized to implement CP policies innovatively under the following conditions: (a) local resource endowment is scarce; (b) the economy is relatively well-developed and the local government financial situation is strong; and (c) technology providers in the CP-related environment and energy domain are technologically competent.

With regard to CP policy implementation, it is fair to conclude that CP projects in China are mostly promoted in a command and control way. In both Hangzhou and Guiyang, the progress of CP implementation, whether good or not, is under the relevant control of local government as they involve virtually all aspects of CP from setting target enterprises to evaluating the results. As an encouraging progress, market-base mechanisms are increasingly used in CP practices, but still in a rather controlled manner. Therefore, it is not surprising that this study concludes the different implementing strategies of local government tend to produce completely different results. This investigation has revealed a number of strategies that contributed to the success of local CP promotion: (a) different policy instruments are

used in a combined way for promoting CP practices; (b) detailed regulations of local CP service organizations are required for building CP market capacity; (c) differentiated CP subsidizations, based on the results of expert reviews, are more likely to promote high quality CP practices; and (d) high transparency of project information may promote activities of targeted enterprises towards CP.

Although some insight into CP implementation is drawn based on the two cases of Hangzhou and Guiyang, it is worthy to emphasize that there is no universally best way to implement the CP policy: implementation can only be effective if the policies can be and were adjusted to suit local conditions [22]. In China, under the same institutional arrangement, central policies are implemented in all 2862 Chinese counties with diversified local site conditions. As a result, to adapt central policies into local conditions, proper implementing strategies of modification, specification and revision are indispensable. In order to improve CP practices effectively, well-adaptive implementation at the local level is necessary.

As is known that a top-down approach is frequently adopted in China's context: some experts and policy makers have sought to improve implementation quality by passing cleaner and stricter central policies [30]; however, the practice of CP promotion in China shows a different scenario: guided by central CP policies, local governments are given space and flexibility to develop local strategies that may meet both the central government's target and local interests. It has been noticed that as legislation gets stricter and/or resources invested into innovative strategies are very limited and conditioned, the implementers find it more difficult to adapt it to the different local interests involved [30]. Therefore, certain flexibility should be incorporated into policy design on the central level for more effective policy implementation, even if that means missing the policy targets in areas where the policy doesn't fit local interests. As Berman and McLaughlin conclude, excessive control can lead deliverers to follow guidelines only symbolically [31]. For future studies, it would be interesting to assess the needed extent of the "strictness" or "discretion" of CP central policies, in order to ensure both "discretion" and "fidelity" of local adaptive implementation. Another remaining aspect is how to build CP capacity in enterprises, service organizations and research centers in China. As reviewed at the beginning, capacity building of these actors is considered as an important requirement for CP promotion [1,8]. The factors which contribute to the capacity development of these actors should be addressed by future research.

Acknowledgments

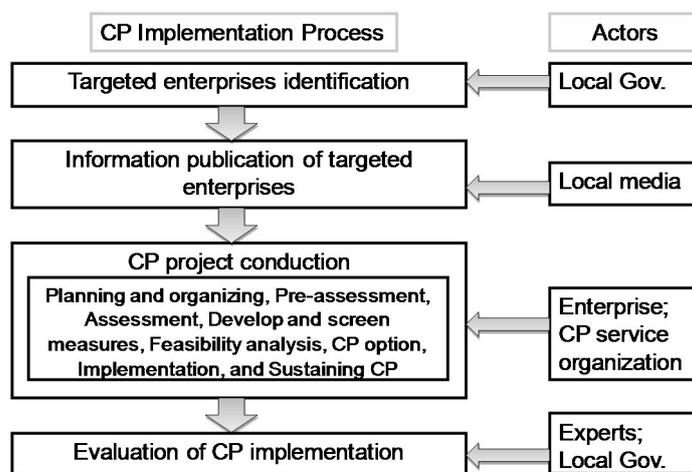
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Author Contributions

All authors contributed to the research design. Jianxing Yu provided network support for conducting interviews; Ting Guan and Jianxing Yu performed interviews and document collections in Hangzhou and Guiyang. With the advices of Dieter Grunow and Jianxing Yu, exploratory analysis was conducted by Ting Guan. All authors conceptualized the line of argumentation in the manuscript. Ting Guan wrote the manuscript. All authors have read and approved the final manuscript.

Appendix A

Figure A1. Local mandatory CP policy implementation and related actors.



Note: (Resource from [13,19]).

Appendix B

Table A1. Interview List.

No.	Interviewee	Type of organization	Title	Date
iH01	C	Research Institute (Zhejiang Province Institute of Metrology)	Vice president	21 September 2012
iH02	W	Research institute (Institute for Thermal Power Engineering of Zhejiang University)	Researcher	18 September 2012
iH03	Q	Hangzhou Government (Development and Reform Commission)	Vice Director	24 September 2012
iH04	L	Hangzhou Government (Economic Development and Trade Commission)	Vice Director	26 September 2012
iH05	S	Research institute (Institute for Thermal Power Engineering of Zhejiang University)	Researcher	29 September 2012
iH06	S	Energy service institute (Energy Saving Association)	Professor; Energy expert	15 October 2012
iH07	S	Energy service institute (Energy Saving Association)	President	16 October 2012
iH08	L	Hangzhou Government (Economic Development and Trade Commission)	Vice Director	22 October 2012
iH09	X	Zhejiang Provincial Government (Energy Auditing Team)	Chief Engineer	25 October 2012

Table A1. Cont.

No.	Interviewee	Type of organization	Title	Date
iH10	H	Energy service institute (CP Energy Evaluation Centre)	Researcher	29 October 2012
iH11	L	Hangzhou Energy service institute (Energy Saving Association)	Former president	5 November 2012
iH12	H	Hangzhou Energy service institute (Zheda CP center)	President	14 November 2012
iH13	H	Hangzhou Energy service institute (Zheda CP center)	Consultant	15 November 2012
iH14	X	Company (Zhejiang Diyuannengyuanhuanjing company)	Manager	25 February 2013
iH15	S	Company (Fenghuangcheng Company)	Manager	25 February 2013
iH16	W	University (Zhejiang University)	Professor	20 March 2013
iG01	W	Guizhou Provincial Government (Development and Reform Commission)	Vice Director	31 October 2012
iG02	Z	Guiyang Government (Development and Reform Commission: Resource Conservation and Environmental Protection Bureau)	Director	31 October 2012
iG03	H	University (Guizhou Party School)	Professor	1 November 2012
iG04	X	Guiyang Government (Industry and Information Technology Commission: Energy Saving Bureau)	Officer	1 November 2012
iG05	Z	Guiyang Government (Industry and Information Technology Commission: Energy Saving Bureau)	Director	1 November 2012
iG06	H	Guiyang Government (Comprehensive demonstration office for energy saving and emission reduction)	Director	2 November 2012
iG07	L	Enterprise (Guiyang aluminium Enterprise)	Manager	2 November 2012
iG08	W	Enterprise (Guiyang aluminium Enterprise)	Manager	2 November 2012
iB01	L	Central government (National Development and Reform Commission: Resource Conservation and Environmental Protection Department)	Vice Director	3 September 2012
iB02	W	Central government (Ministry of Industry and Information Technology: Energy Saving Department)	Director	8 October 2012
iB03	L	Central government (National Development and Reform Commission: Resource Conservation and Environmental Protection Department)	Director	8 October 2012
iB04	X	Central government (National Energy Saving Center)	Chairman	8 October 2012
iB05	Z	Central government (National Energy Saving Center: Energy Saving Department)	Vice Director	8 October 2012
iB06	S	Central government (National Energy Saving Center: General Office)	Vice Director	8 October 2012
iB07	Z	Research institute(National Energy Research Institute)	Researcher	9 October 2012
iB08	D	Energy service company (Energy Efficiency Project Investment Company)	Chairman and CEO	10 October 2012
iB09	H	Central government (State Council)	Department Chief	5 April 2013
iB10	L	Central government (State Council; Energy Saving Department)	Vice Director	5 April 2013
iB11	C	China National School of Administration	Professor	10 April 2013

Appendix C. Questionnaire Outline

Questionnaires are designed to be different for varied individuals, depending on the background of interviewees. Most questions are addressed in the following way:

- (1) Background of the interviewees, such as positions, educational/working experiences and duties.
- (2) The significance of involvement of their work in local CP promotion: How important is their duties in local CP implementation?
- (3) The organizational arrangement: Which organization is responsible for monitoring all of the programs/projects? How is it done?
- (4) Challenges and opportunities of the organizations in which the interviewees worked.
- (5) The positive/negative factors that affect the outcome of implementation of CP programs.
- (6) Specific measures that are adopted in local CP promotion: What is the status of local CP implementation and what are the results of the CP implementation so far?
- (7) The evaluation of local CP implementation: are the interviewees satisfied with the way they have been implemented?
- (8) Implications of CP policy implementation: What are the major lessons learnt so far from implementing?
- (9) Implications of CP policy implementation: What are the challenges of opportunities of local CP policy implementation in the future?

Conflicts of Interest

The authors declare no conflict of interest.

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