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RESEARCH REPORT

Lessons Learned from China's Residential Tiered Electricity Pricing Reform

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About GSI

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1.0 Introduction

Because electricity is an essential commodity for every day life, the government mostly regulates its retail price. In order to ensure that all sections of society can access electricity affordably, pricing is done in blocks so that the poor, who consume less, pay less. Under such a tiered electricity pricing (TEP) system, electricity consumers pay a low rate for an initial consumption block and a higher rate as they increase use beyond that block (Schoengold & Zilberman, 2014). TEP is widely used by power-sector regulators and can, if properly designed, improve equity by providing the poor with subsidized rates, while maintaining economic efficiency (i.e., avoiding overconsumption) and limiting subsidy expenditure.

In October 2010, China introduced a TEP pricing reform for the residential sector,[1] in accordance with an official document (No. [2010] 2617) issued by China's National Development and Reform Commission (NDRC, 2010). Previously, households were charged a flat rate, which varied by province, regardless of how much each consumed. Rates were set by NDRC as part of the so-called "electricity end-use tariff catalogue." These rates were low and even insufficient to cover the cost of supply, heavily cross-subsidized by industry and commercial sectors, and inefficient in promoting savings. Also, the tariffs were regressive in that the system disproportionately benefited higher income groups (who consume more power). The new pricing system was implemented as a response to severe (and growing) energy security and environmental concerns in China, thereby promoting solutions that address the urgent need to improve efficiency, lower pollution and keep prices affordable.

With the introduction of the new pricing system, the central government outlined the general principles of the reform, and it was the duty of the provincial governments to set the specific electricity-use pricing (price ladders) and associated volume blocks (e.g., kilowatt hours [kWh] per month or per year). However, the TEP pricing system was criticized and has been the subject of significant debate. There was a public outcry over high electricity rates, as they increased the financial burden for some consumers. In addition, the TEP principles set out by the central government posed some challenges for the provinces that were tasked with implementing them. Chief among these was the principle of keeping "the electricity cost burden comparable to before for most households" (NDRC, 2010); however, as noted, prices would increase for some households (i.e., depending on their consumption) under the TEP pricing structure.

Regardless of these debates and existing problems, the price adjustment hearings were convened in most provinces in May 2012. By July 2012, the new pricing mechanism and electricity tariff system were piloted in all the provinces except Tibet and Xinjiang.

This paper reviews and evaluates the TEP reform, examining the impacts on equity, efficiency and subsidy expenditure. It also looks at how problems associated with the reform were addressed, and the form and mode of communication with stakeholders.

[1] In fact, as early as 2006, China adopted some demonstrative TEP regime changes in a few provinces, including Zhejiang and Sichuan. The reform in 2010 was nationwide.

2.0 Context

2.1 Overview of the Regulated Power Sector and Electricity Pricing System in China

The power system in China is highly regulated and rigid in planning, operations and pricing (Kahrl, Willliams, Ding & Hu, 2011). Electricity prices at the stages of generation, transmission and dispatch, and end-use retail are all set and controlled in a centralized manner, with different rates set for different consumers. A cost-driven tariff-level setting is the basic mode for generation and grid transmission service; that is to say, the regulated tariff of one power plant, is set according to the capital investment, fuel cost and operating cost to ensure the tariff is sufficient (but not excessive) to cover the total cost. Cross-subsidies are prevalent between different sectors and users. Traditionally, electricity prices have been viewed as a "means" to target particular policy objectives (e.g., common utility services for the poor, restricting the energy-intensive industries, etc.), rather than a mechanism to link demand and supply.

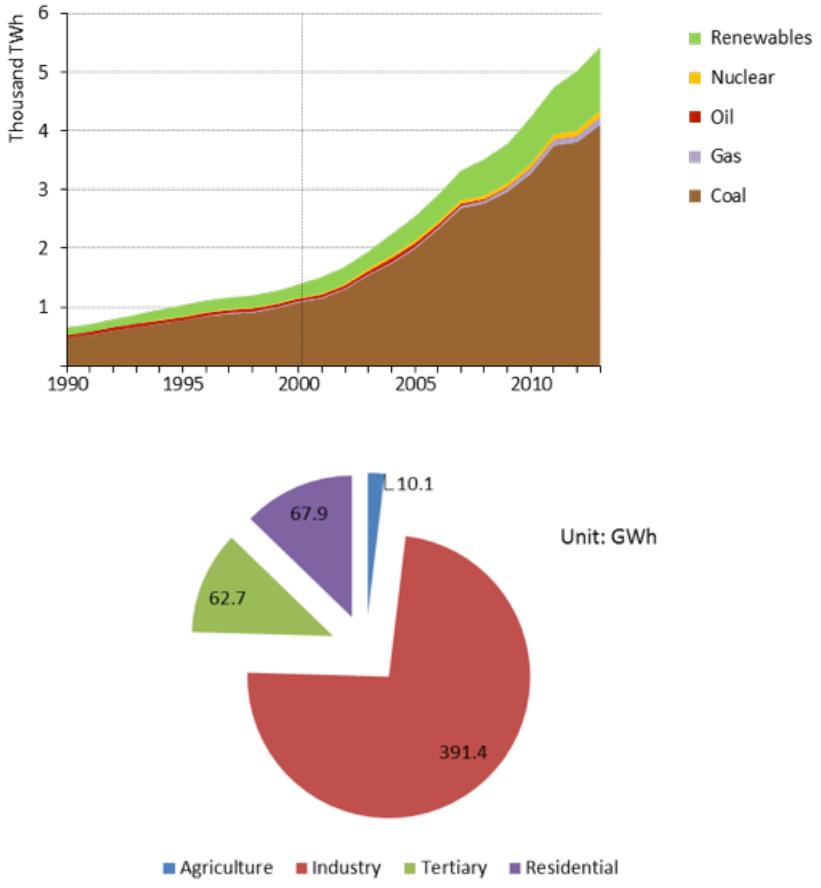

FIGURE 1: THE GENERATION MIX IN CHINA'S POWER SECTOR (1990–2013) AND THE CONSUMPTION MIX IN 2013 (IN GIGAWATT HOURS [GWH])

Source: China power sector 50 years (1990–2000); National Bureau of Statistics (2000–2010); China Electric Council flash report of China's power sector development (unpublished: 2011, 2012, 2013).

The capacity, and thus the generation, of electricity have increased steadily over the past 20 years, at an annual growth rate of approximately 10 per cent from 1990 to 2013. From 2005 to 2010, the power sector's installed capacity has grown annually by 80–100 GW. However, growth has slowed in recent years, both in response to lower economic growth and concerns related to over-capacity. In 2014, growth in the generation of electricity is as low as 3.8 per cent based on the latest statistics.

China is highly dependent on coal thermal power for generation (Figure 1). Three quarters of electricity generation is derived from coal, despite the rapid growth of renewable energy over the last five years. Wind power annually experienced double growth from 2006 to 2010, and the growth of solar photo voltaic (PV) capacity increased substantially, rising from 0.3 GW in 2010 to 15 GW in 2013.

Electricity consumption is dominated by industry and commercial sectors; residential sector share is less than 15 per cent of the total consumption mix (which implies that for every unit price increase in industry and commercial tariffs, the residential sector can get 5–6 units of subsidy credit). Since commercial and industrial sectors have high paying capacity, these consumers cross-subsidize the residential sector consumers. In 2013 the total electricity use by the residential sector was about 67.9 terawatt hours (TWh) (refer Appendix A for other years).

The generation pricing mechanism has evolved over time. Currently, most of the generation sources are given benchmark prices that vary by geographic area (e.g., the province-specific thermal power benchmark price system), by resource quality (e.g., wind and solar power, and part of hydro projects) or threshold setting (e.g., for nuclear, adopting the thermal power price if beyond a level of 0.43 Yuan/kWh) (NDRC, 2013).

In terms of the tariff structure, the on-grid benchmark prices are normally levied with a value-added tax (VAT) rate of 17 per cent. It is apparent from Figure 1 that the generation mix has not changed much over time, thus it affects the tariff level to a lesser degree. That the generation mix is dominated by coal-fired generation makes the tariff level highly sensitive to the variation in coal price. China adopts the coal power price linkage mechanism to change the tariff with one year as the least interval, trigged by NDRC.[2]

For electricity consumers, prices are set by NDRC for different provinces in a complex form, as per the "electricity end-use tariff catalogue" (Appendices B and C show the forms applied in Zhejiang and Gansu provinces when the reform started, which are the two provinces listed as examples in the subsequent sections). Price levels are altered for different users and different voltages. The prices are highest for commercial and industry consumers, and lowest for the agriculture and household sectors. The principle adopted is that for the same electricity-use purpose, a lower price is charged for higher voltage, and vice versa (refer to Appendices B and C for details). The commercial and industry electricity price can be as high as above 1 Yuan/kilowatt hour (kWh); the household tariff is about 0.5 Yuan/kWh; and the price for agriculture in a poor area of China can be as low as 0.2–0.3 Yuan/kWh.

The composite in the end-use tariff is complex, not only including a VAT, but also a surcharge to support the development of renewable energy sources, especially wind and solar, and additions for the urban construction and education funding in some special cases. The final price levels are all set by NDRC, theoretically in a cost-driven model, but in reality in a very ambiguous way. Logically, if the cost of generation, transmission and distribution increase, this additional cost would pass through to the end-user sectors.

[2] The detailed discussion on the evolution of the mechanism and the change of the tariff are beyond the scope of this paper, see details at Ma (2011) and He et al. (2015) etc.

Between the generators and the end-users, two grid companies (the State Grid Corporation of China [SGCC] and the China Southern Grid [CSG]) hold a monopoly on electricity transmission, dispatch and retail.[3] CSG serves the five provinces in the southern region of China: Guangdong, Guangxi, Guizhou, Yunnan and Hainan. SGCC operates its business in the rest of China except the west part of Inner Mongolia. The revenue of the grid companies is generally the "residue" between end-use retail prices and the generation prices, as mentioned above, both of which are set by the central government.

One of the Chinese government's priorities is improving access to electricity for poor people in rural areas. Currently, about 1.7 million people have no access to electricity supply in Sichuan, Xinjiang and Qinghai. As per the government plan (NEA, 2013), access to electricity for the entire population is expected to be in place by the end of 2015.

2.2 Issues with the Previous Flat Pricing System

The flat pricing system that preceded the TEP is problematic for several reasons:

- **The electricity is undervalued and the cost of supply is not recovered**. Electricity consumption by household sector is characterized as small scale (consumption is low compared to, for example, that of industrial users), varied across time, connected at a low voltage level (resulting in large transmission loss) and decentralized, implying that the cost of supply to consumers is high. The residential electricity price, approximately RMB0.5 per kWh, was estimated to cover only 60–80 per cent of the actual delivery cost (Xinhua, 2012; Wang & Tang, 2012).[4] The price level is far lower than industry and commercial tariffs, making the cost recovery difficult. Also, as a result of lower prices, electricity is over-used and inefficient, making it uneconomical.
- **It violates the energy saving and emission reduction strategy and targets**. China has a large population but low endowment in energy resources. Concern over energy security and environmental degradation has increased in recent years. In the 11th Five-year Plan (2005–2010), China adopted a national target of a 20 per cent decline in energy intensity relative to 2005. This target was hard to achieve (19 per cent has been achieved finally), even after adopting the high-cost options (e.g., early retirement of small energy installations not having reached the end of their life cycle). Saving energy on the consumption side is always thought to be the cheapest "no-regret" action. In the power sector, the term "virtual power plant" is used to refer to the equivalent capacity-saving effects from reduced consumption. Low prices for electricity, not reflecting the actual cost and external impacts, reduce the incentive to conserve energy, and therefore have worked against the objective of reducing the energy intensity of China's economy.
- **Low, flat rates are regressive**. The flat, subsidized rate for consumers is problematic from a distributional equity perspective. Wealthy households consume more electricity than poorer households, and thus capture more of the subsidy share. Indeed, nationally, the top 5 per cent of households consume 25 per cent of electricity in the residential sector (NDRC, 2012). A survey in Hubei province shows that the 10 per cent of households with the highest electricity consumption account for 53.7 per cent of total household electricity usage (Liu & Yang, 2010). If electricity access is considered a public service, subsidies should be targeted to the poorer households rather than the wealthier ones.

[3] There are a few other grid companies as well in some provinces—for example, Inner Mongolia, Shanxi and Guizhou. But compared to these two giant super powers, they operate in a far smaller area and have no impacts on our discussion in this paper.

[4] In terms of the geographic distribution, the on-grid price level in eastern and coastal regions is high, and low in the western and northern regions. The disparity of household tariffs is very small, even reversed compared to the sequence of on-grid pricing. So the subsidy levels in coastal regions are higher than in the northern and western regions.

2.3 The Power Sector Reform Background and TEP Reform Process

China's power sector has been plagued by strict regulation, an inflexible pricing system and a monopoly in the transmission and dispatch of electricity. Consequently, leaders and non-government experts in China have repeatedly expressed the urgency of reform. Reforms involving changes to pricing mechanisms and institutions, such as grid competition, transmission and distribution assets, splitting of grid companies and retail competition, are more difficult than implementing a TEP pricing system. To start reforming the power sector, the Chinese government adopted the TER pricing system as the first move.

Before TEP was initiated in 2010, a series of studies were conducted by the government-affiliated research institutes[5] and independent think tanks. In a few provinces, these studies and the pilot program provided a useful reference for the preparation of the initial proposal for the reform cases at a national level. The policy process and timeline of the entire TEP reform is summarized in Table 1. The whole process spanned 2–3 years from the time of launching the pilot run to formal implementation.

TABLE 1. TIMELINE OF CHINA'S TEP REFORM

TIME	CONTENTS
2006	Demonstration of TEP in few provinces, including Zhejiang and Sichuan.
2008–2010	Feasibility study of TEP pricing system in household sector by the government and think tanks
October 2010	Official document No. [2010] 2617 to launch the reform and clarify the general principle
All of 2011 and the first half of 2012	Proposal design by provincial governments, public debate, hearings on the pricing change, finalization of the pricing system
July 2012	Pilot run in all the provinces except Xinjiang and Tibet
December 2013	Summary and prospect, by official document No. [2013] 2523

[5] For example by the Energy Research Institute of NDRC (http://www.eri.org.cn/news_zj.php?cid=92&aid=1317)

3.0 Pricing

3.1 General Pricing Policy from the Central Government

The official document (No. [2010] 2617) issued by NDRC (2010) sets out the general principles of TEP reform.

In the official document, three basic principles are stated:

- Combined cost recovery and equitable burden
- Combined identical policy across regions and consideration of local attributes
- Combined short-term and long-term horizon of power sector reform

The idea behind these three principles is to develop a pricing system that can be integrated into a "balance strategy" as a whole. The first principle aims to balance the recovery of the generating cost and the affordable burden of the residents. The second principle aims to capture the heterogeneity across regions, while keeping the general principle on volume and pricing. The final principle takes into account the long-term horizon and emphasizes that the long-term target is to make the price reflect the true value of electricity.

As the preliminary proposal by the central government, the standards to split the three tiers of electricity use, volume and the corresponding mark-up for the tariff were presented in two suggested schemes. The local governments could choose either of the schemes as the base for the specific case within the province.

The initial three tiers and two proposed schemes are illustrated in Figure 1. The electricity use in Case 1 ([110, 210]) is the two nation-wide average thresholds for dividing the price ladders, which target 70 per cent of households in the first tier (i.e., monthly use below 110 kWh). Case 2 ([140, 270]) provides coverage of 80 per cent of households in the first tier, but with a higher starting price by about 0.01 Yuan/kWh relative to current level. The second thresholds (i.e., 210 in Case 1 and 270 in Case 2) were expected to cover 90 per cent and 95 per cent electricity users respectively and with a price increased by 0.05 Yuan/kWh. The electricity-use behaviour beyond the second threshold would result in a price further increased by 0.2 Yuan/kWh, which means that 10 per cent of households in Case 1 and 5 per cent in Case 2 would be accordingly affected largely by the increasing electricity tariff.

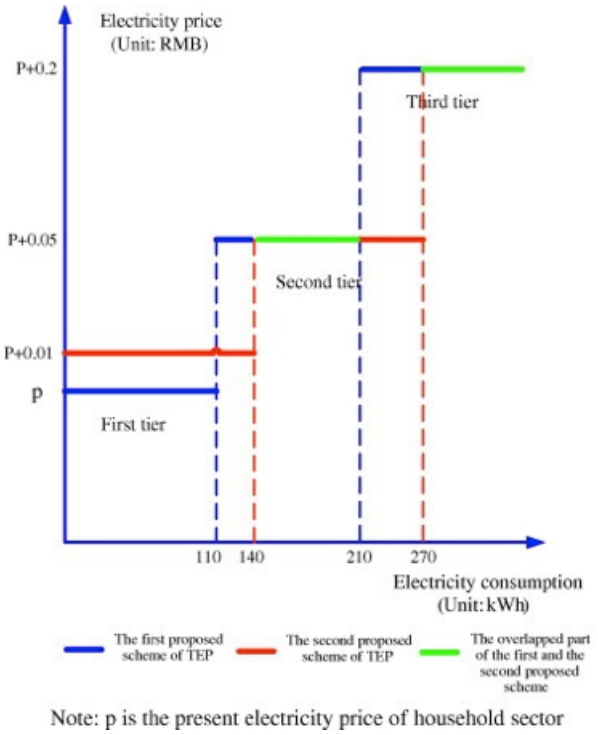

FIGURE 2: TWO INITIALLY PROPOSED TEP REFORM SCHEMES BY NDRC

Source: adapted from Wang, Bin, & Yixiang (2012). The electricity use blocks and the added wedge for per unit price are only shown for illustration and are heterogeneous across regions. Generally, more electricity is used in developed regions, and the price wedge for increased consumption is higher as well.

The wide diversity in economic development among China's provinces, when combined with other factors, results in different electricity consumption levels (measured in kWh per month hereafter). The specific electricity volume of each tier, rather than the average level, was set by the provincial government (see Section 3.2), but the covered household share indicated by the official document (No. [2010] 2617) is compulsory. The three blocks of electricity use were defined as "basic daily life use," "normal daily life use" and "comparatively high quality life use."

In addition to the heterogeneity between provinces, there are also big differences in consumption between urban and rural households. Block I covers a higher percentage of rural households (nearly 100 per cent), given their lower consumption patterns.

In addition, the official guideline document (No. [2010] 2617) outlined some other issues related to long-term institutional arrangements, including:

- Clarifying the scope of the reform, limited to households with dedicated individual meters. Due to historic reasons, electricity meters in some residential areas are shared by households (i.e., where they share the same floor of an apartment). In these types of situations, it was urged that the space be retrofitted so they can be charged as "one household, one meter."
- Encouraging the adoption of a "peak-valley tariff" system, which is to say higher prices during peak load periods (8:00–20:00) and lower prices in the "valley" period.

- Using the grid company's increased revenue from tariff adjustment based on the benchmark price adjustment to cover the cost of updating the residential meters, and to compensate the generator with stricter sulphur dioxide removal standards[6] and higher coal prices. However, the impact of such reforms is an open question and it remains to be seen whether the balance of the revenue and additional expenditure due to this pricing change will lead to positive or negative cash flows for the grid companies. It will be difficult to make this process clear and transparent.
- Incorporating year-based accounting, rather than the commonly used month-based accounting, for regions that have adopted prepaid electricity cards (e.g., Beijing), for the implementation of the TEP (i.e., annual block = month block *12). For others, the accounting cycle should be consistent with the meter-reading cycle (not longer than two months).

  In fact, this point is a critical part of the reform and is of vital interest to the residential consumers. The variation of electricity use every month in a year exists in various degrees along seasons and geographic areas. The regions where air conditioners are commonly used consume much more electricity in the summer than the winter months, where the heating can be obtained from a centralized system. Consumer expenditure can be quite different when accounting consumption per month rather than per year.
- Dealing with local issues properly. In the process of implementing the policy, some specific issues (e.g., shared meters, leased apartment, etc.) have been identified and need to be taken care of by the government. These issues can only be only resolved on a case-by-case basis.

3.2 Summary of Specific Cases in Various Provinces

According to the guidelines issued by the central government, the provinces categorized as "in need of reform" started the reform case design, assessment and outreach work throughout the year of 2011. The price hearings on their specific cases were held successively in May 2012. The reform proposals and the time frames for hearings in various provinces are summarized in Table 2.

The program finalized after hearings favour Case 2 in most cases, which is to say increased electricity quota in Block I with no price increase. On the expense side, the price increased to 0.30 Yuan/kWh for Block III. The complexity of the proposals varied across provinces. Different or similar consumption behaviours in summer and winter as well as peak load and valley periods complicated the cases in Guangdong, Fujian, Guangxi, Yunnan (which is rich in hydro power) and others.

[6] This compensation measure considered the fact that, in the past, some power plants were retrofitted with sulphur dioxide removal equipment, or the emission standard had been tightened further. Both of these measures caused the production cost of electricity to increase, but that was not reflected previously in the end-use pricing regime regulated and trigged by the government.

TABLE 2: SELECTED TEP CASES

REGION	LOW-END THRESHOLD, LESS THAN IN BLOCK I	HIGH-END THRESHOLD, LARGER THAN IN BLOCK III	TIME FOR HEARING	DETERMINED PROGRAM AFTER HEARING
Beijing	**Case 1:** 2,760 kWh annually **Case 2:** 2,880 kWh annually	**Case 1 &2:** 4,800 kWh annually	May 11, 2012	**Block I:** below 2,880 kWh annually **Block II:** range between 2881 and 4,800 kWh **Block III:** above 4,800 kWh
Shanghai	**Case 1:** 260 kWh monthly **Case 2:** peak months, 350 kWh (Jan, Jul, Aug, Dec); Off-peak, 210 kWh **Case 3:** 3,120 kWh annually	**Case 1:** 400 kWh month **Case 2:** peak months, 450 kWh (Jan, Jul, Aug, Dec); Off-peak, 320 kWh **Case 3:** 4,800 kWh annually	May 11, 2012	**Block I:** below 3,120 kWh annually **Block II:** range between 3,121 and 4,800 kWh **Block III:** above 4,800 kWh
Tianjin	**Case 1:** 200 kWh monthly	**Case 1:** 340 kWh monthly	May 10, 2012	**Block I:** below 220 kWh monthly **Block II:** range between 221 and 400 kWh **Block III:** above 400 kWh
Chongqing	**Case 1:** 200 kWh monthly	**Case 1:** 320 kWh monthly	May 16, 2012	**Block I:** below 220 kWh monthly **Block II:** range between 221 and 400 kWh **Block III:** above 400 kWh
Guangdong	**Case 1:** 210 kWh monthly **Case 2:** summer (May to Oct.), 240 kWh; off-summer, 170 kWh	**Case 1:** 430 kWh monthly **Case 2:** summer (May to Oct.), 600 kWh; off-summer, 400 kWh	May 16, 2012	**Block I:** below 260 kWh monthly for summer; off-summer, 200 **Block II:** range between 261 to 600 kWh for summer; off-summer, 201 –400 kWh **Block III:** above 600 kWh and 400 kWh for summer and off-summer.
Zhejiang	**Case 1:** 213 kWh monthly **Case 2:** 2,556 kWh annually	**Case 1:** 394 kWh **Case 2:** 4728 kWh annually	May 11, 2012	**Block I:** below 2,760 kWh annually **Block II:** range between 2,881 and 4,800 kWh **Block III:** above 4,800 kWh

Gansu	**Case 1:** 120 kWh monthly **Case 2:** 140 kWh monthly	**Case 1:** 220 kWh monthly **Case 2:** 240 kWh monthly	May 10, 2012	**Block I:** below 160 kWh monthly **Block II:** range between 161 to 240 kWh **Block III:** above 240 kWh
Yunnan	**Case 1:** rainy season (May–Nov.), 0.467 Yuan/kWh favoured price for all use; dry season, 0.467 Yuan/kWh within 120 kWh **Case 2:** Raining season (May–Nov.), 0.45 Yuan/kWh favoured price for all use; Dry season, 0.45 Yuan/kWh within 150 kWh	**Case 1:** 0.517 Yuan/kWh for use between 121-250 kWh monthly, 0.817 Yuan/kWh for beyond **Case 2:** 0.5 Yuan/kWh for use between 151–210 kWh monthly, 0.817 Yuan/kWh for beyond	May 25, 2012	**Block I:** rainy season (May-Nov.), 0.467 Yuan/kWh favoured price for all use; dry season, 0.467 Yuan/kWh within 170 kWh **Block II:** dry season, 0.5 Yuan/kWh for use between 171 to 260 kWh **Block III:** 0.8 Yuan/kWh above 260 kWh in dry season

Source: Author's compilation based on pieces of news from Xinhua Agency, Sina.com and Phoenix New Media.

During the hearings, two controversial points were also identified.

1. **Low quota of electricity volume in Block I.** This might be one of the most controversial settings for the TEP reform, as this concern was raised in most of the hearings. In the preliminary proposal, 120 kWh per month was the level set by undeveloped regions, including Gansu, Shanxi and Anhui, and 130–160 kWh was the level set for middle-developed regions, including Henan, Jiangxi, Hunan, Hubei and Fujian. For advanced provinces and municipalities including Guangdong, Tianjin, Chongqing, Shanghai and Beijing, the quota was set beyond 200 kWh per month. Although the regional heterogeneity was reflected plausibly, the variation along month and household group was significant, and some specific conditions (mentioned below) are difficult to consider. Figure 3 shows the urban electricity-use disparity by eight income groups.

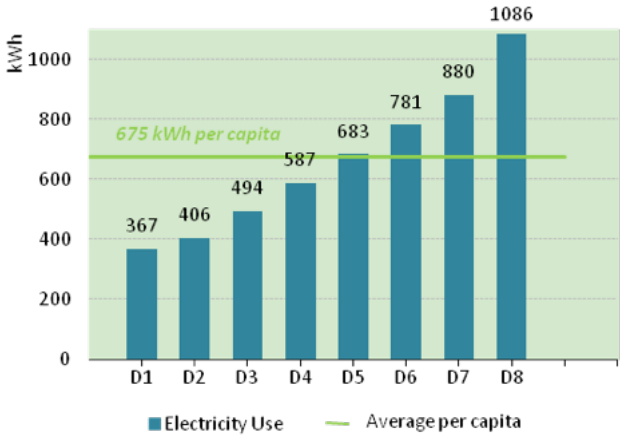

FIGURE 3: DISTRIBUTION OF RESIDENTIAL ELECTRICITY CONSUMPTION BY INCOME DECILE IN CHINA, 2010

Source: National Bureau of Statistics (2011); China Statistical Yearbook 2011

For illustrative purpose, consider a small town in Gansu Province, Jinchang. Traditionally, the people of Jinchang use an electric furnace to cook food and monthly electricity use is generally 260 kWh, far more than the quota of Block I. That means, although Jinchang is an underdeveloped area, the electricity expense might be comparable to, or even higher than, most of the developed regions because of the increased price. The final pilot-run cases approved by the provincial governments have factored in this problem. The quota was enhanced a little bit (albeit the degree is small) as the indispensable life demands of electricity in some provinces are different. Figure 4 shows the comparison before and after the hearings by the local government.

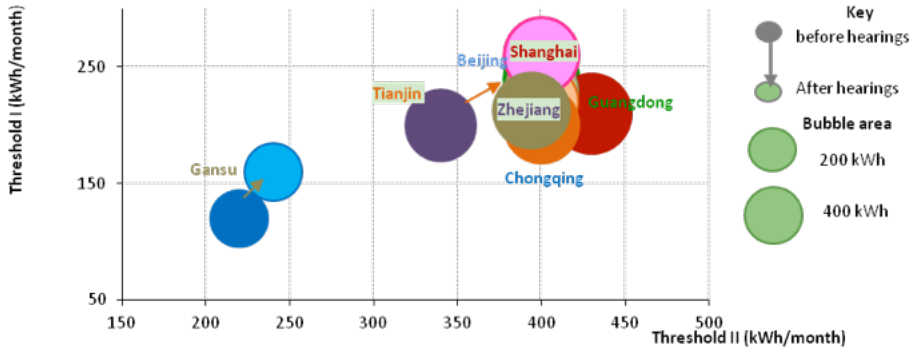

FIGURE 4: PROPOSED CASES AND ITS CHANGE BEFORE AND AFTER THE HEARINGS IN SOME PROVINCES BASED ON TABLE 2

2. **Public concern about the aggregated level of price and complaints about the rising level of electricity price.** As per the reform principle, the households not covered in the umbrella of the reform would have a tariff increased by 0.02–0.03 Yuan/kWh. Thus after this reform, the aggregated level of household price of electricity is equivalently increased (this is just one of the objectives of the reform), although the degree of increase is moderated. The public outcry for the reform is similar to that in other countries, as it is likely to increase their financial burden. Complaints were raised about the transparency of the proposal setting. In some places, the hearings were actually interpreted as notice meetings of price increases. However, the reaction of the public was limited.

4.0 Impacts and Compensation Measures

4.1 Impacts on the Economy and Different Groups

Considering 0.5 Yuan/kWh is approximately 60–80 per cent of the actual cost of electricity delivered to consumers, the implied total subsidy is about CNY13.6 billion, which is equivalent to 0.0002 per cent of the current GDP. Furthermore, the impact of this reform is only marginal on the top electricity consumers (top electricity consumers comprise 15–20 per cent of households). So the impact on the economy (e.g., inflation, government surplus, etc.) is negligible, and this reform could be regarded as a small reform in a small individual sector.

Regarding the **distributional impacts on households**, certainly, the households with high-end income are the "losers" of this reform, given they generally consume much more electricity than the quota in Block I. Unit electricity price beyond Block II increased by 0.3 Yuan/kWh, 50 per cent more than before.

On the other extreme side, low-income households, who consume less electricity, are more vulnerable to price change. Such consumers were protected and can obtain free electricity access as a common service (as detailed in Section 4.2). According to the government survey, the impact on the medium-level income group is minimal.

For a representative case, Table 3 gives the comparison of expenditure before and after the reform for households with different electricity consumption behaviour in Zhejiang and Gansu (the former is developed and the latter is far from developed). It is evident from the table below that the impact on expenditure of low-income levels has not changed much due to the increase in electricity price.

TABLE 3: COMPARISON OF MONTHLY EXPENDITURE OF HOUSEHOLDS IN ZHEJIANG AND GANSU PROVINCES

REGION	MONTHLY ELECTRICITY USE (KWH)	ELECTRICITY PRICE BASE (YUAN/ KWH)	EXPENSE BEFORE REFORM (YUAN/ MONTH)	EXPENSE AFTER REFORM (YUAN/ MONTH)	CHANGE DEGREE (%)	NOTES
Zhejiang	205 (average level in 2010, urban area)	0.538	110	110	0	Zhejiang province is a developed region located in eastern China. Threshold is in the range of 230, 400 kWh per month, and additional price wedge is [0.05, 0.3] based on the Level One price Source: Xu (2012)
	111 (average in 2010, rural area)		60	60	0	
	280 (top 10% income group)		151	153	2%	
	1500(Luxury level comparable to Germany)		807	1257	56%	
Gansu	95 (average level in 2010, urban area)	0.510	48	48	0%	Gansu province is a developing region located in northwest China. Threshold is 140, 240 kWh per month, and price wedge is 0.05, 0.3 Source: Bureau of Gansu (2011)
	27 (average in 2010, rural area)		14	14	0%	
	162 (top 10% income group)		84	84	1%	

Source: Xu (2012)

The **grid company** is also a stakeholder in this reform. It implements the accounting of the new pricing system and manages almost everything except the price level. The grid company gained from the increased revenue, which was expected to be used for expenses related to meter updates, higher purchase prices from the generation companies due to tightened environment regulation and subsidies to the poorest group. However, it is not clear whether the increased price is able to recover the cost, and if it is not, to what extent the surplus or deficit exists. In fact, this also raises a question about the credibility of the reform.

4.2 Compensation to the Poor

There is a substantially large income disparity between China's rural and urban populations, and so the income statistics are differentiated by rural and urban. For urban households, in China's statistical system, household income is ranked by per capita disposable income. The population is divided into groups of lowest income (10 per cent), low income (10 per cent), lower-middle income (20 per cent), middle income (20 per cent), upper-middle income (20 per cent), high income (10 per cent) and highest income (10 per cent). The lowest 5 per cent of households is also referred to as "poor households."

In the rural income statistical system, households are grouped into five categories, each consisting of 20 per cent of households (i.e., low income households, lower-middle income households, middle income households, upper-middle income households and high income households).

Appendices D and E show the per capita disposable income distribution of urban and rural households by income decile in the last decade. The groups of low-income and lower-middle-income households in rural areas have comparable income levels to the lowest 5 per cent of households in cities.

Besides this decile classification, there are absolute income standards issued by local governments to attribute people into the subsidized groups. In urban areas, this group is called "Dibao Household," that is to say, the lowest urban life income security fully supported by government subsidy. Correspondingly, in villages, "Five Bao household" means rural households with livelihoods that have five guaranteed aspects (food, clothing, medical care, housing and burial expenses). The recognized standards for "Dibao Household" and "Five Bao" are strict but varied across regions, and the covered households normally have no regular income source or very low income.

The lowest-income household group (the bottom 10 per cent in the income pyramid, divided by seven groups in urban areas) have an annual disposable income of less than CNY5,000 in urban areas (about USD3/day per capita, among which the poorest 5 per cent survive on about USD2/day per capita), and almost no regular income in rural areas. The subsidy and compensation is required and should be targeted to these two groups.[7] As a reform process, approximately 10–15 kWh of free electricity volume was attributed to them in the reform. In total, it is projected that about 40 million households, which is 10 per cent of the total national population, would benefit from this reform process and their welfare would be not reduced (if not improved) (NDRC, 2012).

However, there is uncertainty about whether 10–15 kWh for one month is sufficient or not for the poorest households to meet the basic demands of life. It really depends on the geographic area and lifestyle of people living in those areas. The statistics in Table 3 for Gansu region, a comparatively poor province in China, showed that, in that rural area, an average of 27 kWh would be used per month. If we consider electricity use for lighting purposes only, then this electricity supply is sufficient.

4.3 Practical Issues and Solutions

Several practical problems and issues were identified in the hearings and the public discussions held for the reform proposal, including:

- **Households with more people.** The pricing was based on "household unit statistics" for convenience and feasibility, adopting a "one meter for one household" setting. But this would be unfair for large families, for example, in an apartment shared by multiple generations. Case-by-case solutions were provided at local levels (e.g., applying for an additional meter if the number of people is beyond a certain threshold level in Jiangsu or adding 100 kWh to the original quota if the number of people in a household is over five in Shanghai). These solutions addressed some of the problems but increased the discretionary power of the government.

[7] We do not raise specific examples of the poorest groups in rural areas, given that households in rural areas still rely on many products that are not monetized. The case of urban people might be more comparable.

- **How to measure and share for leased apartments.** This is similar to the problem above, but complicated by the relationship of the members sharing one electricity meter. There are split incentives for the homeowner and the tenants. In practice, some owners with strong market power levy more charges to the tenants with the excuse of TEP reform. This problem was reflected in the summary official document of NDRC (2013) in No. [2013] 2532. It emphasized the need to regulate rental housing electricity billing behaviour. But, to date, no specific measures to avoid this situation have been laid out.
- **Seasonal variation of electricity use and how to consider it.** In a few regions, year-based accounting is adopted (e.g., Beijing and Shanghai). In other regions, like Guangdong, higher quotas for the peak summer period are applied.

5.0 Perceptions and Communications

5.1 Communications Strategy by Governments

Before launching the TEP in 2011, the NDRC's official staff responsible for the reform took many occasions to disclose the direction of this reform and release some preliminary thoughts. As early as the second half of 2009, the director of the price department of NDRC, Changqing Cao, disclosed the direction of the residential electricity pricing regime reform in an interview with *China Investment Magazine*.[8] A draft document aiming to speed-up the electricity pricing reform was being prepared at the same time. TEP reform is one of the pillars in that document.

When the proposed program reforms were issued by the central government in October 2010, Changqing Cao again explained the policies and answered concerns in an open interview.[9]

In March, 2012, just before the hearing and formal launch of the TEP reform in most of the provinces, the deputy director of NDRC, Shen Peng, who was seen as the responsible people for this reform, stated that the reform would be implemented shortly (Huang Ye, 2012).

As for the distribution of tasks, local governments were responsible for the design of specific cases for itself, organizing the hearings and determining the final case for pilot runs. The entire process is transparent as far as procedure is concerned. In July 2012 NDRC held a press conference to announce the start of the pilot run of TEP pricing system.

5.2 Reactions of Stakeholders

The stakeholders involved include: the central government, local governments, grid companies and households. The media can provide some channels for communication of the reforms.

The response of common residents to the reform is simple and obvious: consumers are reluctant to accept it if costs increase, and have thereby raised complaints on the insufficiency of Block I. After the hearings, most of the provinces developed an enlarged electricity volume for Block I. This could be regarded as a positive result of the good interaction of the decision-makers and the constructive public opinions.

The state-owned grid companies, as the other main stakeholders of this reform, fully support the change in the pricing. In fact, they on took many additional duties (and therefore expenditures) to make the reform technically feasible, including changing to smart meters, updating the accounting frequency and approach, altering their computer systems, etc.

Both the mainstream and the market-based media in China played important and bridging functions during the reform process, as channels for broadcasting information and hosting dialogues. The progress of the reforms was widely reported in the central and local media, including on televisions, in newspapers and on the Internet. In the first half of 2012, TEP reform was the hottest news topic, especially questions of whether the reform will lead to increasing the economic burden, how to determine the volume of Block I and other related topics.

[8] The interview is available here: http://xn--fiqs8sithh0c94h837d.com/www/NewsInfo.asp?NewsId=999
[9] Text of the interview is available here http://www.china.com.cn/policy/txt/2010-10/13/content_21110937.htm

There are also signals that the authorities planned specific efforts to deal with public expressions of unfairness and potential loss. To justify the reform, the government issued some propaganda materials. Guidance materials to support the legitimacy of the reform were edited so they could be used for this purpose.[10] Such materials included potential questions regarding the reform and provided the specific answers for communication purposes.

Market-oriented media is a channel used to release some different—even conflicting—information. The open survey, organized by Sina.com, has showed that over 68 per cent of the voters disagreed with the TEP and over 80 per cent think that the reform is leading to electricity price increases. The sample size to date is about 43,000 respondents.

The Sina.com survey results fundamentally contrast the feedback results requested by NDRC as mentioned by the mainstream media (e.g., CNTV, 2010). The outcome of the results of hearings at the provincial level was that at least 50 per cent of the people supported the reform.

It was difficult to judge whether the web-based survey was biased in terms of the uncontrolled sample (everyone surfing the Internet and seeing the survey page could be involved) and the survey design. In reality, the poorest people group is most vulnerable to the price increase, and requires subsidy or transfer payments from the government. The possibility that the poor were worse-off can't be excluded. The descriptive information above only shows that people have diverse opinions, especially for reforms that are closely and directly associated with the daily life of the public.

[10]For an example of a guidance document, see: http://www.xnzwgk.cn/UpFiles/JF602/JF60201/201208_JF602010100201208002080517295 10.doc

6.0 Looking Forward

In December 2013 NDRC issued another official document (No. [2013] 2523) to summarize the reform and emphasize some solutions on identified operating problems, especially on the shared apartment issues. As mentioned above, the prescriptive counter-measure proposed by NDRC is to regulate rental housing electricity billing behaviour. But it is hard to monitor the behaviour of the homeowners, and it is also neither the competence nor under the scope of NDRC.

Regardless, the next steps following the TEP reform are envisioned, especially regarding:

- Adopting a similar pricing system in gas and water use in the residential sector.
- Peak and valley differentiated tariffs as the next step of residential electricity pricing reform, which is expected to be adopted throughout the country by 2015 (the progress now is slower than scheduled).

This marks the wrap-up of the pilot run and normal implementation of the TEP pricing system. Meanwhile, NDRC also expanded the tiered pricing approach to the industrial sector when it announced a three-tiered pricing system for the aluminum sector. Non-ferrous metal smelting and pressing—including mostly aluminum—is the third largest consumer of electricity in China after steel production and chemical products.[11]

Doubts and problems exist, however, which should not necessarily imply that the implementation of TEP reform is ill-advised. It is very challenging both technically and politically to create a well functioning deregulated power market. The problems that have emerged are caused not by TEP reform, but the persistent flaws in China's power system, the lack of market-based reform, monopoly and non-transparency in transmission and dispatching operations.

Strong political commitment and leadership is needed for change. TEP reform is an opportunity to strengthen the capability for reform and the first step towards a thorough power sector reform. As the latest signal, the fundamental and deeper reform (e.g., market-based pricing), other than marginal changes in sectors like residential electricity use, was expected to be launched at the end of 2014, and has now been delayed due to significant changes in the NDRC organization (Zhang Qihua, 2014). Further reforms are likely to be based on market-based pricing and real-time price. However, it is too early to envision what progress can be achieved and by when.

[11] This might be a bad example, following the choice of pricing in the residential sector. The fundamental motivation for TEP in the residential sector is equity, which might not be suitable for industry sectors. There, the TEP adoption might hinder the market-based pricing system, which should be the promising direction of China's power reform.

7.0 Lessons Learned

From the review above, we can summarize the whole process of TEP reform as well organized and generally smooth. This can be seen in the workload-sharing system between central and local governments, the timely exchange of ideas with the public through the media and the hearings with transparent discussion and uniform procedures.

TEP reform has a solid theoretical foundation and good merits in balancing budget, stimulating conservation and promoting equity. But in the real world, it is really challenging to convince the public of the legitimacy of the reform and develop their full understanding of the benefits.

TEP is an efficiency-oriented reform for society as a whole, targeting subsidy reduction with the aim to make the poorest better off (or at least not worse off) from the perspective of equity. In practice, the justification of the reform and communication with the public are also important. A number of lessons can be drawn as a result of China's experiences of TEP reform in the last three years.

Lesson 1: Transparency is vital to build sufficient support for the reform.

In China's reform, the procedures are transparent enough, but the cost structure of the tariff and how the pricing is determined lack transparency. This is the focal point of concern for the public questioning the credibility of the reform. In fact, China's authority stressed that China's residential price is lowest in the world on many occasions. But this is not necessarily supported by the facts:

- China's tariff is low only in the nature of equivalent U.S. dollars relative to other countries. The burden of the households is not necessarily low due to low income.
- Residential electricity price is cross-subsidized at the expense of industry and commercial electricity use. This mechanism did not alleviate the burden of households as a whole. Given that high electricity cost is passed on as increased cost in various commodities and services, the financial burden on the household still increased. This intentional distortion is only meaningful for the distributional impacts. Thus, only fundamental reform aiming at improving the performance of the power sector can increase the welfare of the households entirely.
- The authority only announced the final cases, but lacked rigorous and transparent data analysis to support it and educate the public. The government argued that 80 per cent of the households would not be affected by the reform. However, this is not consistent with people's subjective feelings. It is hard to bring clarity to technical complexity and historic blur.

Lesson 2: Balance between accuracy and operational feasibility is challenging work.

China's TEP reform simplified the cases for the sake of operational ease (e.g., the family unit was selected as the basic unit for accounting). This is easy to operate (with clear boundaries), but accuracy is lost in terms of the household size. The electricity block and its price tier are identical across the same province, ignoring the high heterogeneity still existing within the province. These are trade-offs between accuracy and feasibility. For the policy-makers, to keep this balance is essential and requires strong leadership and experience. A rough reform design would bring to the fore the fairness problems, while complex design would make the reform unattractive with limited capability and technical difficulty. In both cases, there is a risk of failure for the reform.

Lesson 3: The distribution of incremental revenue of the grid company should be regulated.

Objectively, TEP reform increases the revenue of the grid company. It is difficult to validate and verify this additional revenue in the context of the revenue modes of the grid (as the residue between on-grid tariff and retail tariff). As part of stakeholder consultation, in a personal discussion with an official at NDRC, it was communicated that, in practice, the implementation of the pricing change is a little bit disorganized. In some regions, the accounting was unclear and the price ladders were determined in a simplified way. The "revenue-neutral" condition for the grid company is hard to believe. Understanding these kinds of problems can only be possible with deeper and systematic power reform, especially on the monopoly transmission and dispatching sections.

References

Bureau of Gansu (2011). *Gansu statistics yearbook*. Retrieved from http://zhidao.baidu.com/share/36e22339429ec56ab3f78f83b3db4984

CNTV. (2010, October 22). 60% of the public supporting the TEP pricing reform. Retrieved from http://jingji.cntv.cn/20101022/104613.shtml

He, Y., Bing, W., Dacheng, L., Min, D., Kangren, H., & Tian, X. (2015). China's electricity transmission and distribution tariff mechanism based on sustainable development. *International Journal of Electrical Power & Energy Systems, 64*, 902–910

Huang, Y. (2012, March 29). Issued in the first half of this year of the TEP electricity pricing mechanism [in Chinese]. Retrieved from http://paper.people.com.cn/gjjrb/html/2012-03/29/content_1027971.htm?div=-1

Kahrl, F., Williams, J., Ding, J. & Hu, J. (2011). Challenges to China's transition to a low carbon electricity system. *Energy Policy*, 39, 4032–4041.

Liu, S.J. & Yang J. (2010). Research on tiered electricity price [in Chinese]. *Price: Theory Practice, 3*, 12–14.

Ma, J. (2011). On-grid electricity tariffs in China: Development, reform and prospects. *Energy Policy, 39* (5), 2633-2645.

National Bureau of Statistics. (2001–2014). *China statistical yearbook* [in Chinese]. Retrieved from http://www.stats.gov.cn/tjsj/ndsj

National Bureau of Statistics (NBS) (2011). *China Urban Life and Price Yearbook* [in Chinese]. Retrieved from http://tongji.cnki.net/overseas/engnavi/YearBook.aspx?id=N2009030074&floor=1

National Development and Reform Commission. (2010, October 8). *Guidelines on the TEP reform of residential tariff (Version for feedback)*. [in Chinese] No. [2011]2617. Retrieved from http://www.ndrc.gov.cn/jtdjyj/qwll/201010/t20101008_374091.html

National Development and Reform Commission. (2011, November 29). Notice on the price adjustment of the Northwest Power Grid in China. Retrieved from http://www.sdpc.gov.cn/fzgggz/jggl/jggs/201112/t20111201_541513.html

National Development and Reform Commission. (2012, May 18). *The residential tariff much lower than abroad, and the growth rate is less than 1/2* [in Chinese]. Retrieved from http://www.nea.gov.cn/2012-05/18/c_131595288.htm

National Development and Reform Commission. (2013, December 11). *Notice on the improvement of TEP for residential sector* [in Chinese]. No. [2013]2523. Retrieved from http://jgs.ndrc.gov.cn/zcfg/201401/t20140102_574319.html

National Development and Reform Commission. (2013, June 15). *Notice on the setting of on-grid electricity tariff for nuclear power plants* [in Chinese]. No. [2013]1130. Retrieved from http://www.sdpc.gov.cn/zwfwzx/zfdj/jggg/dian/201307/t20130708_549225.html

National Energy Administration. (2013). The population with no access to electricity reduced by 1 million in 2013 [in Chinese]. Retrieved from http://www.nea.gov.cn/2013-12/12/c_132960884.htm

Ningbo Power Utility. (2010, May 10). Grid sale price of electricity in Zhejiang Province. Retrieved from http://jd.ningbo.gov.cn/art/2010/5/10/art_3208_406200.html

Schoengold K. & Zilberman, D. (2014). The economics of tiered pricing and cost functions: Are equity, cost recovery, and economic efficiency compatible goals? *Water Resources and Economics*, 7, 1–18.

Sina. (2012, March 28). Survey on the attitude to the TEP pricing reform. Retrieved from http://survey.finance.sina.com.cn/result/67719.html

Wang, Z., Bin, Z. & Yixiang, Z. (2012). Determinants of public acceptance of tiered electricity price reform in China: Evidence from four urban cities. *Applied Energy, 91*(1), 235–244.

Wang, Z. & Tang, H. (2012, May 11). Hearing on residential tariff held and over 80% households no expenditure increase. Retrieved from http://news.xinhuanet.com/legal/2012-05/10/c_111926219.ht

Xinhua News Agency. (2012, May 9). Official response to the increased part of electricity tariff from TEP reform: Used for subsidizing the lowest income households [in Chinese]. Retrieved from http://news.xinhuanet.com/local/2012-05/09/c_123097774.htm

Xu, J. (2012). Calculating on basic electric energy of step tariff for residential power consumption. *Energy Technology and Economics, 24*(6), 52–58

Zhang, Q. (2014, October 20). Gaming on power sector reform undergoing [in Chinese]. Retrieved from http://finance.sina.com.cn/chanjing/cyxw/20141020/112020585718.shtml

Zhu, K. & Haotao, Y. (2014). Decomposition analysis of China's residential life electricity consumption. *China Power, 47*, 3.

Appendix A: Nation-Wide Indicators of Residential Electricity Use Behaviour from 2000–2013

	TOTAL POPULATION (BILLION)	RESIDENTIAL ELECTRICITY USE (TWH)	URBANIZATION RATE (%)	HOUSEHOLD SIZE (URBAN)	HOUSEHOLD ELECTRICITY USE (KWH, URBAN)	HOUSEHOLD SIZE (RURAL)	HOUSEHOLD ELECTRICITY USE (KWH, RURAL)
2000	1.267	14.52	36.20%	3.13	632	4.2	273
2001	1.276	16.09	37.66%	3.1	642	4.15	320
2002	1.285	17.71	39.09%	3.04	665	4.13	355
2003	1.292	20.58	40.53%	3.01	734	4.1	416
2004	1.300	23.84	41.76%	2.98	803	4.08	496
2005	1.308	28.85	42.99%	2.96	945	4.07	595
2006	1.314	33.51	44.34%	2.95	1025	4.05	734
2007	1.321	40.63	45.89%	2.91	1148	4.03	942
2008	1.328	43.96	46.99%	2.91	1192	4.01	1047
2009	1.335	48.72	48.34%	2.89	1269	3.98	1178
2010	**1.341**	**51.24**	**49.95%**	**2.88**	**1285**	**3.95**	**1257**
2011	1.347	56.2	53.73%	2.87		3.9	
2012	1.354	62.18	52.57%	2.86		3.88	
2013	1.361	67.93	51.27%				

Source: China Statistical Yearbook (2001-2014); Zhu & Yin (2013); Flash report 2013 by China Electric Council (unpublished).

Appendix B: Electricity End-Use Tariff Catalogue with Tax and Surcharge in Zhejiang Province (as of 2011)

										UNIT: YUAN/KWH
CATALOGUE	VOLTAGE		POWER PRICE	HOUR OF DAY TARIFF		HOUR OF DAY TARIFF (6 BLOCK)			CAPACITY PRICE	
				PEAK	VALLEY	PEAK	AVERAGE	VALLEY	CAPACITY OF TRANSFORMER YUAN/KVA/ MONTH	CAPACITY OF TRANSFORMER YUAN/KVA/ MONTH
Residential	<1kV independent meter	50kWh and below	0.538	0.568	0.288					
		51-200kWh	0.568	0.598	0.318					
		above 201 kWh	0.638	0.668	0.388					
	<1kV shared meter		0.558							
	1-10kV		0.538							
	Agriculture 1-10kV		0.508							
Large industry	1-10kV					1.054	0.872	0.388	38	28
	35kV					1.031	0.852	0.379	38	28
	110kV					1.01	0.835	0.371	38	28
	220kV and greater					1	0.827	0.367	38	28
Where	Small and medium fertilizer	1-10kV							30	20
		35kV							30	20
		110kV and greater							30	20
	Aluminum							40	30	
	Chlor-alkali	1-10kV				0.945	0.733	0.307	40	30
		35kV				0.918	0.715	0.298	40	30
		110kV and greater				0.899	0.698	0.29	40	30

General industry and commercial	< 1kV		0.844	0.963	0.651	1.373	1.068	0.545		
	1-10kV		0.824	0.941	0.636	1.341	1.043	0.531		
	35kV and greater		0.809	0.924	0.624	1.317	1.024	0.521		
	Where: Small and medium fertilizer	< 1kV	0.322							
		1-10kV	0.302							
		35kV and greater	0.287							
	Where: the user not adopting hour of day tariff	< 1kV	0.975							
		1-10kV	0.955							
		35kV and greater	0.94							
Non-industry	< 1kV		0.874							
	1-10kV		0.854							
	35kV and greater		0.839							
	Where: Forces, prison	< 1kV	0.658							
		1-10kV	0.638							
		35kV and greater	0.623							
Agriculture	< 1kV		0.641							
	1-10kV		0.621							
	35kV and greater		0.606							
	Where: Agricultural irrigation, threshing	< 1kV	0.39							
		1-10kV	0.37							
		35kV and greater	0.355							
	Where: poor counties agricultural irrigation	< 1kV	0.123							
		1-10kV	0.103							

Source: Ningbo Power Utility (2010).

Appendix C: Electricity End-Use Tariff Catalogue with Tax and Surcharge in Gansu Province (2011)

CATALOGUE		VOLTAGE LEVEL	POWER PRICE			CAPACITY PRICE	
			PEAK	AVERAGE	VALLEY	MAX. DEMAND YUAN/KW/ MONTH	CAPACITY OF TRANSFORMER YUAN/KVA/ MONTH
Residential		less than 1kV	0.7590	0.5100	0.2610		
		1kV and greater	0.7440	0.5000	0.2560		
Non-residential lighting		less than 1kV	1.2453	0.8381	0.4308		
		1kV and greater	1.2303	0.8281	0.4258		
General industry and commercial		less than 1kV	1.2038	0.8077	0.4116		
		1-10kV	1.1888	0.7977	0.4066		
		35kV and greater	1.1738	0.7877	0.4016		
Large industry		1-10kV	0.7126	0.4806	0.2485	33	22
		35kV	0.6976	0.4706	0.2435	33	22
		110kV	0.6826	0.4606	0.2385	33	22
		220kV	0.6751	0.4556	0.2360	33	22
Where	Furnace ferroalloy, calcium carbide, caustic soda electrolysis, aluminum	1-10kV	0.6433	0.4340	0.2248	33	22
		35kV	0.6283	0.4240	0.2198	33	22
		110kV	0.6148	0.4150	0.2153	33	22
		220kV	0.6073	0.4100	0.2128	33	22
	Ammonia, calcium magnesium phosphate and other fertilizers furnace	1-10kV	0.4920	0.3332	0.1743	25	16
		35kV	0.4770	0.3232	0.1693	25	16
		110kV	0.4620	0.3132	0.1643	25	16
		220kV	0.4545	0.3082	0.1618	25	16
Agriculture		less than 1kV	0.6714	0.4489	0.2265		
		1-10kV	0.6564	0.4389	0.2215		
		35kV and greater	0.6414	0.4289	0.2165		

Where	Poor county agricultural irrigation	less than 1kV		0.2325			
		1-10kV		0.2275			
		35kV		0.2225			
	High-lift underground water irrigation	101 meter and greater		0.1905			
	High-lift surface water irrigation	101-200 meter		0.1205			
		201-300 meter		0.1105			
		300 meter above		0.0905			

Source: Adapted from NDRC (2011).

Appendix D: Per Capita Disposable Income Distribution of Urban Households (Unit: Yuan)

	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Average	26,955	24,565	21,810	19,109	17,175	15,781	13,786	11,760	10,493	9,422	8,472	7,703
Lowest Income Households (first decile group)		8,215	6,876	5,948	5,253	4,754	4,210	3,569	3,135	2,862	2,590	2,409
--Among which, poorest (first 5%)		6,520	5,398	4,739	4,198	3,734	3,358	2,839	2,496	2,313	2,099	1,958
Low Income Households (second decile group)		12,489	10,672	9,285	8,162	7,363	6,505	5,541	4,885	4,429	3,970	3,649
Lower Middle Income Households (second quintile group)		16,761	14,498	12,702	11,244	10,196	8,901	7,554	6,711	6,024	5,377	4,932
Middle Income Households (third quintile group)		22,419	19,545	17,224	15,400	13,984	12,042	10,270	9,190	8,167	7,279	6,657
Upper Middle Income Households (fourth quintile group)		29,814	26,420	23,189	21,018	19,254	16,386	14,049	12,603	11,051	9,763	8,870
High Income Households (ninth decile group)		39,605	35,579	31,044	28,387	26,250	22,234	19,069	17,203	14,971	13,123	11,773
Highest Income Households (tenth decile group)		63,824	58,842	51,432	46,826	43,614	36,785	31,967	28,773	25,377	21,837	18,996

Source: NBS statistical yearbook, various years.

Appendix E: Per Capita Disposable Income Distribution of Rural Households (Unit: Yuan)

	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Average	8,896	7,917	6,977	5,919	5,153	4,761	4,140	3,587	3,255	2,936	2,622	2,476
Low Income Households	2,583	2,316	2,001	1,870	1,549	1,500	1,347	1,183	1,067	1,007	866	857
Lower Middle Income Households	5,516	4,808	4,256	3,621	3,110	2,935	2,582	2,222	2,018	1,842	1,607	1,548
Middle Income Households	7,942	7,041	6,208	5,222	4,502	4,203	3,659	3,149	2,851	2,579	2,273	2,164
Upper Middle Income Households	11,373	10,142	8,894	7,441	6,468	5,929	5,130	4,447	4,003	3,608	3,207	3,031
High Income Households	21,273	19,009	16,783	14,050	12,319	11,290	9,791	8,475	7,747	6,931	6,347	5,896

Source: NBS statistical yearbook, various years.

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