

An Investigation of China's Subsidy Program for Energy-saving Products

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Abstract

Subsidy is used in many countries as an important instrument to promote energy-saving products. China started subsidizing energy-saving products, including light bulbs and automobiles, in 2009. The subsidized product groups quickly expanded to major home appliances such as air conditioners, flat-panel TVs, refrigerators, washing machines and water heaters. The latest subsidies for purchasing the five types of energy-saving products reached 26.5 billion RMB since June 2012. It is expected that even larger financial budgets from the Chinese government will be allocated to support the wide deployment of high energy efficient products according to the national 12th Five-Year-Plan, which adopted the "energy conservation and emission reduction" as the national long-term development strategy.

In this paper, the policy framework of China's Subsidy Program for Energy-saving Products is reviewed. The recent subsidy schemes for air conditioners, flat-panel TVs, refrigerators, washing machines and water heaters are introduced. Based on retail market data, an investigation of the market status for the five types of products is conducted. The subsidy schemes are analyzed in terms of products' properties such as type, size, energy efficiency tiers, price, functional capacities etc. This paper concludes with suggested options to improve the subsidy program.

Introduction

In order to mitigate climate change and sustain human development, changing the way in which we use energy is more economically efficient than simply increasing the energy supplies. Energy efficiency was addressed by the McKinsey & Company [1] as a cost-effective tool to fulfill this goal. In the last three decades, much effort has been made on promoting energy efficient appliances and equipment including technologies, regulation measures (e.g. MEPS - Minimum Energy Performance Standards - and mandatory labeling schemes such as Energy Label in China and Europe), financial incentives (e.g. tax, electricity price etc.), voluntary actions (e.g. endorsement labels such as "Energy Star" in USA) and more. Among financial incentives, subsidies are widely used in various ways to increase market penetration of energy-saving products in developed economies such as Europe [2] and USA [3].

China is now the world's largest carbon emitter [4]. With China's fast urbanization and increasing deployment of electrical appliances, the share of residential electricity consumption over total electricity consumption went up from 3.5% in 1980 to 12.5%¹ in 2012. Given the continuing trend in middle class growth, the residential electricity consumption in China will remain high in the coming years. Additionally, China has become a dominant player globally, which produces the majority of the world's home appliances. A report² showed that the nation's production capacity of color televisions accounted for 80% of the world's total. The production capacity of air-conditioners, refrigerators and washing machines also accounted for 70%, 50% and 40%, respectively. In August 2012, the State Council issued the 12th Five-Year-Plan on Energy Conservation and Emission Reduction in which China announced a goal of 16% cuts in energy consumption per unit of GDP by 2015 along with carbon dioxide emissions set to be cut by 17% from 2010 levels. This strong political commitment has led to a series of policy initiatives in which the so-called "Jienenghuimin" project [5] (a project to promote energy-efficient products for the benefit of the people) is a key subsidy program during this

¹ Data published by China National Energy Administration. http://www.gov.cn/qzdt/2013-01/14/content_2311167.htm (in Chinese and read in January 2013)

² A report published by the China Economic Weekly, using data from the China Household Electrical Appliances Association, 2012.

five-year period to stimulate demand for products and drive market transformation towards higher energy efficiency.

China had subsidized efficient lighting products since 2008. Based on a series of important decisions (Guofa [2006] No.28 and Guofa [2008] No.23, see Table 1) made by the State Council, the “Jienenghuimin” project was initiated in June 2009. Together with the lighting products, air conditioners and cars were included into this program. The subsidies are given to manufactures by the central government. The participating manufactures must register to the program according to implementing rules for a specific product category. Additional cost between an energy-efficient model and an inefficient one is determined and taken as the subsidized amount to remove the purchase barrier for expensive efficient products. In general, the manufactures/retailers pay customers cash first (except cars) and they can only get the subsidy back from the government when they fulfill mandatory requirements such as a certain amount of registered models were sold, all procedures are proper and they pass the monitoring inspection etc. The energy efficient appliances are defined in national energy efficiency standards by “evaluating values of energy conservation” which is the minimum requirement for energy-efficient products certification (a voluntary endorsement label). The evaluating values of energy conservation also determine tier 2 products in the mandatory China Energy Label. Under this context, energy efficient appliances are known as those products which have the energy-efficient products certification, and those which are ranked tier 2 and tier 1 in China Energy Label. By the end of the 2010, 16 billion RMB were spent and 34 million efficient air conditioners, 1 million efficient cars and 360 million efficient lighting bulbs were sold and subsidized. The market share of energy efficient products has been highly increased, e.g. the market share of energy-efficient air conditioners increased from 5% to 70%. It was estimated that through this round of subsidies, 120 billion RMB of domestic demand was stimulated, 22.5 billion kWh of electricity was saved annually and 14 million tons of CO₂ emissions were reduced³.

Table 1: Policy documents for the subsidy project “Jienenghuimin”.

Content	Document No.	Publishing Time
State Council Decisions on Energy Conservation	Guofa [2006] No.28	Aug 6, 2006
State Council Notice on Energy Conservation	Guofa [2008] No.23	Aug 1, 2008
Implementing rules for lighting products	Caijian [2007] No.1027	Dec 28, 2007
Official kick-off of the project and the subsidy management framework	Caijian [2009] No.213	May 18, 2009
Implementing rules for air conditioners	Caijian [2009] No.214	May 18, 2009
Implementing rules for air conditioners (adjusted)	Caijian [2010] No.119	Apr 30, 2010
Implementing rules for cars (with displacement lower than 1.6L)	Caijian [2010] No.219	May 26, 2010
Implementing rules for electric motors	Caijian [2010] No.232	May 31, 2010
Implementing rules for flat-panel TVs	Caijian [2012] No.259	May 25, 2012
Implementing rules for air conditioners	Caijian [2012] No.260	May 25, 2012
Implementing rules for household refrigerators	Caijian [2012] No. 276	Jun 4, 2012
Implementing rules for washing machines	Caijian [2012] No. 277	Jun 4, 2012
Implementing rules for household water heaters	Caijian [2012] No. 278	Jun 4, 2012

Note: Analysis is based on the highlighted policy documents in this paper.

From June 2012, a new round subsidy program with a larger scale of budget (26.5 billion RMB) has started and it covers five major household appliances including flat-panel TVs, air conditioners, household refrigerators, washing machines and household water heaters. Under such context, questions are raised, for example, how will this new policy shift the market? Can the regulation measures such as MEPS and labeling schemes effectively support this policy? How can you make this policy an opportunity to save more energy? To answer these questions, we reviewed this new

³ Data published by National Development and Reform Commission. http://www.sdpc.gov.cn/xwfb/t20111009_437354.htm (in Chinese and read in February 2013)

policy and investigated the Chinese retail market for these five kinds of products. Based on our analysis, we introduced our findings and provided recommendations to improve the effectiveness of this policy.

China’s MEPS, Labeling and Certification System

As the technical basis of implementing financial incentives for energy-saving products such as government procurement and subsidy programs, China has built an energy efficiency standards, labeling and certification system (see Figure 1).

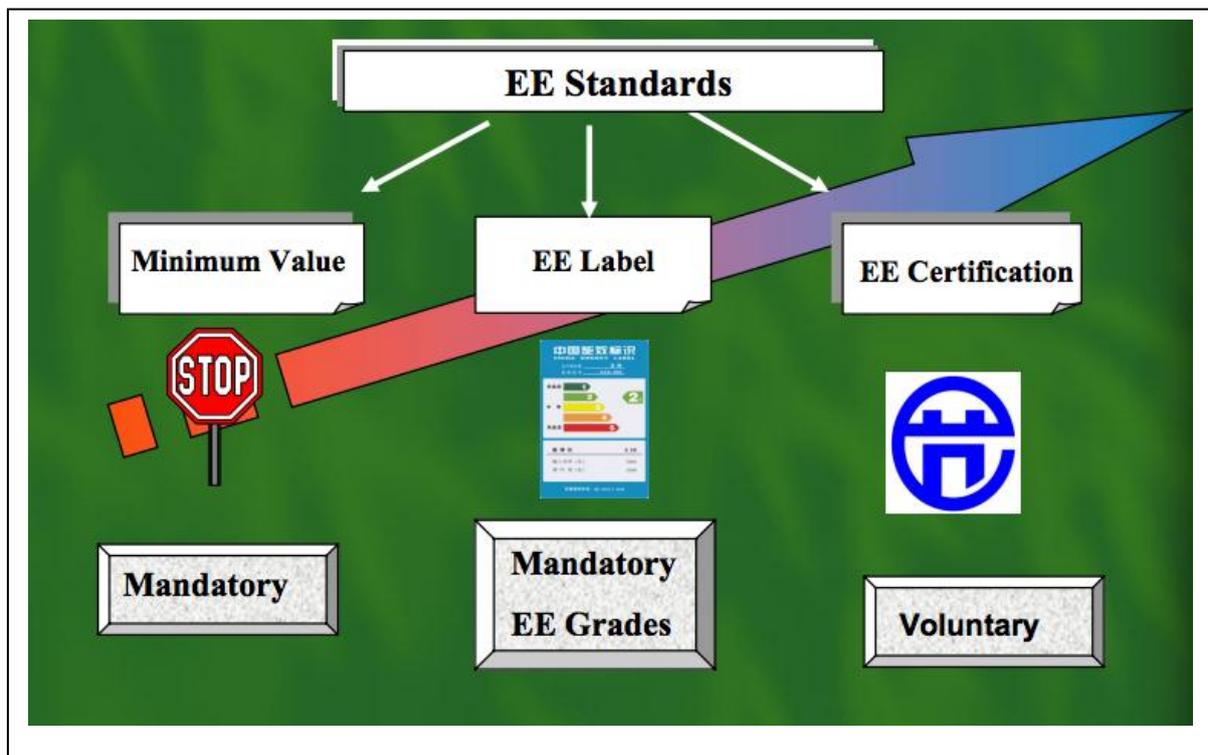


Figure 1: China’s Energy Efficiency Standards, Labeling and Certification System (source: Cheng Jianhong, China National Institute of Standardization (CNIS), March 2009).

Figure 1 helps explain that the Minimum Energy Performance Standards (MEPS) eliminate inefficient products from the market. Comparative labeling and grading schemes (the mandatory China Energy Label) create market transparency that is particularly helpful for consumers to select energy efficient products, while the voluntary endorsement certifications (with energy efficient products labels) encourage manufactures to produce more high energy efficient products and to keep innovating energy-saving technologies.

From 1989 to 2012, China has established 48 MEPS covering household appliances, lighting equipment, commercial equipment, industrial equipment, vehicles and office equipment. Adapted from the EU energy label, China launched the mandatory “China Energy Label” [6] in 2005. As a comparable information label, three or five tiers are defined in the product MEPS. Tier 1 has the highest energy efficiency; tier 2 specifies the evaluating values of energy conservation for the product, which are the minimum requirements for energy-saving product certification; and the last grade (3 or 5) sets the minimum allowable values of energy efficiency, which are the threshold of market access. The principles of setting standards and grading the products are based on market statistics. To ensure a reachable value and enough product availability, top 15%-20% products in the market are identified as energy efficient products (tier 2 and tier 1). 10%-15% are to be eliminated as inefficient products from the market, and the rest in the middle are pushed to reach a higher level of energy efficiency. By the end of 2012, China Energy Label had covered 27 product categories. The MEPS and energy label information for the five subsidized products can be seen in Table 2.

Table 2: China's MEPS and energy label for the target five subsidized product categories.

Product	MEPS Reference	Standard Implementation Date	China Energy Label Implementation Date	Energy Efficiency Tiers
Flat-panel TVs	GB 24850-2010	2010-12-1	2011-3-1	3
Variable speed air conditioners	GB 21455-2008	2008-9-1	2009-3-1	5
Fixed speed air conditioners	GB 12021.3-2010	2010-6-1	2005-3-1	3
Refrigerators	GB 12021.2-2008	2009-5-1	2005-3-1	5
Washing Machines	GB 12021.4-2004	2005-5-1	2007-3-1	5
Gas water heaters	GB 20665-2006	2007-7-1	2008-6-1	3
Solar water heaters	GB 26969-2011	2012-8-1	2012-9-1	3

Based on these MEPS and the energy label implementing rules, the subsidy schemes were made and implemented for each product category. Since tier 2 specifies the minimum requirement for energy-saving product certification, the subsidies usually went to the models that fulfill energy efficiency requirements for tier 1 and tier 2. However, technologies innovate very quickly and the market transforms all the time, so the regulation measures, including MEPS, labeling and subsidy schemes, shall follow the market and change themselves accordingly.

We investigated market status of the target subsidized energy efficient products. The model-based distribution of energy efficiency tiers of each product is illustrated in Figure 2.

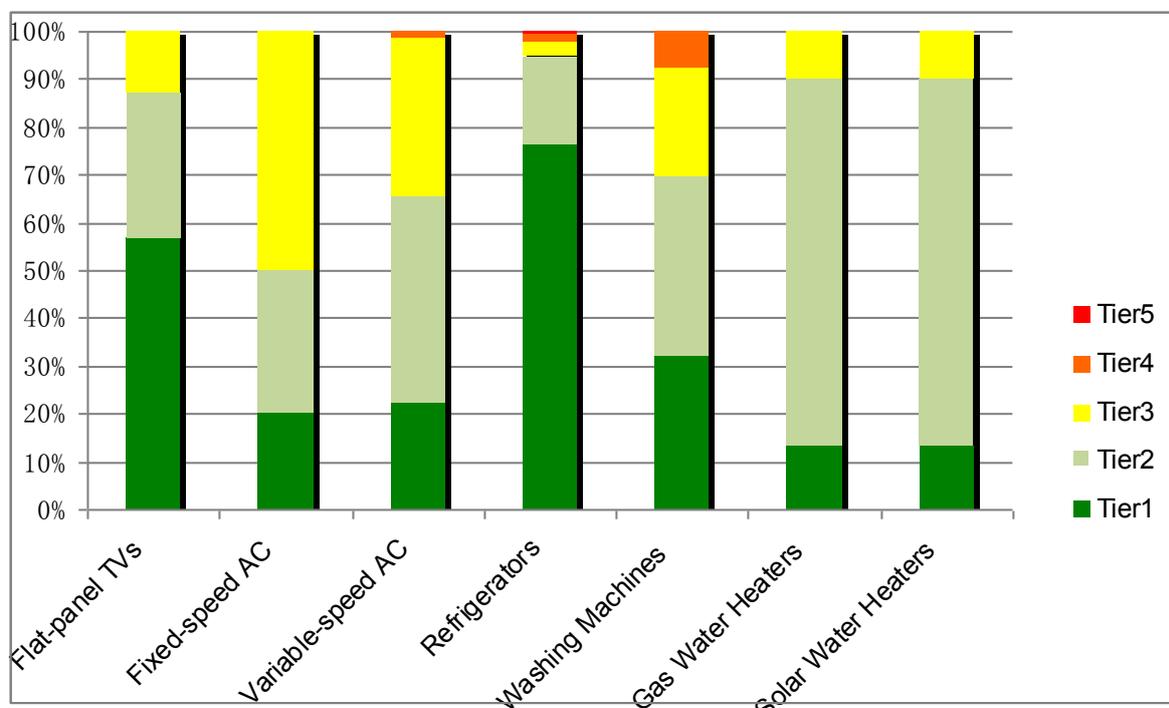


Figure 2: Distribution of energy efficiency tiers for target subsidized energy using products on Chinese retailer market by May 2012 (model based without sales data).

The share of tier 1 products for refrigerators, flat-panel TVs and washing machines are 76%, 57% and 32% respectively, which is too high to determine the actual energy efficient products. About 77% models of gas water heaters and solar water heaters are tier 2 products, so this is too hard to tell they are actual energy-saving products although all of them may have the energy efficient products certification. The share of tier 1 together with tier 2 products for the five products is all more than half of the models, so that subsidies shall not simply go to tier 1 and tier 2 products, but be used for those actual top efficient products.

Subsidy Schemes & Analysis

Our analysis was conducted on an available product model (*not sales*) basis. Several data sources including retailers, independent market research companies and labeling programs were integrated into one database for the analysis. It examines product type, size, energy efficiency tiers, energy consumption and efficiency index, price, functional capacity etc, and the correlation between these factors. In the following we review the policy, present our main findings and introduce what our analysis means to the subsidy schemes and how the policy can systematically be improved. The detailed subsidy schemes and analysis for each product are introduced as follows.

Flat-panel TVs⁴

MEPS for flat-panel TVs (GB 24850-2010) regulate two basic types of flat panel technologies that dominate the television market, Plasma Display Panels (PDPs) and Liquid Crystal Displays (LCDs). LCD televisions break down further into two types differentiated by the backlighting source, either Cold Cathode Fluorescent Lamps (CCFLs) or Light Emitting Diodes (LEDs). During 2008 and 2009, backlighting technologies have been rapidly innovated and in particular, the high efficiency LED has replaced traditional CCFL and become the dominant backlight in China's market. In June 2012, we analyzed 2337 models of which 66% were LED, 28% were CCFL and only 6% were PDP. Because of this fast technology upgrading, the market shifts to higher efficiency rapidly and 80.9% (see Figure 3) of LCD TVs based on LED backlight technology can reach the energy efficiency level Tier 1.

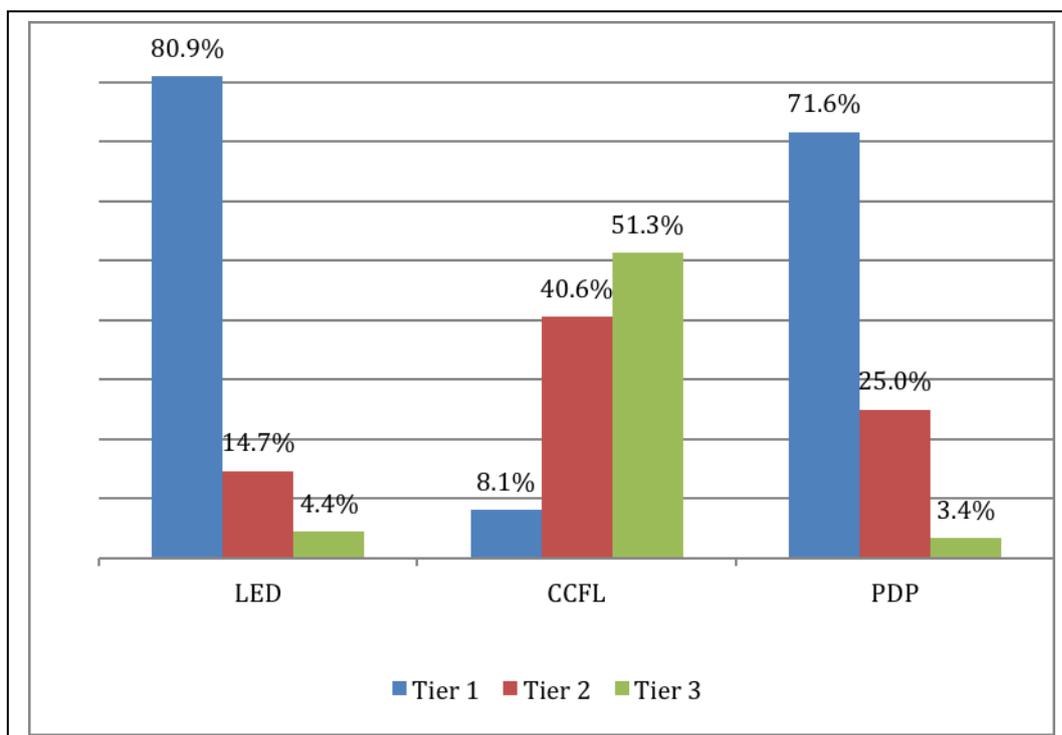


Figure 3: Distribution of televisions on the market in July 2012 across the 2010 energy efficiency standard tiers (note derivation of EEI's not comparable between LED/CCFL televisions and PDP televisions)

⁴ http://www.sdpc.gov.cn/zcfb/zcfbqt/2012qt/t20120529_482367.htm

The latest subsidy program (see Table 3) only supports flat-panel TVs with EEIs higher than the current Tier 1 (GB 24850-2010) requirement. This illustrates policy makers are aware that the current Tier 1 requirements for LCD and PDP televisions are not sufficiently high to reflect the current levels of higher efficiency televisions. Further, the subsidy thresholds set suggest EEIs of 1.7 for LCD and 1.4 for PDP represent energy efficient products, and EEIs of 1.9 for LCD and 1.7 for PDP represent highly energy efficient products.

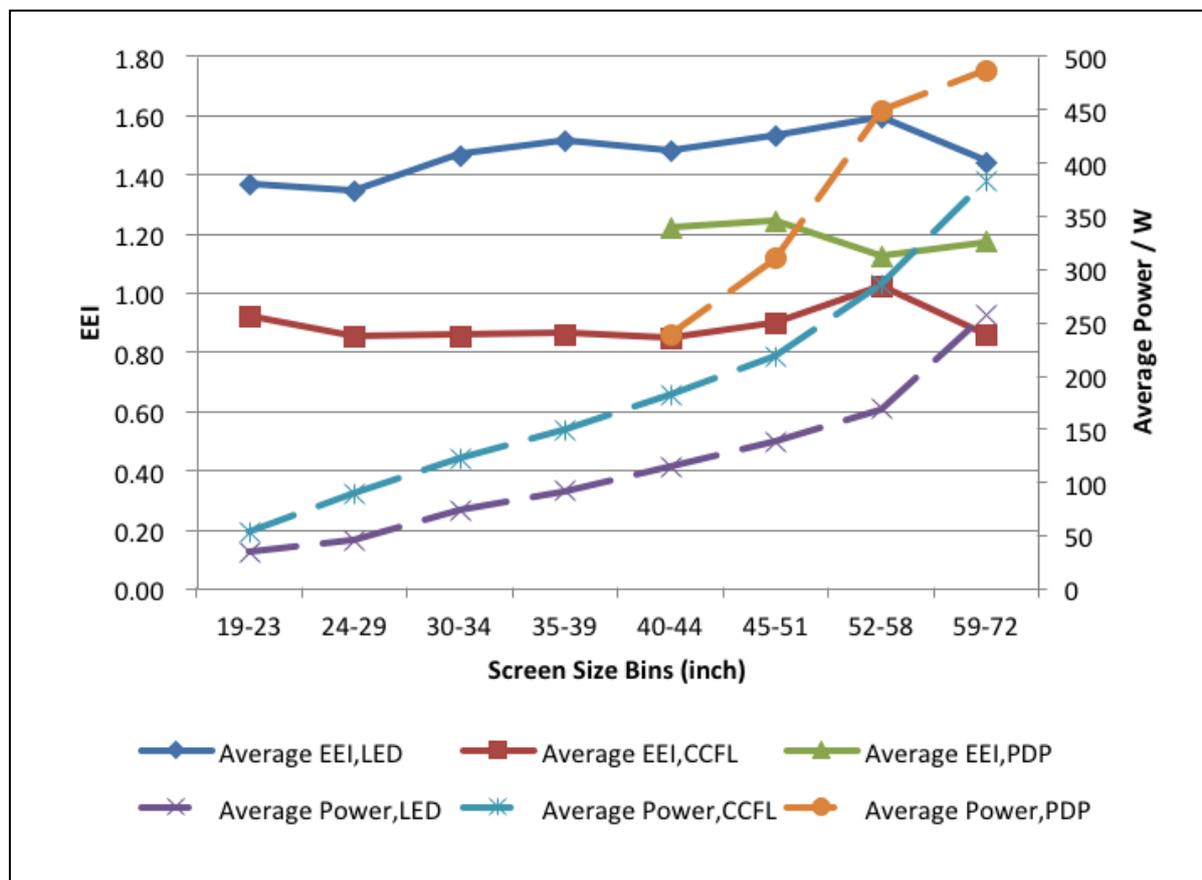
Table 3: Subsidy scheme for flat-panel TVs of varying efficiency and screen size (Energy Efficiency Index values calculated using GB 24850-2010).

Screen (inches)	Size	Liquid Crystal Display - LCD (RMB/Unit)		Plasma Display Panel - PDP (RMB/Unit)	
		EEI \geq 1.7	EEI \geq 1.9	EEI \geq 1.4	EEI \geq 1.7
19-32		100	150	-	-
32-42		250	300	250	250
42 and above		350	400	350	350

However, in the coming MEPS revision draft, the proposed minimum energy performance requirement (MEPR) for LCD and PDP are 1.7 and 1.4, respectively. This means these values will be the requirement as an entry level. In this case, it reflects that the requirements for this subsidy policy are not stringent enough as declared to be only for efficient products, and most of the televisions on the market could benefit from it.

Secondly, there is only EEI and passive standby power information on the energy label so ordinary consumers are highly unlikely to understand the meaning of EEI. They don't have any idea how much energy the TV consumes per day for a certain time of use. This gives the consumer no indication that that a PDP television is actually consuming significantly more energy than an equivalent LCD model, and thus removes the consumer's ability to choose the fundamentally more efficient LCD television with the associated lower energy consumption. The reason is that the EEI thresholds defined in the MEPS for LCD and PDP televisions are not directly comparable. A compensation coefficient "EFF_{PDP,ref}" is defined to calculate EEIs for PDP televisions on an equivalent basis to LCD televisions. It means that both technologies can "fair play", however without adoption of the "technology neutrality" approach as well as the information transparency for energy consumption, the energy label loses its nature of "saving energy by information". We believe that the PDP TVs shall not be subsidized anymore and subsidies shall only go to energy-saving technologies such as LED.

We also found that there is no energy consumption cap in the subsidy schemes, i.e. from the point of view of saving energy, subsidy program should exclude extremely big size TVs such as TVs over 60 inches because, based on the actual living condition in China, TVs bigger than 60 inches could be regarded as luxury products with very high energy efficiency but TVs consume more energy when they are bigger (See Figure 4) and should not be encouraged for purchase if a relatively smaller size product could meet the needs. TVs with bigger size get more subsidies. This will encourage



consumers to buy big sized TVs which consume more energy. Of course, the subsidy program has also goals to stimulate the domestic market and boom the economy. But without having a cap to control the total energy consumption, the “Jevons paradox” might happen.

Figure 4: Relationship between the energy efficiency index, power and screen size of televisions*

*Due to limited data availability, the data of power is not complete for all models. Power data was available for 1,547 models consisting of 925 LED models, 520 CCFL models and 102 PDP models.

Air conditioners

Fixed speed air conditioners were within the first batch of subsidized products in 2009. The subsidy scheme is listed in Table 4. Both the fixed and variable speed air conditioners are included in the latest subsidy program from June 2012 to May 2013. The subsidy scheme is shown in Table 5.

Table 4: Subsidy scheme for fixed-speed air conditioners (2009 ~ 2011).

Cooling	2009.6 ~ 2010.5 ⁵ (RMB/Unit)	2010.6~2011.5 ⁶ (RMB/Unit)
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⁵ http://www.sdpc.gov.cn/zcfb/zcfbqt/2009qt/t20090525_281606.htm

Capacity (W)	Tier 1	Tier 2	Tier 1	Tier 2
CC≤2800	500	300	200	150
2800<CC≤4500	550	350	200	150
4500<CC≤7100	650	450	250	200
CC>7100	850	650	/	/

Table 5: Subsidy scheme for fixed-speed and variable-speed air conditioners (2012).

Cooling Capacity (W)	Fixed speed air conditioner (RMB/Unit)		Variable speed air conditioner (RMB/Unit)	
	Tier 1	Tier 2	Tier 1	Tier 2
CC≤4500	240	180	300	240
4500<CC≤7100	280	200	350	280
CC>7100	330	250	400	330

It was reported [7] that during the first subsidy period (2009-2010), the subsidized price (i.e. original price minus the subsidy) of an efficient air conditioner, with power consumption of around 1.5HP (horse power), was cheaper by 2000 RMB for tier 1 products, and by 1500 RMB for tier 2 products than its original price. It is clear that the latest subsidy scheme for air conditioners is not as generous as in the first phase. We found that taking the subsidy into consideration, it cannot sufficiently close or reduce the price gap between tier 1, tier 2 and tier 3 products (see Figure 5).

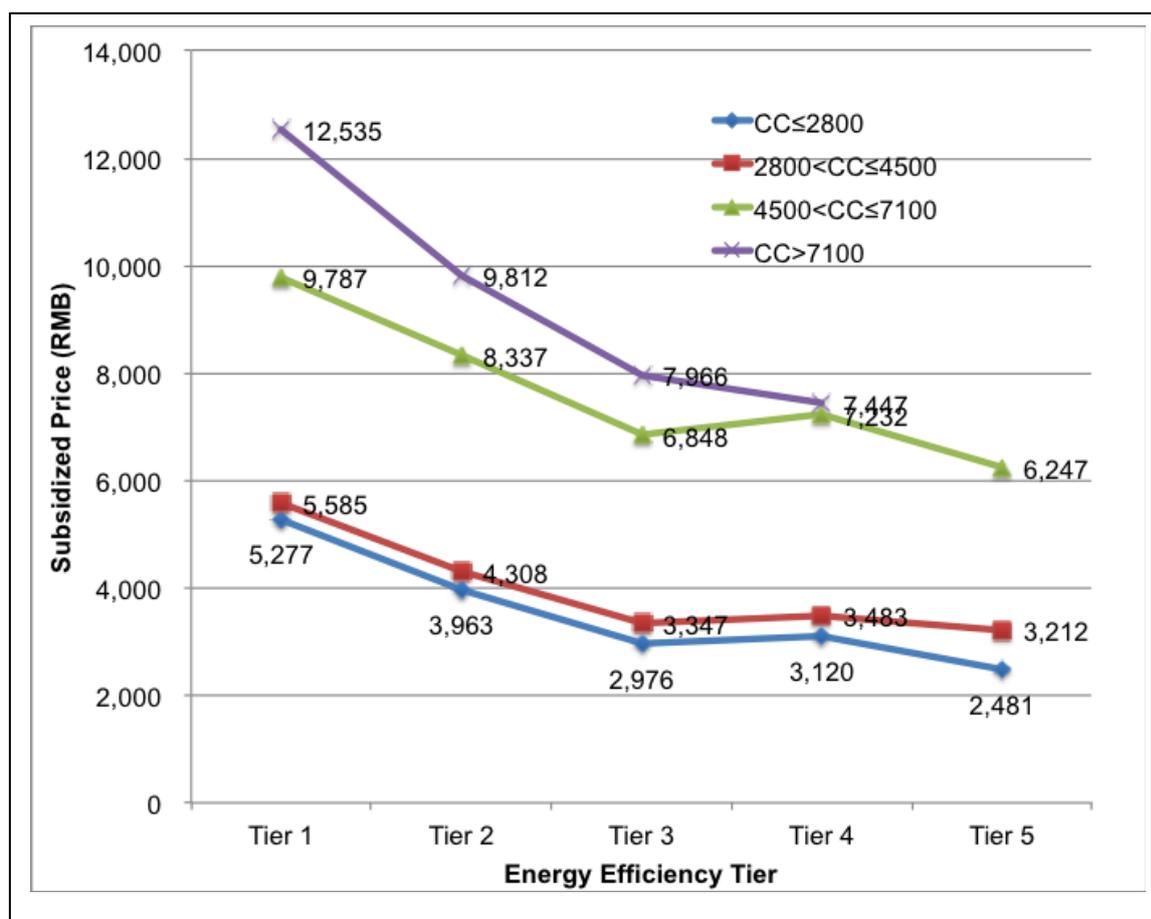


Figure 5: Subsidized average price of each efficiency tier in four cooling capacity groups

The price gaps and the increasing rate are shown in the Table 6.

⁶ http://www.sdpc.gov.cn/zcfb/zcfbqt/2010qt/t20100511_346219.htm

Table 6: Price gaps and increasing rate among the tiers.

Tier	Price Gap (%)				Price increasing rate (%)			
	CC≤2800	2800<CC≤4500	4500<CC≤7100	CC>7100	CC≤2800	2800<CC≤4500	4500<CC≤7100	CC>7100
1~2	1,399	1,345	1,519	4,287	33	30	18	37
1~3	2,584	2,550	3,289	7,814	86	76	48	98
1~4	2,457	2,402	2,905	8,332	79	69	40	112
1~5	3,097	2,673	3,890	6,880	125	83	62	77
2~3	1,184	1,205	1,769	3,526	40	36	26	44
2~4	1,058	1,057	1,385	4,045	34	30	19	54
3~5	1,697	1,328	2,371	2,593	68	41	38	29

The price difference between high efficiency products and lower efficiency products is so great that the higher tier models are at least 20% more expensive than those in lower tiers. Potentially, the price gap is large enough for the consumers to switch to the low efficiency products when they make their purchasing decision. It is speculated that the actual manufacturing costs of the high efficiency products are not as high as reflected by the price differences, as shown above. It is possible that the manufacturers and retailers are using the high efficiency tiers as a marketing tool to boost the retail price.

Refrigerators⁷

The implementing rules for subsidizing refrigerators took effect on June 4, 2012 with subsidies for energy-efficient refrigerators ranging from 70 RMB per unit to a maximum of 400 RMB per unit, depending on efficiency tiers and refrigerator type. The detailed subsidy scheme is shown in Table 7.

Table 7: Subsidy scheme for household refrigerators (2012).

Refrigerator type		Subsidy Amount (RMB/Unit)	Energy Efficiency Requirement
Freezer, Fridge/Freezer	Total Storage Volume (TSV) ≤120L	70	Energy Efficiency Index (η) ≤ 50% Tier 1
	120L < TAV ≤ 300L	130	
	TSV > 300L	180	
Fridge Freezer, frost-free fridge freezer	TSV ≤ 240L	260	η ≤ 32%
	240L < TSV ≤ 300L	330	
	TSV > 300L	400	η < 40% Tier 1

China Energy Label for refrigerators does have energy consumption information (kWh/24h), but there is no Energy Consumption Cap included in this subsidy scheme. It is still designed according to the EEI that is calculated as the ratio of the measured energy consumption of the unit during the test to the baseline value (maximum allowable value was proportionally set to the baseline value) of energy consumption. Since 90% of the available models in the retailer market are fridge freezers, we investigated 1143 of them in terms of EEI. 73.8% are tier 1 products and 248 models' EEI are lower than 32%. This indicates the subsidy scheme could be more stringent and the MEPS needs to be revised as well.

By the end of November 2012, 4197 refrigerator models had been registered and will be covered by the national subsidy programs. While it is possible that the subsidy has fulfilled its primary focus of stimulating demand for products, it appears the secondary goal of driving higher product efficiency

⁷ http://www.sdpc.gov.cn/zcfb/zcfbqt/2012qt/t20120608_484887.htm

has not been fulfilled. It appears the subsidy program for refrigerators was designed based on outdated product information and thus a very high proportion of refrigerators were eligible for the subsidy rather than restricted to the higher efficiency products.

Currently 14.3% of the 4197 models that have been registered to receive a subsidy have a storage volume over 300L and will be given 400RMB per unit, of those, 9.1% have a volume over 350L. While sales figures for these models are unknown, the data from GOME⁸ suggests that larger units are taking an increasing proportion of the market. If such big amounts of money can be used to subsidize the small and middle-sized refrigerators, the concept of both sufficiency and efficiency can be covered in this program.

Since the manufactures and retailers get more profit from the high-end market of refrigerators and the people who buy these expensive products are less likely to be sensitive to price, the impact of the subsidy is likely to be marginal even when at the maximum subsidy level of 400RMB. Figure 6 illustrates how the bigger the subsidized refrigerator is, the lesser percentage the subsidies account for from the average prices for the initial purchase. China's new subsidies average less than 10% of the appliance cost. Therefore, it is potentially helpful to stop subsidizing money-and-energy-consuming products and instead, add this budget to increase subsidies to attract the customers to buy ultra-energy-efficient refrigerators with the best energy-saving technologies.

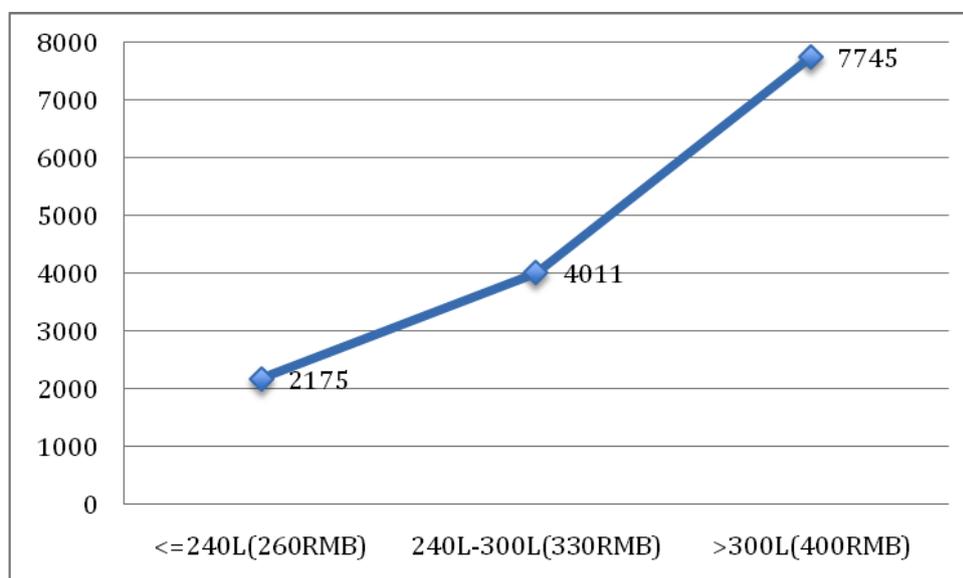


Figure 6: Average prices (RMB) for refrigerators with different subsidized volume groups.

Furthermore, it is found that some manufactures registered their refrigerator models for the subsidy with exactly the minimum value of the required energy efficiency index⁹. This raises risk for the monitors of the policy. To effectively examine and verify such kind of values, it is useful to define the tolerances that the tested parameters shall be subject to, namely each measured value shall be within the allowed tolerance from the value as required or declared.

Washing machines¹⁰

There are two main technologies of washing machine on the Chinese market: drum (front load) and impeller (top load). GB 12021.4-2004 regulates these two technologies with the same indicators

⁸ It is estimated by GOME, one of the biggest electrical appliances retailers in China, that the market share of three-door and side-by-side door refrigerators (both of which typically use more energy than their two door top vertical equivalent units) will increase from 50% to 65% in 2012.

⁹ <http://www.sdpc.gov.cn/zcfb/zcfbqg/2012gg/W020120914638886942311.xls> (read in October 2012)

¹⁰ http://www.sdpc.gov.cn/zcfb/zcfbqt/2012qt/t20120608_484897.htm

including energy consumption (kWh/cycle/kg), water consumption (L/cycle/kg) and washing ability. Both types of product are included in this subsidy program and the scheme is shown in Table 8.

Table 8: Subsidy scheme for washing machines (2012).

Product type	EET and Energy efficiency requirements	Subsidy amount (RMB/Unit)
Full-automatic impeller	Washing capacity≤3.5 kg, tier 2 and tier 1	100
	Washing capacity>3.5 kg, tier 1	200
Double barrel impeller	Tier 2 and tier 1	70
Drum	Tier 1, Washing ability≥1.03, Water consumption≤10 L/cycle/kg, Energy consumption≤0.17 kWh/cycle/kg	260

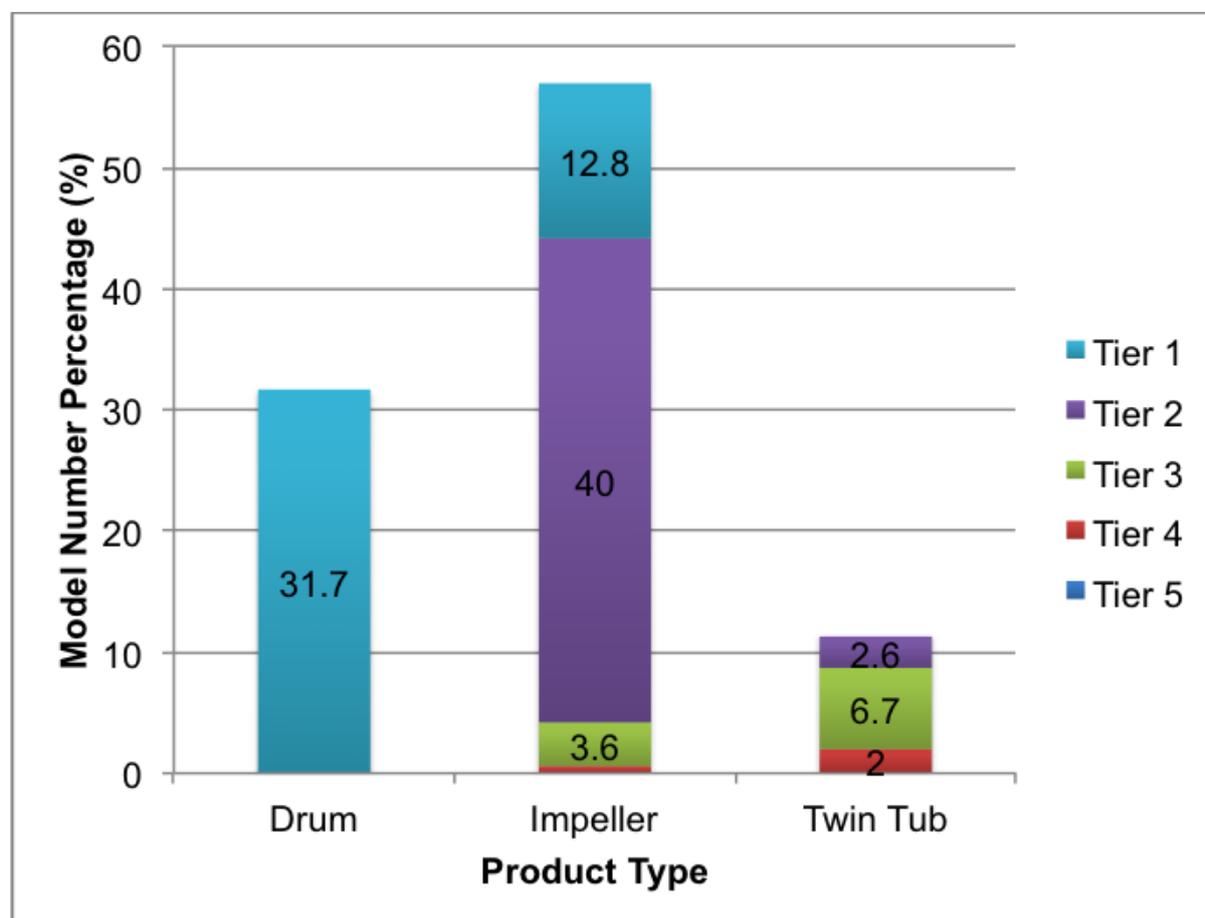


Figure 7: Energy efficiency tier share in different product types

Figure 7 shows all the drum washing machines are tier 1 products, while 25% of the impeller washing machines are tier 1 products. Taking tier 1 and 2 as the energy-saving products which is defined in the standard, there are more than 85% of washing machines that are energy-saving products. Resetting of the MEPS and energy efficiency classification of the washing machine is urgently needed.

Water heaters¹¹

The latest subsidy program includes three kinds of water heaters: 1) Gas water heaters, 2) Solar water heaters, and 3) Air-source heat pump water heaters. It was encouraging that the electrical water heater was excluded from the subsidy because such kinds of products waste energy by multiple transformations (coal to electricity, electricity to heat). We found that the subsidy scheme was established before the minimum energy performance standard for air-source heat pump water heaters was available. This implies that the standardization work is sometimes behind the policy and the process time needs to be improved. Due to the current limited data and page, more detailed discussion about this product can be seen in our specific report.

Conclusions

This paper reviewed the latest subsidy program for energy-saving products in China, and analyzed the subsidy schemes for the five target product categories based on a market analysis. Due to the data limitation, we cannot see the full spectrum of the truth, but based on our existing analysis we still arrived at the following conclusions:

1. MEPS need to be revised soon. On one hand, the market share of tier1 models is too high to determine the high energy efficient products, on the other hand, the recent subsidy program needs a more stringent standard to regulate the energy-efficient appliances market. Technology-neutrality is needed to have lowest energy consumption when we receive the same services. In addition, the energy consumption information shall be visible on the energy label to ensure customers have options to select energy-saving products.
2. It is recommended that the new MEPS replace the last tier with a meaningful value according to the models distribution of energy efficiency tiers, and reclassify tier 1 accordingly. We also proposed possible plans, for example reclassification for refrigerators is given based on EEI distribution and the subsidy scheme.
3. The effectiveness of the subsidy program can be improved given the following advices: from the energy saving perspective, subsidies shall only go to top-efficient necessary products (follow the rules of both efficiency and sufficiency), i.e. no wrong signals shall be given to consumers to get the maximum subsidy and buy a big-sized product which is unnecessary, otherwise “Jevons paradox” might happen. Therefore high absolute energy consumption modes (even if it is very efficient) shall not be subsidized; High-end models and luxury products shall not be subsidized, instead, to promote energy-saving technologies for mainstream models, subsidies shall intensively go to those models that have small and medium size. (this statements is from our point of view of saving energy, not considering the economic effect)
4. Many products in Tier 1 and Top10 are made artificially expensive to profit from affluent customers. This needs to be stopped. Subsidy should only go to end-consumer, not manufacturers.
5. To ensure an effective implementation of the energy policies, more enforcement and monitoring measures need to be taken. Tolerance is strongly recommended for the evaluation of the difference between the tested parameter values and the required or declared values, especially during subsidy registration.

Acknowledgement

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¹¹ http://www.sdpc.gov.cn/zcfb/zcfbqt/2012qt/t20120608_484891.htm

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Number references in the text in square bracket. Use "references" style here or Arial 10 justified single space. After each reference skip one line (inbuilt into style). See the examples below

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