

# Impacts of China's Energy Efficient Appliance Subsidy Program on Customer Behavior

## Executive Summary

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Over the past few decades, China's burgeoning economy has resulted in significantly accelerated urbanization and a notable increase of disposal income among Chinese citizens. Along with rapid economic development, China's energy consumption has risen at an extraordinary rate. Domestic electricity consumption grew 43% between 2008 and 2012,<sup>1</sup> and sales of appliances have skyrocketed. In 2010, China surpassed the United States as the world's largest energy consumer.

The Chinese Government recognizes household appliances as one of the primary contributors to overall energy consumption. Since the 1980s, it has implemented a series of measures to improve household appliance energy efficiency and facilitate market transformation towards more energy efficient products. To date, China has implemented 48 minimum efficiency performance standards (MEPS) for energy-using products. In 2005, the government introduced the China Energy Label, a categorical mandatory energy information label adapted from the EU's categorical energy label. The label categorizes appliances into three or five tiers of efficiency, with Tier 1 being the most efficient and Tier 5 (or Tier 3) being the least efficient. Tier 5 (or Tier 3) aligns with the minimum energy efficiency required for a product to enter the Chinese market. As of 2013, the China Energy Label is displayed on 29 types of products, covering all major household appliances.

In order to further facilitate market transformation, the Chinese government also launched a series of incentive programs. In the past, such programs included the *Appliances to the Rural Areas Program* in 2008, the *Promoting Energy-Efficient Appliances for the Benefit of People Program* in 2009, and *Appliances Trade-in Program* in 2009. In the executive meeting chaired by Premier Wen Jiabao on May 16, 2012, the State Council decided to commit 26.5 billion RMB (\$4.26 billion) to the newest phase of the *Promoting Energy-Efficient Appliances for the Benefit of People Program* - hereafter referred to simply as "the subsidy program." This program aimed to subsidize energy-efficient appliances - specifically Tier 1 and/or Tier 2 products. It covered six categories of household appliances, including air conditioners, televisions, refrigerators, clothes washers, water heaters and desktop computers. It was launched on June 1, 2012 and scheduled to end on May 31, 2013.

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<sup>1</sup> Enerdata, Global Energy Statistical Yearbook 2013. <http://yearbook.enerdata.net/electricity-domestic-consumption-data-by-region.html>



The subsidy program was the latest and by far the largest incentive program implemented by the government that seeks to improve the energy efficiency of end-use electric products and promote their use. However, no studies had been conducted to assess the effectiveness and impact of this or similar programs from the perspective of consumers. In 2012, CLASP and All China Marketing Research (ACMR) aimed to fill this gap by conducting a consumer survey in 10 cities across different socioeconomic strata in China.

The primary objectives of the survey were:

- To investigate consumers' behavioral characteristics in energy efficient appliance purchases;
- To assess levels of awareness about the subsidy program; and
- To study the relationship between the size of the subsidy and consumers' expectations under different purchase scenarios.

Based on the results and analysis of the survey, we attempted to formulate a set of practical policy recommendations for future policy design and implementation.

## Methodology

The project team designed a detailed questionnaire to evaluate the impact of the subsidy program among consumers. The questionnaire consisted of three major components. The first component examined consumers' purchase behaviors. Participants were asked which factors they consider the most when purchasing an appliance, whether or not they purchased energy efficient (EE) appliances,<sup>2</sup> and the primary reasons that they choose or do not choose EE appliances.

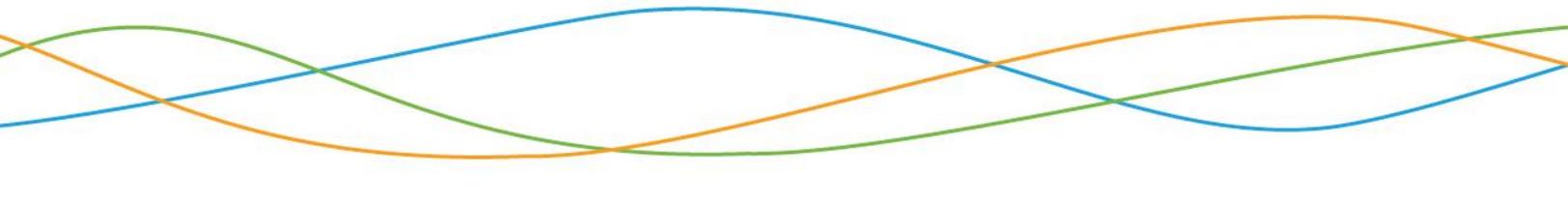
The second component assessed consumers' level of awareness about the subsidy program. Consumers were asked whether or not they had heard of the program, whether they could name all six subsidized product categories, whether they knew the size of the product subsidies, and their general response to the subsidy programs.

The third component investigated consumers' willingness to pay for efficient appliances and attempted to quantify consumers' expectations about the size of the subsidy under different purchase scenarios.

The questionnaire was distributed to consumers in ten cities across China. The total number of consumers interviewed was 15008, out of which 2630 completed the survey. These 2630 respondents will be referred to as "successful samples" in the following sections; most of the analysis was performed based on the successful samples.

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<sup>2</sup> Energy efficient appliances are defined in this study as appliances with Tier 1 and/or Tier 2 energy ratings.

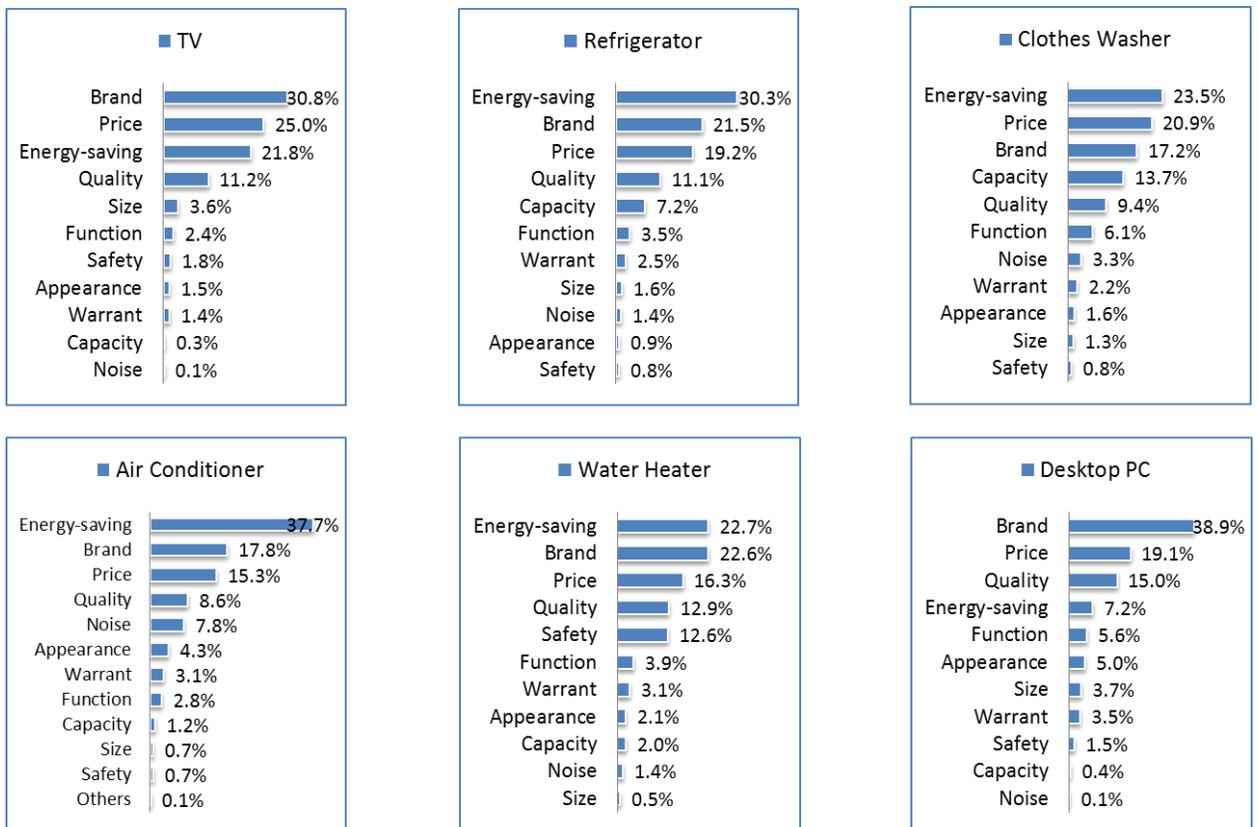


## Results & Discussion

### Behavioral Characteristics of Consumers

The first component of the study investigated factors that could potentially influence a consumer's purchase decision about particular types of appliances. For each type of appliance, survey participants were asked to select the most important factor they would consider when making a purchase. Generally, energy saving was among the top three factors for all appliances, except for desktop computers and televisions. Brand and price were the top considerations for most consumers on televisions and desktop personal computers (PCs), while a large proportion of consumers considered energy saving to be most important factor for heavier energy-consuming appliances such as refrigerators and air conditioners.

Figure 1: Factors influencing consumer purchasing decisions



Numbers are in percentages of consumers, where N=2630

Of the surveyed consumers, 75% had purchased appliances in the past six months, while 25% planned to purchase a new appliance in the next three months. Among those who had

purchased appliances (1723), 87% of participants chose energy efficient appliances. A majority of these consumers (53%) considered electricity saving to be the primary reason for choosing efficient appliances, whereas 26% of consumers indicated that they would choose an efficient appliance due to their awareness of environmental and energy conservation.

It appears that Chinese consumers' purchasing decisions were not greatly affected by the subsidy program. Only 13% of consumers who participated in the subsidy program (1723) indicated that the subsidy was the primary reason for them to purchase energy efficient appliances. Saving energy appears to be the primary reason for most Chinese consumers to select energy efficient appliances because they can save money on their electricity bills. Continual increases in electricity prices<sup>3</sup> and the long life-span of appliances stood out as two potential reasons that the subsidy program was not a top consideration for consumers.

However, when consumers were asked to rate the influence of the subsidy program on their purchase decisions, the average ratings were between 3.7 and 4.1 (5 being the highest influence), indicating that the subsidy program still had a significant influence on consumers' decisions. Subsidies could act as a catalyst for energy efficient appliance purchases and speed up planned purchases. Sometimes the mere existence of a rebate made consumers more willing to choose higher efficiency practices because they could feel more comfortable about the promised energy efficiency.<sup>4</sup>

### Program Recognition and Awareness among Consumers

Among the 15008 total consumers interviewed, 62% had heard of the subsidy program. Among the successful sample, 58% had seen the subsidy program label. However, most participants were found to lack in-depth knowledge of the subsidy program. Only 10% were able to name all six types of appliances covered by the program, while most knew the subsidy size for only one type of appliance or did not know the subsidy size at all. We also found that consumer awareness of the subsidy program was lower in fourth-tier cities compared to others, indicating that regional and socioeconomic status may affect consumer awareness.<sup>5</sup>

These results show that while promotion of the subsidy program raised a considerable level of awareness among consumers, there were still a large number who were not aware of the program or lacked detailed knowledge of it. It should be recognized that increasing awareness about energy efficiency programs has historically been a gradual process. In 2000, for instance, only 40% of American consumers were aware of the U.S. ENERGY STAR program, but this awareness increased to 60% of the population by 2005 and exceeded 80% in 2011. Based

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<sup>3</sup> Huang, S. (2009). Review and outlook of china's electricity tariff reform - dedicated to the thirtieth anniversary of reform and opening-up. [In Chinese] *Price: Theory & Practice*, (5)

<sup>4</sup> Train, K. E., & Atherton, T. (1995). Rebates, loans, and customers' choice of appliance efficiency level - combining stated and revealed-preference data. *Energy Journal*, 16(1), 55-69.

<sup>5</sup> Chinese cities are classified into four tiers, with the first tier comprising the most socioeconomically advanced cities, such as Beijing, and the fourth tier comprising smaller cities such as Jiangmen.

on the progress of the ENERGY STAR program, current consumer awareness of China's subsidy program is satisfactory but still has room for improvement.

A majority of participants learned about the subsidy program through media in retail stores and/or referrals from friends or relatives. Retail store media included program posters, signage, advertisements, pamphlets, and introduction by sales staff. Although online shopping has increased in recent years in China, consumers still chose to visit retail stores to shop for appliances. Therefore, enhancing promotion of the subsidy program in retail stores could improve the program's effectiveness.

### Size of the Subsidy and Consumer Expectations

In this part of the survey, consumers were first asked whether they were willing to pay more for energy efficient appliances, and then asked about their expectation of the subsidy's size. Compared to inefficient appliances, 86% of Chinese consumers claimed that they were willing to pay extra for energy efficient appliances. The extra cost that most consumers were willing to pay was below 10%. Hence, we expect that a larger incentive will be needed to actually alter Chinese consumers' purchase decisions.

When studying the expectations for the subsidy size, all surveyed consumers were given two hypothetical scenarios. The first was inelastic demand, under which the consumers needed to purchase new appliances, to replace broken ones or for use in a new home. The second scenario was elastic demand, where consumers had the flexibility to choose whether or not to purchase new appliances, such as replacing a functioning older television or adding a secondary television.

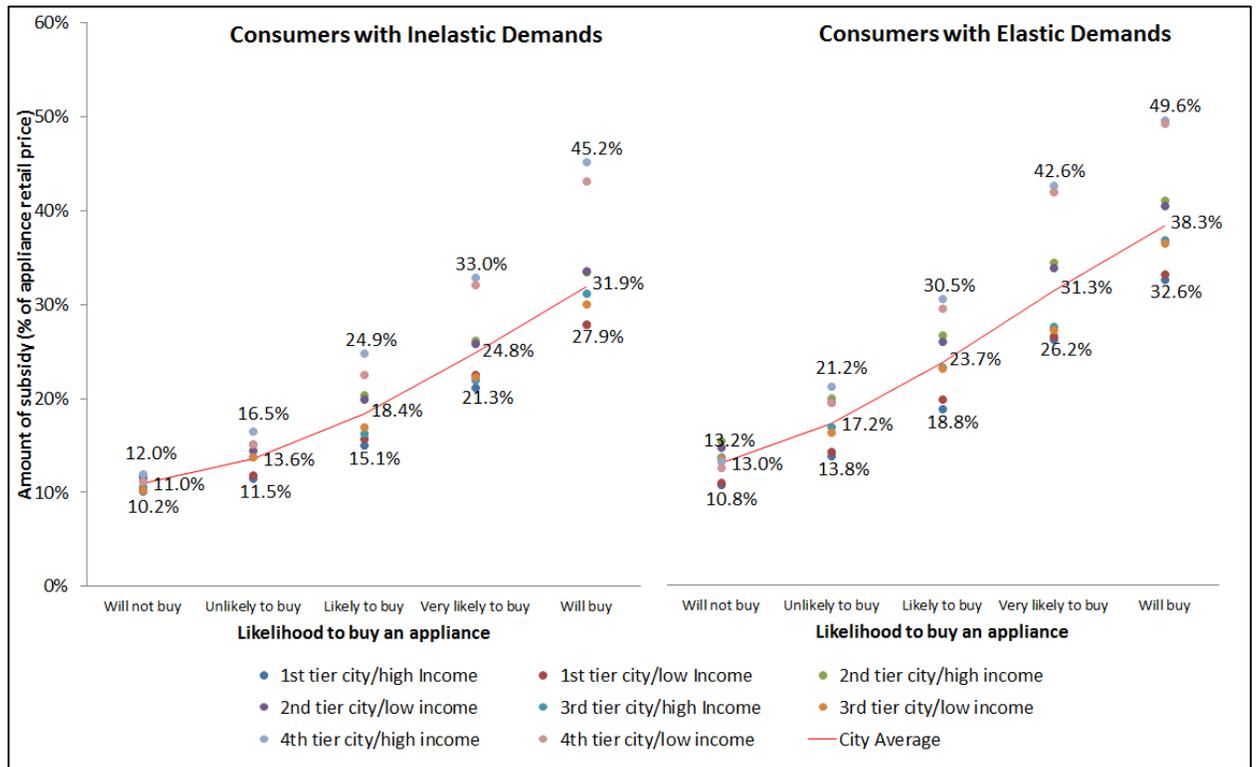
Under both scenarios, the likelihood that consumers would purchase energy efficient appliances was found to increase with the size of the subsidy, as illustrated in Figure 2 below. The consumers with elastic demands required more incentive than those with inelastic demands. On average, when the size of the subsidy reached 24.8%, consumers with inelastic demands would become very likely to buy energy efficient appliances. In comparison, consumers with elastic demand expected a 31.3% subsidy before they become very likely to buy energy efficient appliances. Strong regional effects were also apparent: the expectations of consumers in smaller cities were much greater than those of consumers in larger cities.

The size of the subsidy offered in the program ranged from 4% to 12% for refrigerators, air conditioners, and televisions. In a study conducted in June 2012, Top 10 China suggested that consumers will have a clear propensity to purchase efficient appliances when the size of the subsidy is equivalent to 20% to 30% of the retail price.<sup>6</sup> Similarly, an Austrian appliance turn-in program offered both initial investment rebates and payments for kWhs saved, and the rebate was the greater value of either 20% of the initial electricity bill or 20% of the cost of

<sup>6</sup> Top10 China, <http://www.top10.cn/news/110/256/Top10-265.html>

the new appliance.<sup>7</sup> Thus it appears that the 2012-2013 Chinese subsidies were relatively small compared to both the expectations of Chinese consumers and other international practices.

Figure 2: Likelihood for consumers to buy appliances under different scenarios



## Conclusions and Recommendations

Overall, our analysis suggests a moderate level of awareness among Chinese consumers about the Chinese National Subsidy Program, but in general, consumers lacked in-depth knowledge about the program. As such, we recommend that Chinese policymakers enhance marketing, advertising, and outreach for the subsidy program by taking the following actions:

### Allocate more resources to public outreach

A sufficient budget for public awareness campaigns is essential for the success of an energy efficiency program. As noted above, the U.S. ENERGY STAR program cumulatively spent over \$2.5 billion USD on advertising through December 1999, reaching over 1 billion consumers. To

<sup>7</sup> Haas, R. (1996). Some empirical findings of an Austrian appliance turn-in program. *Energy* 21(1), 55-60. doi: 10.1016/0360-5442(95)00085-2

achieve similar success, Chinese policymakers should set a sufficient budget for expanded outreach activities.<sup>8</sup>

#### Use various types of media for outreach efforts

Although the program has achieved success by reaching out to consumers who shop in retail stores, policymakers should diversify communication channels for the program - such as print media and television commercials - in addition to expanding retail store promotions. Such a campaign would not only increase public awareness of the subsidy program, but also promote recognition and spur purchases of efficient appliances in general, which would contribute to the eventual transformation of the appliance market towards higher energy efficiency.

#### Increase outreach to lower-tier cities

Compared to other cities in higher tiers, consumers in fourth-tier cities have a lower level of awareness of the subsidy program. Therefore, we recommend that policymakers enhance the promotion of energy efficiency programs in fourth-tier cities.

Additionally, we found that Chinese consumers' willingness to pay for more efficient appliances was low, and their expectation for subsidy levels was high. Compared to their expectations, the current size of subsidies is rather small. As such, we recommend that Chinese policymakers:

#### Only subsidize appliances with efficiencies at Tier 1 or higher

With the total program budget on incentives unchanged, it would be more cost-effective to subsidize only appliances with Tier 1 or higher energy efficiency, instead of subsidizing both Tier 1 and Tier 2 appliances.

#### Increase subsidy amounts to 20% - 30% of the retail price

Higher subsidy amounts that meet the consumer expectations are more likely to shift Chinese consumers' purchase decisions toward efficient appliances.

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<sup>8</sup> The budget allocation of China's subsidy program was not available to the public, and whether or not the program had specific budget for public awareness is unknown.