

# **Evaluation of Local Enforcement of Energy Efficiency Standards and Labeling Program in China**

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## **ABSTRACT**

As part of China's commitment to promoting and improving the local enforcement of appliance energy efficiency standards and labeling, the China National Institute of Standardization launched a local enforcement of efficiency standards and labeling project on August 14, 2009. For this project, Jiangsu, Shandong, Sichuan and Shanghai were selected as pilot locations. This paper provides information on the local enforcement project's recent background, activities and results as well as comparison to previous rounds of check-testing in 2006 and 2007. In addition, the paper also offers evaluation on the achievement and weaknesses in the local enforcement scheme and recommendations based on international experience.

The results demonstrate both improvement and some backsliding. Enforcement schemes are in place in all target cities and applicable national standards and regulations were followed as the basis for local check testing. Check testing results show in general high labeling compliance across regions for five products. But it also identified key weaknesses in labeling compliance in Sichuan as well as in the efficiency standards compliance levels for small and medium three-phase asynchronous motors and self-ballasted fluorescent lamps. In the case of refrigerators, the efficiency standards compliance rate exhibited a wider range of 50% to 100%, and the average rate across all tested models also dropped from 96% in 2007 to 63% in 2009, possibly due to the implementation of newly strengthened efficiency standards in 2009. In light of these results, this paper also identifies areas for improvement including in local awareness, product sampling methodology, check-testing tools and procedures.

## **Introduction**

After over twenty years of experience with standards and labeling programs, China now has minimum energy performance standards (MEPS) for over 40 products, mandatory categorical energy information label (China Energy Label) covering 23 products and voluntary efficiency certification covering over 50 products (CNIS 2011). MEPS help push the efficiency of products on the market by setting energy efficiency metrics that must be met and help eliminate inefficient, non-compliant products that cannot meet the standard. At the same time, the China Energy Label seeks to pull the market for efficient products by providing information for consumers to identify and/or compare the energy efficiency of similar product models in their purchase decision-making. The China National Institute of Standardization under China's State Administration of Quality, Supervision, Inspection and Quarantine (AQSIQ) is the technical body responsible for developing MEPS and managing the China Energy Label program. One particular area of focus that has emerged with the expansion of the standards and labeling programs is the need for improved implementation and enforcement of the energy efficiency standards and the China Energy Label.

From a legal perspective, multiple laws and regulations in China define the responsibility of each government agency and specify a system of fines and penalties for products that fail to meet MEPS and/or the mandatory labeling requirements. In practice, nevertheless, enforcement is more difficult due to organizational coordination challenges and resource constraints. While CNIS is actively involved in and responsible for developing and managing the standards and labeling programs, China's State Administration of Quality, Supervision, Inspection and Quarantine (AQSIQ) have authority over the supervision and inspection of energy efficiency standards with its national, regional and provincial offices and their inspection institutions responsible for enforcement. However, because

AQSIQ and its provincial divisions are responsible for the national product quality supervision testing of all consumer products, primary emphasis is generally on product safety with secondary emphasis on product performance. Without specific standards or regulations on energy efficiency testing requirements, energy efficiency receives relatively low priority in national quality testing and the major appliances of clothes washers, refrigerators and air conditioners have only been tested one to three times from 2001 to 2006 (Saheb et al. 2011). Similarly, “enterprise self-declaration” in registering for the China Energy Label has historically been a key feature of energy labeling enforcement as AQSIQ and related organizations were not allocated sufficient resources to undertake labeling enforcement.

In recent years, several random market inspections and investigations of national and local supervision departments have raised questions about the validity of self-reported information as some enterprises and third-party laboratories were found to lack sufficient energy efficiency testing capacity (Zhou, Fridley & Zheng 2010). In response to the rising concerns with product quality and labeling accuracy, CNIS initiated several energy efficiency testing and verification pilot projects. In 2006, CNIS, with international support, conducted modest sample testing of 54 product models of refrigerators, freezers and room air conditioners in the sample cities of Beijing, Shanghai and Hefei. A second phase of follow-up check-testing was conducted in 2007 in the same cities but with a slightly larger sample of 73 product models. In August of 2009, CNIS launched the National and Local Enforcement of Energy Efficiency Standards and Labeling project with check-testing of a total of seven products conducted in four pilot locations of Jiangsu, Shandong and Sichuan provinces and Shanghai municipality. This round of check-testing expanded the sample size and product scope of testing and for the first time, incorporated compliance verification for both MEPS and the China Energy Label.

This paper provides a brief review of the methodology of the 2006 and 2007 rounds of pilot check-testing and analysis of testing results. The paper then evaluates the 2009 local enforcement program in terms of its inspection, sampling and testing methodologies and results. A comparison of the 2009 testing to earlier rounds of check-testing serves as the basis for evaluating the recent progress in local enforcement of standards and labeling programs in China. The achievement and weaknesses in the recent local enforcement scheme are further evaluated and recommendations are made based on international experience.

## **Review of Earlier Local Enforcement Check-testing Efforts**

The development and expansion of China’s mandatory energy information label program and emerging concerns about the validity of self-reported information led CNIS to launch its first pilot check-testing project in 2006 to measure how well labeled information matches the claimed energy performance for household refrigerators/ freezers and room air conditioners. More specifically, label compliance check-testing was conducted by selecting products and testing the energy performance tested to verify if it meets the rated label requirements. To ensure the integrity of the budding China Energy Label program, CNIS with technical support from Lawrence Berkeley National Laboratory initiated check-testing in three major Chinese cities.

### **Initial Check-testing Methodology**

The three cities selected for the first pilot check-testing in China include: Beijing in northern China, Guangzhou of southern Guangdong province and Hefei of central Anhui province. The selection of the cities was based on their geographic distribution as well as the existence of an active market for household appliances and participation of local manufacturers in the energy labeling program. Another consideration for selecting the three cities was access to national standards testing

laboratories located within each city.

As seen in Table 1, a total sample of 54 models was purchased from retail markets in Beijing, Guangzhou and Hefei for the 2006 check testing program. The relatively small sample size of approximately 1% of the total number of product models in the energy labeling program was due to budget constraints. The samples selected were then sent to three national test laboratories within the three cities for efficiency testing following the relevant national test procedures. Manufacturers are notified of the efficiency testing results and if manufacturers disagree with results in which products fail the test, they have the option to request a second round of re-testing. To re-test their products, manufacturers must pay the sample acquisition and testing costs and two units of the same product will be randomly selected from the same retailer for testing. Both of the products selected must meet the specified criteria during the round of re-testing to be considered in compliance. The re-testing round was offered as a second chance for compliance and gives manufacturers the benefit of the doubt regarding their commitment to not over-rate their products.

As a second phase of this effort, CNIS repeated the check testing program in 2007 for 73 samples in the same cities, adding clothes washers as an additional product. The distribution of product samples purchased and tested in each of the three cities for the two rounds of initial check-testing is shown in Table 1. The same sampling and testing procedures were followed, including the option of re-testing for products that fail the first test.

**Table 1: Tested Product Samples by City and Type in 2006 and 2007**

	Beijing		Guangzhou		Hefei		Total by Product	
	2006	2007	2006	2007	2006	2007	2006	2007
Refrigerators	14	5	0	18	7	0	<b>21</b>	<b>23</b>
Freezers	0	0	1	7	10	0	<b>11</b>	<b>7</b>
Air Conditioners	0	5	16	0	6	17	<b>22</b>	<b>22</b>
Clothes Washers (2007 only)	-	18	-	3	-	0	-	<b>21</b>
<b>Total by City</b>	<b>14</b>	<b>28</b>	<b>17</b>	<b>28</b>	<b>23</b>	<b>17</b>	<b>54</b>	<b>73</b>

Source: Zhou et al. 2008

For each product family, specific testing criteria are determined based on the current national MEPS, test procedures and China Energy Label categorical efficiency thresholds. In particular, specific tolerance thresholds are set for values obtained from testing when compared to the claimed values on the label for each type of product to determine compliance (Zhou et al. 2008).

### Initial Check Testing Results and Analysis

Table 2 shows the compliance rates of the 2006 and 2007 check-testing by product and region.

**Table 2: Comparison of Compliance Rates by Product Type, City and Year**

	Beijing		Guangzhou		Hefei		Overall	
	2006	2007	2006	2007	2006	2007	2006	2007
Refrigerators	86%	100%	-	83%	71%	-	81%	96%
Freezers	-	-	100%	100%	50%	-	55%	100%
Room ACs	-	100%	94%	-	83%	100%	91%	100%
Clothes washers	-	94%	-	67%	-	-	-	91%

Note: the compliance rates shown above include second stage re-testing outcomes.

Source: Zhou et al. 2008

As seen in Table 2, some products failed the check-testing in all three cities. However, in comparison with the 2006 testing results, the 2007 check testing showed a significant improvement in compliance across product types and regions. In fact, the number of noncompliant product models

(after re-testing where applicable) decreased from 11 out of 54 in 2006, to only 3 out of 73 models in 2007.

At the regional level, products tested in Beijing not only achieved higher labeling compliance rates for refrigerators (from 86 percent to 100 percent), but also achieved 100 percent compliance for air-conditioners and 94 percent for clothes washers. However, it should be noted that the sample size, particularly for refrigerators and air conditioners, were relatively small and not necessarily representative of all products in Beijing. Further, the 2006 performance and compliance rates varied between models sold in high-end, first-tier appliance retailers versus those sold in second- and third-tier retailers, with those sold in high-end retailers having higher compliance. In 2007, this trend was not directly observed. However, because the vast majority (69 out of 73) of the sample was taken from a single high-end retailer, it is not clear that this actually signifies an improvement in the compliance of lower-tier retailers (Zhou et al. 2008).

In contrast to 2006, the three non-compliant models for 2007 had relatively high actual energy ratings. These three models all had labeled energy ratings<sup>1</sup> of Grade 1 or 2, whereas more than half of the 2006 non-compliance product models had the lowest energy rating of Grade 5. In fact, all of the appliances with low energy ratings of Grade 4 or 5 were able to meet their energy performance requirements in either the initial testing or re-testing in 2007. Thus, compared to 2006, the recent absence in the market of non-compliant appliances that could not meet MEPS (Grade 5) requirement is a significant achievement.

Overall, limitations exist in the scope and sampling methodology of the 2006 and 2007 check testing evaluation. The sample selection was very small. The product models tested were representative of only 1 percent of the total number of product models and are not representative of the entire country and the market. In addition, sample testing was conducted only in the markets of three top-tier cities: Beijing, Guangzhou and Hefei, and was largely from top-tier retailers. This is especially true for smaller manufacturers who have fewer models on the market and often sell to smaller cities or rural areas. Air conditioners and refrigerators, for example, included test samples from 48 different manufacturers, out of a total of more than 200 manufacturers of household refrigerators and air conditioners in China. Many of these 200 manufacturers are small enterprises with low production volume (Zhou et al. 2008).

For products that are found to be non-compliant, the *2007 Management Method of the Energy Efficiency Label* gives the China Energy Label Management Center (CELMC) within CNIS the right to suspend the registration of the energy label of any manufacturer. For serious violations, CELMC may not approve the testing report of the energy-labeled product provided by the company, and a third-party testing of the product would be required. At the same time, the names of manufacturers who fail to address compliance problems within specified deadlines would be shared with the local quality supervision departments at all levels to ensure the resolution of issues arising from the testing.

## **Evaluation of 2009 Local Enforcement Program**

### **2009 Local Enforcement Program Background**

As part of its commitment to continue promoting and improving the local enforcement of appliance energy efficiency standards and labeling, CNIS launched the National and Local Enforcement of Energy Efficiency Standards and Labeling project on August 14, 2009. The project has short-term goal of expanding efforts to improve enforcement of standards and labeling to national scale within three years and long-term goal of perfecting overall enforcement (CNIS 2010). Compared to the 2006 and 2007 check-testing initiatives, the 2009 local enforcement program featured broader

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<sup>1</sup> The categorical China Energy Label ranks a product model by its energy performance relative to similar models, with Grade 1 being the most efficient and Grade 5 being the least efficient. Grade 5 is set to the MEPS efficiency level so that all Grade 5 products will at least meet the MEPS requirements.

geographic scope and product coverage and included both labeling inspections and energy efficiency verification testing.

In implementing this project, four pilot locations (Jiangsu Province, Shandong Province, Sichuan Province and Shanghai Municipality) established organizational structures for carrying out the local enforcement program. In the case of the three provinces, the provincial Bureau of Quality and Technical Supervision took the lead in organizing and mobilizing enforcement, supported by the city-level Bureau of Quality and Technical Supervision which actually undertook enforcement (Sichuan QTSB 2010). The products subject to testing were randomly selected from manufacturers' warehouses, and/or retailers and sent to the provincial Institute of Quality Inspection and Technical Research (IQITR) for label compliance inspection and energy efficiency check testing. For Shanghai, the municipal government followed a similar structure but took enforcement one step further by collaborating with its Energy Conservation Supervision Center and inviting five media outfits (primarily newspapers) to oversee their work via public opinion (Shanghai IQITR 2010)

Funding for the 2009 local enforcement project primarily came from international support through the Energy Foundation in China, with CNIS allocating a total of 0.2 million RMB to each local IQITR. The local governments contributed from their own budget to supplement the funding and provided in-kind support. Although no details are available from the four pilot locations regarding their 2009 budgets and expenditures for the project, funding was used to underwrite local efforts in sampling, inspection and testing, data collection and statistical analysis, labor costs, as well as project publicity campaign and training (Sichuan IQITR 2010). Statistics on the specific staffing resources for the market inspection and check-testing were not available due to the complexity of various levels (i.e., city, county, and district) of government agencies involved in enforcement. In the absence of specific data on staffing or detailed breakdown of monetary resources for the enforcement project in the four pilot locations, the organizational structure provides a glimpse into the core institutional resources.

Given the growing number of check-testing projects in China, it should be noted that this local enforcement project is not linked to the national-scale market inspection conducted by CNIS for the China Energy Label, which is focused on improving nation-wide compliance. It is, however, linked to other government policies such as "Home Appliances to Rural Areas," a subsidy project promoting the sale of efficient appliances, and the governmental supervision of local products. The local inspection results are fed into the CNIS's nation-wide inspection program as well.

## **Energy Efficiency Labeling Compliance Inspection**

**Inspection Methodology.** The first step in the inspection process is to identify the target criteria for energy efficiency label compliance inspections. Across Jiangsu, Sichuan, Shandong and Shanghai, the four criteria that were targeted for inspection include (Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011):

- Energy efficiency label implementation by the inspected manufacturer, including whether it has registered with the China Energy Label certification database, the percent of products produced that have an energy label, as well as how it manages the labeling system;
- Whether inspected products are properly labeled in compliance with the requirements set out by the government;
- Whether the design of the label of inspected products complies with pertinent requirements;
- Whether the information on the energy label is consistent with that on the nameplate of the products inspected.

For the 2009 local enforcement project, the pilot provinces and city each identified the types of products to be included in the energy efficiency label compliance inspection as well as energy efficiency check-testing based on two conditions: the capabilities of local laboratories in testing the selected products and the potential social impact brought about by the selected products. The greater the impact that a product's efficiency could have on the market (i.e., if product is in widespread use or

if it consumes significant amount of energy per unit), the more likely that product will be selected for inspection and check-testing.

Once the inspection criteria and products were determined, the city-level Bureau of Quality and Technical Supervision, under the supervision of its provincial-level counterpart, conducted sampling and inspection at the manufacturers' warehouses and in selected retailers that sell the products. The inspection results were recorded by product type and tabulated for data analysis. For products for which the label was deemed as non-compliant, the inspection team took on-the-spot photos of the product model and nameplate as documentation of non-compliance. Manufacturers and retailers that failed to comply with requirements of the label certification project were subject to penalties based on pertinent laws and regulations. All of the statistical results of the inspections were then reported to the provincial Institute of Quality and Technical Supervision for publication on its website. To raise the general public's awareness of energy efficiency labeling and improve manufacturers' compliance, the China Energy Label Management Center made a list of non-compliant manufacturers public on websites and through media outlets (e.g., newspapers and televisions).

**Inspection Results.** Table 3 shows the results provided by the participating provinces of Jiangsu, Sichuan and Shandong (information on Shanghai was not available). Based on the inspection results by region and given different sample sizes, Sichuan had the lowest compliance rate (an average of 41% for two inspected product type) compared with the 100% compliance rate attained by Jiangsu for all three product types inspected, as well as an average of 87% attained by the three product types inspected in Shandong. This variation in performance may be attributed to three main factors: local economic situation, level of standardization in energy efficiency labeling in local markets as well as level of law enforcement in local markets. Economically, landlocked Sichuan is far behind the booming coastal provinces of Jiangsu and Shandong, possibly leading to lower awareness and acceptance of the labeling regulation among manufacturers and consumers. It is also likely that a less-than robust economy in Sichuan might have contributed to its weak standardization in labeling and relative lax enforcement. In addition, the degree of consolidation of manufacturing in each product market might be a factor influencing compliance as well as it might be easier to achieve compliance with a more consolidated manufacturing industry (e.g., refrigerators) than one with over 100 manufacturers (e.g., CFL).

With regard to labeling compliance by product type, four products achieved 100% compliance, including room air conditioners, storage electric water heaters, household induction cooktops and household refrigerators, but these results came from only a single province (Jiangsu or Shandong) and with relatively small sample sizes. Small and medium 3-phase asynchronous motors achieved nearly 60% compliance in Shandong and Sichuan. For self-ballasted fluorescent lamp, the range of sample sizes and results was fairly wide, with high compliance in Jiangsu but very low compliance in Sichuan.

**Table 3. 2009 Energy Efficiency Labeling Compliance Check-Testing Results by Region**

	<b>Jiangsu</b>	<b>Sichuan</b>	<b>Shandong</b>	<b>Shanghai</b>
Room air conditioners	100% (7/7)			
Self-ballasted fluorescent lamps	100% (16/16)	25% (30/119)		
Electric storage water heaters	100% (5/5)			
Small and medium 3-phase asynchronous motors		58% (15/26)	60% (6/10)	
Household induction cook-tops			100% (5/5)	
Household refrigerators			100% (5/5)	NA
Variable speed air-conditioners				NA
LCD computer monitors				NA

Source: Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011

Note: NA indicates that labeling compliance results were not available in Shanghai at the time of writing.

## Energy Efficiency Compliance Check-testing

**Check-Testing Methodology.** To validate the energy efficiency information printed on the energy label of each product and to verify MEPS compliance, the provincial Bureau of Quality and Technical Supervision specified details on sampling, testing, data collection and statistical analysis in energy efficiency check-testing work plans (Sichuan IQITR 2011, Shanghai IQITR 2010). The sampling process then involves selecting sampling regions and notifying the testing facilities, forming a sampling team and selecting samples randomly from manufacturers' warehouses and/or retailers. The samples are then sent to the testing facilities to check for energy efficiency compliance and manufacturers are notified of the testing results. The products are tested in sample batches, with each product tested once to verify whether it meets the efficiency standards and energy label efficiency grade requirements. The pilot locations were all required to follow applicable national standards and regulations in testing the compliance of a particular product in order to ensure testing consistency. The testing process is finished once the product is deemed in compliance, but for non-compliant products, the manufacturers have to decide if they wish to pursue retesting. If the manufacturers contest the results, they have to request retesting within 15 days after receiving the test results.

In addition to product types, the Jiangsu, Sichuan, Shandong and Shanghai governments also specified the sample size (including the number of units chosen per batch, number of manufacturers represented, number of reference vs. tested units), number of times for sampling, origin of samples (i.e. manufacturers' warehouse or retailers), and requirements for sample products. The specific sampling parameters for each product in each region are shown in Table 4.

**Table 4. Sampling Parameters for 2009 Energy Efficiency Check-Testing**

Sample Product	No. of Batches for Sampling	Sample Size				Sample Origin		Region
		Manufacturers Represented	Units chosen	Units Tested	Unit Referenced	Warehouse	Retailer	
Room air conditioners	7	7	21	14	7	0	7	Jiangsu
Self-ballasted fluorescent lamps	16	16	32	16	16	8	8	Jiangsu
	30	23	720*	360	360	0	25	Sichuan
Storage electric water heaters	6	6	3	2	1	0	6	Jiangsu
Small and medium 3-phase asynchronous motors	15	12	15	15	0	0	10	Sichuan
	10	N/A	30	30	0	10	0	Shandong
Household induction cooktop	5	N/A	15	15	0	3	2	Shandong
Household refrigerators	5	N/A	5	5	0	2	3	Shandong
	8	N/A	24	N/A	N/A	N/A	N/A	Shanghai
Variable-speed air-conditioners	6	N/A	12	N/A	N/A	N/A	N/A	Shanghai
LCD computer monitors	10	N/A	20	20	0	N/A	N/A	Shanghai

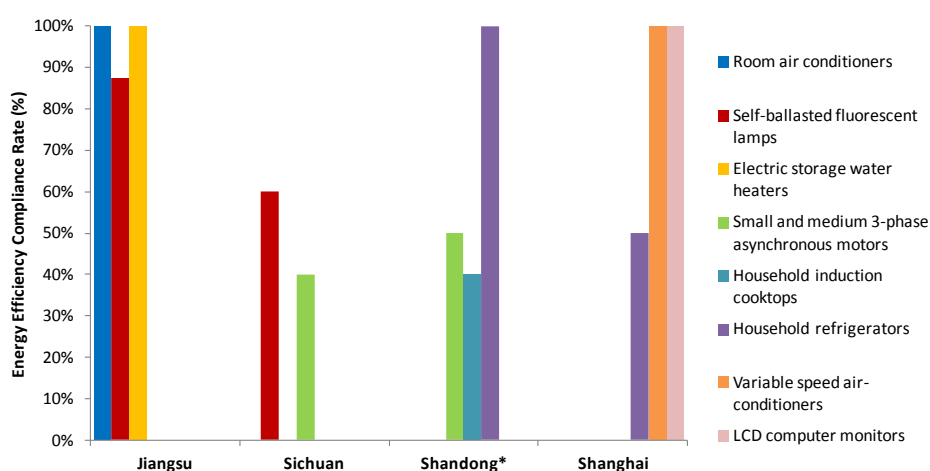
Note: \* 720 lamp units were packaged into 60 sets. Set is the unit in sampling.

Source: Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011

**Check-testing Results.** Although it is not possible to directly compare the four pilot locations in terms of compliance because different combinations of product types were tested and variance in

sample sizes, some general comparisons between the regions' compliance rates can be made (Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011). Figure 1 shows the energy efficiency check-testing compliance results by region by product. Based on the reported results, Jiangsu had the highest compliance rates for the sample products it tested, while Shanghai and Shandong had the second and third highest compliance rates, respectively. Of the four regions, Sichuan had the lowest compliance results, with 60% compliance in self-ballasted fluorescent lamp and 40% compliance in small and medium three-phase asynchronous motors.

In terms of compliance rates by product type, Figure 1 shows that 100% compliance rates were achieved for room air conditioners, electric storage water heaters, variable speed air conditioners and LCD computer monitors but all products were tested in only one location and with a relatively small sample size. In the case of household refrigerators, 100% compliance was achieved by only one of the two areas (Shandong) where testing was conducted and much lower compliance resulted from a large sample tested in Shanghai. For small and medium three-phase asynchronous motors, the results range widely from 100% compliance in Shandong to only 40% in Sichuan. Part of the reason for the extreme range in compliance is because Shandong noted in its report that the 100% reported compliance rate for motors was the result of taking into account the tolerance in additional losses between nominal and minimum guaranteed efficiency values. If measured solely on the basis of nominal efficiency, the rate of compliance would have been down to 50%. The household induction cooktop had the lowest compliance rate of 40% for the small sample tested in Shandong.



	Jiangsu	Sichuan	Shandong*	Shanghai
Room AC	7/7			
Fluorescent lamps	14/16	18/30		
Electric storage water heater	6/6			
Three-phase asynchronous motors		6/15	10/10*	
Induction cooktops			2/5	
Refrigerator			3/3	4/8
Variable speed AC				6/6
LCD computer monitor				10/10

**Figure 1. 2009 Energy Efficiency Check-Testing Compliance Results by Product and Region**

Note: Shandong's motor compliance rate is shown in the graph as nominal efficiency only, but was reported as 100% (and shown in table) to account for tolerance of additional losses between nominal and minimum guaranteed efficiency.

Data Source: Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011

### Comparisons with 2006 and 2007 Check-testing

As an expanded check-testing project with more products types tested in different pilot locations, the 2009 energy efficiency standards and labeling project check-testing differs in many



respects from the previous check-testing efforts of 2006 and 2007. In particular, notable differences are observed in the sampling and energy efficiency testing methodologies as well as the compliance results. As more enterprises are registered in the China Energy Label certification database for regulated products, the scope and extent of the check-testing project widened in 2009.

**Greater scope for sampling and efficiency testing.** The first notable aspect of the 2009 check-testing project is the larger geographic and product coverage of the check-testing efforts, with expansion from three cities in both 2006 and 2007 to three provinces and one city in 2009. In terms of product coverage, the check-testing encompasses twice as many product types as the 2007 project with a total of 8 products often tested in two regions. Additionally, the product types covered by the 2009 testing project also stands out for including industrial (i.e., three-phase asynchronous motors) and office equipment (i.e., LCD computer monitors). As a result of the wider geographic and testing scope, the sample size increased from 73 models in 2007 to more than 110 units representing 62 manufacturers in 2009. Unlike previous years where samples were purchased only from retailers, the 2009 samples originated from both manufacturer warehouses and retailers. Lastly, the 2009 testing results were reported as number of batches tested or rather than as tested physical units that were determined to be in compliance during the 2006 and 2007 check-testing.

**Greater range of compliance results by product types.** The wider scope of sampling and testing in 2009 resulted in a greater range of compliance rates across product types when compared with previous rounds of check-testing. Across all product types and even within one product category (small and medium three-phase asynchronous motors), the compliance rates ranged from 40% to 100%. For products that were tested in 2006 and 2007—namely room air conditioners and refrigerators—the 2009 compliance results revealed mixed success. For room air conditioners, the compliance rate remained at 100%, although testing was only done using a small sample in Jiangsu. However, the compliance results for refrigerators was less positive, with a much greater range of 50% to 100% compliance in Shanghai and Shandong, respectively, compared to 2007 rates of 71% to 100%. In addition, the weighted average compliance rate of refrigerators across regions dropped significantly from 96% in 2007 to only 63% in 2009, which is much lower when compared to the initial 2006 compliance rate of 81%.

Although explanations of why the compliance rate for refrigerators dropped so significantly were not offered in 2009, an important factor may be the very recent implementation of more stringent MEPS for refrigerators in May of 2009. The wide range in compliance rates across regions for a given product reflects not only enforcement issues, but it also illustrates persisting challenges in standardizing testing. In fact, the 2009 test reports highlighted ongoing challenges with standardizing testing tools and procedures among different laboratories to minimize different results for the same tested product.

**Regional variations in overall compliance rates.** From a geographic perspective, there are also notably larger variations in compliance rates across regions. In contrast to 2007 when compliance rates for a given region were closer in range with less than 30% variability between the highest and lowest compliance rates, the testing regions in 2009 had a much greater range in compliance. For Shandong and Shanghai, high compliance rates of 100% for two of the three tested products are offset by much lower compliance rates of only 40% and 50%, respectively. Sichuan's much lower compliance rates of 60% and 40% were also well below any of the three regions in the 2007 round of testing, which had a lowest compliance rate of 67%. A possible explanation for the greater range in compliance rates within a region and lower compliance rates could be that different sampling methods were undertaken (e.g., samples taken from manufacturers in the local testing versus retailers in the national testing done in 2007) and that previous testing conducted by CNIS were more focused on a national-scale with a target of large cities, and may not have highlighted the nuances in local

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<sup>2</sup> In 2006 and 2007, the compliance rate was weighted by the number of sample units tested while in 2009 it was weighted by batches.

conditions, particularly for the smaller cities.

## **2009 Local Enforcement Project Evaluation Key Findings**

The 2009 check testing program incorporated both compliance with national MEPS as well as compliance to regulations for the use of the China Energy Label. The small scope of the testing creates uncertainty about the representativeness of the results to national averages, but because the process involved a range of local stakeholders—government administrators, testing laboratories, manufacturers, and media, it strengthened understanding of the need for and benefit of further work in this area. Compared with the previous rounds of check testing in 2006 and 2007, the 2009 tests covered a wider regional scope as well as larger product type coverage. A total of 110 units representing 62 manufacturers were tested in local laboratories according to applicable national standards and regulations. Unlike the 2006 and 2007 test, some samples were taken from manufacturers' warehouses.

Greater variation in compliance results was observed across product types and within the same product category, while overall the compliance rate was lower than in 2006 and 2007, when the testing focused on large cities and on fewer product types. The results of the check testing found the lowest overall level of compliance—for both energy efficiency standards and labeling—in Sichuan. The reasons for lower compliance are not clear, but the variance from other regions could suggest ways to improve or reform the check-testing program in the future. Sichuan is less economically advanced than the other pilot locations, and this could impact the level of awareness, staff expertise, and amount of funding available. In addition, the two products tested in Sichuan—compact fluorescent lamps and small- and medium-size motors—are products from a fairly unconsolidated manufacturing sector, which may also be a factor in the compliance disparity. In the case of Shanghai, testing found that the compliance rate of refrigerators was significantly lower compared with previous tests. This may be attributable to the fact that a new more stringent refrigerator standard went into effect in May 2009.

In addition to the check-testing results, several overarching challenges were observed by the pilot locations during the preparation, implementation and wrap-up stages of the check-testing project. The main challenge during the preparation phase was the lack of awareness among customers, manufacturers and retailers as a result of insufficient publicity. Some retailers have also demonstrated resistance to inspection and check-testing. Although specific reasons behind retailers' resistance to inspections were not reported, it is likely that some retailers may be worried about the negative impact of enforcement officials selecting and inspecting products on consumer confidence and the retailer's reputation. Furthermore, because enforcement authorities do not fully understand and appreciate the scope and details of the project, they are unable to respond fast enough in updating the relevant online information (i.e. product registry, product-specific national standards and regulations). Challenges that emerged during the sampling and check-testing phases center on weaknesses in the standardization of testing tools and procedures amongst different labs, which produce different testing results for the same tested product. In addition, large manufacturers were frequently targeted for inspection because they are capable of producing products of varied specifications and their market presence offers a sample base that otherwise couldn't be matched by smaller manufacturers. This could result in weak enforcement of smaller manufacturers, which may have lower compliance rates. Issues reported for the wrap-up phase were less significant, and mainly concerned the timeframe for returning compliant and non-compliant samples.

Based on these implementation issues, several actions are recommended for expanding the implementation scale and to improve the effectiveness of local enforcement. Publicity campaigns on the China Energy Label and related efficiency efforts need to continue to be improved and CNIS has been recommended as the possible lead for these efforts, based on insights and feedback from provincial Bureaus of Quality and Technical Supervision. National-level project campaigns increase exposure and awareness of the project among stakeholders. In addition, this top-down approach helps

facilitate enforcement standards and reduce discrepancy among participating provinces and cities, which also benefit manufacturers and retailers that produce or sell products across provincial or national borders. Moreover, provincial governments should also set aside specific funding and staffing for the enforcement project to be carried out successfully. This would help clarify roles and responsibilities of enforcement staff and inspectors, lead to better accountability, higher working morale and productivity.

## **Conclusions**

As China's standard and labeling program continues to expand and grow, the existing basis for monitoring and enforcement, particularly on the local level, is also evolving. In addition to having multiple laws and regulations related to enforcement with specific fines and penalties outlined, China also has a national testing and enforcement program for appliances and has undertaken national and pilot check-testing efforts in recent years. While China's pilot check-testing efforts are impressive given that some countries with a longer history of standards and labeling programs are only beginning verification and enforcement testing, China's earlier check-testing projects also identified key areas of weaknesses in the existing local enforcement efforts. The 2006 and 2007 check-testing sampling methodology covered only a few products from three highly developed, top-tier cities and from top-tier retailers. Budget limitations and inconsistent test results between test laboratories also hampered effective local check-testing efforts.

The 2009 check-test project demonstrated that capacity for local check testing has continued to expand and strengthen, although difficulties with insufficient funding, product sampling scope, testing consistency, and comparability of results still remain. Improvements in local enforcement include: infrastructure established by participation locations for local enforcement and organizations for technical support; government agencies lending key support at the policy level; and media outlets undertaking publicity campaigns to raise support and understanding among local populations. However, this round of testing also highlighted the lack of awareness and lack of an initial publicity campaign on efficiency standards and labeling enforcement, which result in manufacturers failing to register their products; retailers' resistance to inspection; lack of timely updating of product information online; incidents of different laboratories reaching different results for the same product; higher compliance rates for products produced by large manufacturers along with lack of attention to enforcement for smaller manufacturers.

In light of China's experiences with local enforcement of its standards and labeling program, strengthening supporting policies and improving enforcement testing and mechanisms could further improve standards and labeling program compliance. From a policy perspective, institutional capacity for enforcement can be bolstered by revising and updating existing policies to place greater emphasis and regulatory responsibility on enforcement and setting aside specific funding and staffing from both central and provincial governments for local enforcement projects. Methodological changes to enforcement testing such as targeting non-compliant manufacturers in subsequent years and greater emphasis on implementing standardized testing tools and procedures among different laboratories can help address existing program weaknesses.

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## References

China National Institute of Standardization (CNIS). 2010. National and Local Enforcement of Energy Efficiency Standards and Label Project Implementation and Training Plan (in Chinese). Presentation. Sichuan Province, China.

CNIS. 2011. *White Paper of the Energy Efficiency Status of China Energy-Using Products (in Chinese)*. Beijing: China Zhijian Publishing House.

Jiangsu Province Quality and Technology Supervision Bureau (Jiangsu QTSB). 2010. “Summary of Current Phase of Energy Efficiency Check-testing Results (in Chinese).” Presentation. Jiangsu, China.

Saheb, Y., Zhou, N., Fridley, D., and A. Pierrot. 2011. *Compliance and Verification of Standards and Labeling Programs in China*. LBNL Report-4599E. Berkeley, California: Lawrence Berkeley National Laboratory.

Shandong Province Institute of Quality Inspection and Technical Research (Shandong IQITR). 2011. “National and Local Enforcement of Energy Efficiency Standards and Labeling Program (in Chinese).” Presentation. Shandong Province, China.

Shanghai Institute of Quality Inspection and Technical Research (Shanghai IQITR). 2010. “Draft Supervisory System for Enforcement of Local Energy Efficiency Label (in Chinese).” Shanghai, China.

Shanghai IQITR. 2011. *Work Summary of National and Local Enforcement of Energy Efficiency Standards and Labeling (in Chinese)*. Shanghai: Shanghai Institute of Quality Inspection and Technical Research.

Sichuan Institute of Quality Inspection and Technical Research (Sichuan IQITR). 2010. “Summary of 2009 National and Local Enforcement of Energy Efficiency Standards and Labeling Program in Sichuan Province (in Chinese).” Presentation. Sichuan Province, China.

Sichuan IQITR. 2011. “Draft of 2010 Supervisory System for Enforcement of Local Energy Efficiency Labeling Program (in Chinese).” Draft report prepared for China National Institute of Standardization, Beijing, China.

Sichuan Quality and Technology Supervision Bureau (Sichuan QTSB). 2010. *Draft Sichuan Province’s Monitoring System for Energy Efficiency Products (in Chinese)*. Internal report prepared for China National Institute of Standardization, Beijing, China.

Zhou, N., Zheng, N., Fridley, D., Wang, R., and C. Egan. 2008. *Check-testing of Manufacturer Self-Reported Labeling Data and Compliance with MEPS*. Report LBNL-247E. Berkeley, California: Lawrence Berkeley National Laboratory.

Zhou, N., Fridley, D. and N. Zheng. 2010. *China Energy Efficiency Round Robin Testing Results for Room Air Conditioners*. LBNL Report 3502-E. Berkeley, California: Lawrence Berkeley National Laboratory.