Local Enforcement of Appliance Efficiency Standards and Labeling Program in China: Progress and Challenges

Nina Zheng, Nan Zhou, Cecilia Fino-Chen and David Fridley,
Lawrence Berkeley National Laboratory

ABSTRACT

As part of its commitment to promoting and improving the local enforcement of appliance energy efficiency standards and labeling, the China National Institute of Standardization launched the National and Local Enforcement of Energy Efficiency Standards and Labeling program on August 14, 2009. For this program, Jiangsu, Shandong, Sichuan and Shanghai were selected as pilot locations. This paper provides information on the local enforcement program'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, in particular, 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. This paper also identified areas for improvement including awareness at the local level, product sampling methodology, and 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 and a mandatory energy information label (China Energy Label) covering 23 products. One particular area of focus that has emerged with the expansion of the standards and labeling (S&L) programs is the need for improved implementation and enforcement of the energy efficiency standards and the China Energy Label.

The two common types of enforcement mechanisms for S&L programs are product certification or registration by a product manufacturer prior to retail distribution and product energy verification check-testing after retail distribution. This paper focuses on verification check-testing, which involves purchasing samples from retailers or distributors to test for compliance in qualified laboratories, with manufacturers required to either immediately address and correct performance issues or pay fines and penalties for non-compliance and possibly cease product distribution if compliance cannot be met. Internationally, Australia and the United Kingdom have two of the most established and extensive check-testing programs, both of which

have specific testing budgets within their S&L programs. Both programs test the energy performance of products to verify compliance with MEPS, as well as labeling accuracy and conformity. Australia's program is also unique in that it features targeted sample selection based on risk of failure and likely impact and purchases samples anonymously from both retailers and wholesale suppliers (Zhou Zheng & Fridley 2012). The U.S. recently began pilot check-testing programs for both MEPS and ENERGY STAR programs, but is focused primarily on testing to verify compliance with efficiency thresholds and do not include inspections on labeling compliance.

In China, energy efficiency verification testing is conducted at the national level but the responsible regulatory agency, the State Administration and Quality, Supervision, Inspection and Quarantine (AQSIQ), has limited resources and too many conflicting priorities, resulting in little emphasis on energy efficiency testing (Zhou 2008). In 2006 and a 2007 follow-up, China National Institute of Standardization (CNIS) as the technical body responsible for developing MEPS and managing the China Energy Label program conducted modest sample labeling compliance testing for three common products in three sample cities with international support but were very limited in scope and sampling size. In August of 2009, CNIS launched a project to conduct labeling compliance inspections and efficiency compliance check-testing of eight products and four regions. This round of enforcement verification and testing represents an important step in local enforcement efforts being undertaken in China by expanding the sample size and product scope of testing and incorporating compliance verification for both MEPS and the China Energy Label.

This paper presents an update on this most recent and comprehensive round of regional appliance energy efficiency check-testing as the basis for reviewing progress in local enforcement of appliance S&L programs and identifying remaining challenges and areas for improvement in China. This paper begins with a short overview of the 2009 check-testing project, including the sampling, label compliance verification and efficiency check-testing methodologies. The paper then presents labeling and MEPS compliance results in the four regions and analyzes compliance results across regions and product categories. Key differences from earlier rounds of check-testing are identified in discussing the overall progress in local enforcement of S&L programs in China, and recommendations made based on project feedback and results.

Review of Check-Testing and Local Enforcement in China

In China, the AQSIQ has 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 for 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. Similarly, "enterprise self-declaration" in registering for the China Energy Label remains the key feature of energy labeling enforcement as AQSIQ and related organizations were not allocated sufficient resources for independent verification.

Non-compliant manufacturers and retailers in China are subject to penalties based on the relevant laws and regulations and a list of non-compliant manufacturers is published on the China Energy Label website. Under the 2008 revised Energy Conservation Law, the specific possible penalties for violating mandatory labeling requirements are detailed and include fines of 10,000 to 30,000 RMB[1] (2008 USD $1440 to $4320) if the label is absent or do not comply with labeling requirements and fines of 50,000 to 100,000 RMB (2008 USD $7200 to $14,410) for misleading or falsifying labeling results (NPC 2008). Manufacturers' business license may also be revoked for serious labeling violations. For MEPS violations, enterprises that manufacture, import or sell non-compliant products are ordered to stop production, import or sales and illegal gains from non-compliant products will be confiscated and the violator may be further fined 100% to 500% of the illegal proceeds from non-compliant products (NPC 2008).

In reality, however, several recent 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 rising concerns with product quality and labeling accuracy, the central government and CNIS in particular have initiated several energy efficiency testing and verification pilot programs. In 2006, CNIS with funding from international organizations[2] launched an unprecedented energy efficiency checking and testing program to evaluate MEPS compliance and labeling accuracy. A total of 43 models of refrigerators, room air conditioners and washers were purchased from retailers in the major cities of Guangzhou, Beijing and Hefei and tested in national laboratories following national MEPS test procedures. The first round of check-testing presented mixed results on the implementation and enforcement of the selected appliance standards, with a range of noncompliant product models in the three cities and overall products compliance rates between 71% and 91% (Zhou et al. 2008). The appliance check-testing was repeated in 2007 with a larger sample size of 73 models in the same cities, and found overall improvement in compliance rates for all three tested products with a significant drop in the number of non-compliant models.

2009 Check-Testing Background

Organizational Structure

CNIS launched the National and Local Enforcement of Energy Efficiency Standards and Labeling project to conduct labeling inspections and efficiency check-testing for a total of eight products in the four pilot locations of Jiangsu, Shandong and Sichuan provinces and the municipality of Shanghai. For 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 IQITR 2010, Sichuan QTSB 2010). Shanghai's municipal government took

[1] Chinese currency of Renmibi (RMB) is converted to approximate USD equivalent using OANDA 2008 annual average exchange rate of 6.94035 RMB per USD.

[2] China does not have a specified budget for MEPS enforcement and testing as the responsibilities often fall to local jurisdictions with varying financial capacities. The CNIS verification testing and round-robin testing efforts described were primarily funded through research grants from international organizations and foundations.

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.

Product Selection for Labeling Compliance and Check-Testing

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.

Labeling Compliance Inspections

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 identified for inspection were (CNIS 2010):

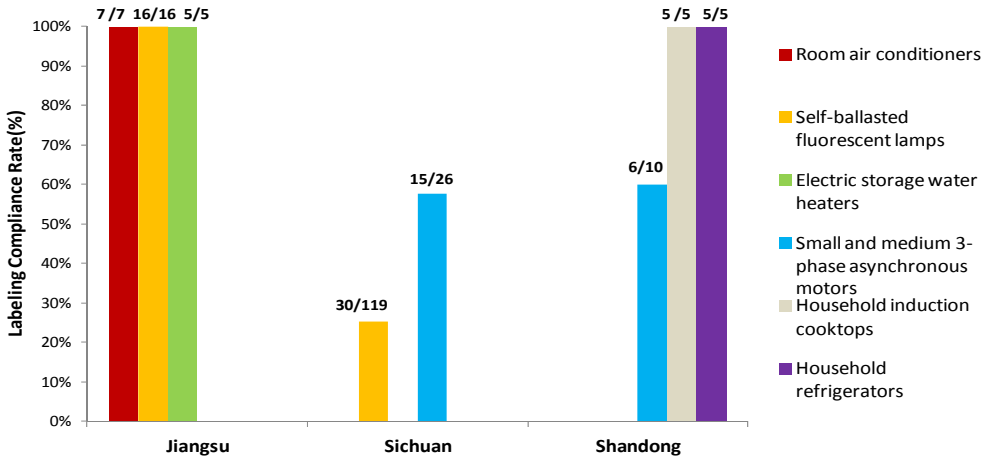
- Energy efficiency label implementation by the inspected manufacturer, in terms of product registration with the China Energy Label database, percent of products manufactured that have an energy label, and management of the labeling system;
- Whether inspected products are properly labeled in compliance with requirements set by the government;
- Whether the design of the label of inspected products complies with requirements; and
- Whether the energy label information is consistent with that on the product's nameplate

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. 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 publicized non-compliant manufacturers on websites and through media outlets (e.g. newspapers and televisions).

Results and Analysis

As seen in Figure 1, the sample size for labeling compliance inspections varied slightly between Jiangsu and Shandong, but was much larger in Sichuan for both self-ballasted fluorescent lamps and motors. In light of these differences in 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 a higher average rate of 87% attained by the three product types inspected in Shandong (Figure 1). This variation in labeling compliance may also be attributed to three 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, it is also possible that the degree of consolidation of manufacturing in each product market might be a factor. It might be easier to achieve compliance with a dozen refrigerator manufacturers than with 100 CFL manufacturers.

Figure 1. 2009 Labeling Compliance Results by Region



Note: Labeling compliance was conducted in Shanghai for household refrigerators, variable-speed air conditioners and LCD computer monitors but results were not available at the time of this paper.
Data Source: Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011

With regard to labeling compliance by product type, room air conditioners, storage electric water heaters, household induction cooktops and household refrigerators had the highest compliance rates but were inspected in only one province (either Jiangsu or Shandong) with a relatively small sample size of less than ten units. Small and medium 3-phase asynchronous motors were inspected in both Shandong and Sichuan, and had similar compliance rates of close to 60%. For self-ballasted fluorescent lamp, the range of the sample size and inspection results was fairly wide, varying from high compliance in Jiangsu to much lower compliance with a larger sample size tested in Sichuan.

Energy Efficiency Check-testing

The second phase of the 2009 local enforcement project focused on check-testing product samples to verify the validity of the China Energy Label information.

Product Sampling Methodology and Process

The sampling process thus involves formulating a work plan, selecting sampling regions and notifying the testing facilities, forming a sampling team and checking samples randomly from manufacturers' warehouses and/or retailers. In addition to determining the specific product types, each provincial or municipal government also specified different criteria related to sample size, including the number of batches for sampling, units chosen and tested per batch, number of manufacturers represented and the origin of samples (Table 1).

Table 1. Efficiency Check-testing Sampling Parameters by Product and Region

Sample Product	# Batches for Sampling	Sample Size		Sample Origin		
		Manufacturers Represented	Units Tested	Warehouse	Retailer	Region
Room air conditioners	7	7	14	0	7	Jiangsu
Self-ballasted fluorescent lamps	16	16	16	8	8	Jiangsu
	30	23	360	0	25	Sichuan
Storage electric water heaters	6	6	2	0	6	Jiangsu
Small and medium 3-phase asynchronous motors	15	12	15	0	10	Sichuan
	10	N/A	30	10	0	Shandong
Household induction cooktop	5	N/A	5	3	2	Shandong
Household refrigerators	8	N/A	N/A	N/A	N/A	Shanghai
Variable-speed air-conditioners	6	N/A	N/A	N/A	N/A	Shanghai
LCD computer monitors	10	N/A	20	N/A	N/A	Shanghai

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

Table 2 shows that as with the labeling inspections, there was also a wide range in the unit sample sizes for energy efficiency check-testing. For self-ballasted fluorescent lamps, Jiangsu tested only 16 units in 16 sample batches while Sichuan tested 360 units in 30 sample batches. Household induction cooktops, storage electric water heaters and variable-speed air conditioners also stand out as having the smallest test sample size of only 5, 6 and 6 sample batches, respectively.

Check-testing Methodology and Process

The samples are sent to the testing facilities and tested in sample batches, with each product tested once to verify whether it meets the MEPS requirements and energy label efficiency grade requirements. To maintain check-testing consistency and to follow legal requirements, the pilot locations all followed applicable national standards and regulations in testing the compliance of a particular product. Table 2 lists the specific check-testing criteria as

mandated by the national MEPS and the China Energy Labeling Implementation Rule for each product, and a product is deemed in compliance only if it meets all of the relevant energy efficiency criteria.

Table 2. Efficiency Check-testing Criteria by Product

Product	**Efficiency Check-testing Criteria**
Room air conditioners	Cooling capacity; Cooling power consumption; Energy efficiency ratio
Self-ballasted fluorescent lamps	Lamp power; Chromaticity tolerance; Minimum allowable value of energy efficiency; Initial luminous efficacy
Product	**Efficiency Check-testing Criteria**
Electric storage water heaters	Inherent energy factor for 24 hours; Hot water output ratio
Small and medium three-phase asynchronous motors	Efficiency
Household induction cooktops	Heating efficiency; Standby power consumption
Household refrigerators	Power consumption; Internal volume; Efficiency indicators
Variable speed room air conditioners	Cooling capacity; Cooling energy consumption; Intermediate cooling capacity; Intermediate cooling energy consumption; Seasonal energy efficiency ratio
LCD computer monitors	Energy efficiency; Energy consumption in off mode

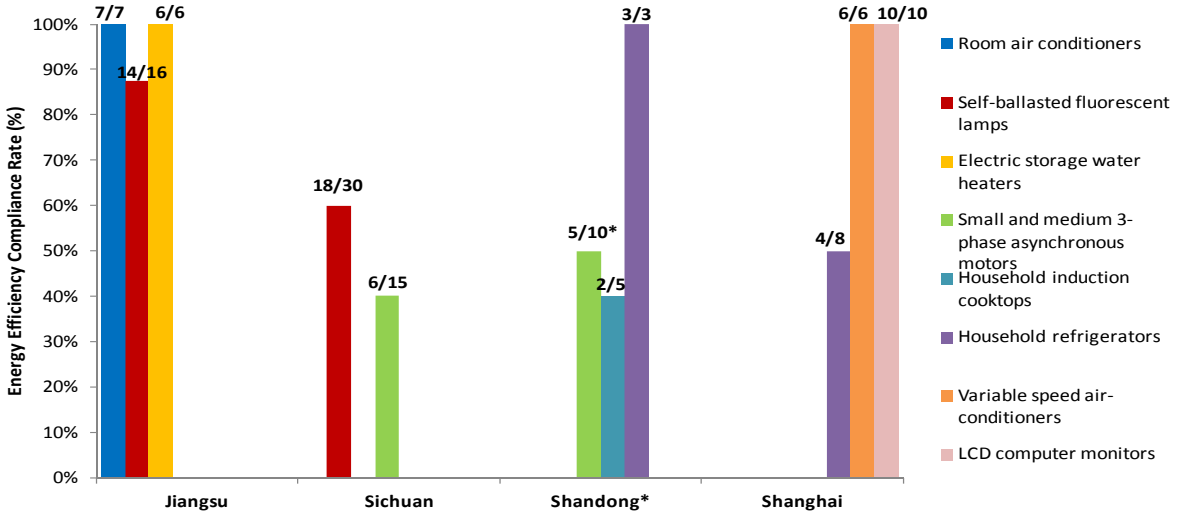
Source: CNIS 2010.

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 an optional second stage of retesting. If the manufacturers contest the results, they have to request retesting within 15 days after receiving the test results.

Check-Testing Results and Analysis

Although it is not possible to directly compare the four pilot locations in terms of overall compliance and specific compliance rates because different combinations of product types were tested and sample sizes for the products tested varies between regions, some general insights on compliance trends can be made. However, it should be noted that because the sample sizes for each were relatively limited and most products were tested in only region, these compliance rates are not necessarily representative of a product's overall energy performance throughout China nor are the products tested in each region representative of that region's overall appliance efficiency compliance. The compliance rates for each product in each region are shown in Figure 2, with the specific testing results and sample sizes shown above each bar.

Figure 2. 2009 Energy Efficiency Check-testing Compliance Results by Region



*Note: Shandong's motors compliance rate is shown only in terms of nominal efficiency but was reported as 100% when adjusted to tolerate additional losses between nominal and minimum guaranteed efficiency values.
Data Source: Jiangsu QTSB 2010, Sichuan IQITR 2010, Shandong IQITR 2011, Shanghai IQITR 2011

Based on the reported results and recognizing differences in sample sizes, Jiangsu had the highest compliance rates for all three sample products it tested. Jiangsu is followed by Shanghai with relatively high compliance rates, with two out of three products tested meeting 100% compliance. Shandong exhibited mixed compliance results, with full compliance in refrigerators but lower compliance for induction cooktops and three-phase asynchronous motors (in nominal efficiency). Of the four regions, Sichuan had the lowest compliance results, with 60% compliance in self-ballasted fluorescent lamps and 40% compliance in small and medium three-phase asynchronous motors.

In terms of compliance rates by product type, four products – room air conditioners, electric storage water heaters, variable speed air conditioners and LCD computer monitors - reached 100% compliance but were all tested in only one location. Household refrigerators achieved full compliance when tested in Shandong, but had a much lower compliance rate when tested with a larger sample size in Shanghai. Self-ballasted fluorescent lamps had 88% compliance in Jiangsu, but compliance was lowered to 60% with a larger sample in Sichuan. For small and medium three-phase asynchronous motors, the results ranged widely from 100% reported compliance in Shandong to only 40% in Sichuan, but Shandong's reported 100% compliance takes into account the tolerance in additional losses between nominal and minimum energy efficiency values.[3] If measured solely on the basis of nominal efficiency, Shandong's motor compliance rate would have dropped to 50%. Household induction cooktop had the lowest compliance rate of 40% with the small sample tested in Shandong.

[3] In measuring motor efficiency, both nominal (expected nameplate efficiency) and minimum guaranteed efficiency is used. The minimum guaranteed efficiency allows for higher losses that are expected due to statistical variation in a population of motors.

Progress and Challenges in Local Enforcement and Check-Testing

Comparing the 2009 label inspection and efficiency check-testing experiences with the two prior rounds of check-testing provides general insights into progress and remaining challenges in local enforcement of appliance standards and the China Energy Label.

Improvements in Methodology: Greater Scope for Sampling and Efficiency Testing

On one hand, the sampling and testing methodologies undertaken in the 2009 local enforcement efforts show improvement compared to the initial efforts. As more enterprises are registered in the China Energy Label product certification database for regulated products, the scope and extent of the check-testing project widened in 2009. The 2009 check-testing project is notable in its 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. The inclusion of Sichuan Province, an inland province in Central China with slower economic growth[4] than the coastal provinces of Jiangsu and Shandong, is also worthwhile in that it reflects broader representation of pilot locations chosen for check-testing.

In terms of product coverage, the check-testing encompasses twice as many product types as the 2007 project with a total of 8 products and testing for the same product undertaken in two regions in most cases. 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 the 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 rather than as tested physical units that were determined to be in compliance during the 2006 and 2007 check-testing.

Challenges in Greater Variations of Compliance Rates

On the other hand, a wider scope and coverage of check-testing also resulted in a great range in compliance rates when compared with previous rounds of check-testing.

Variations in Compliance Results by Product Types

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. Room air conditioners maintained a high compliance rate, but were tested only in Jiangsu with a small sample of only 7 batches. 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,

[4] According to provincial-level data by the National Bureau of Statistics, Sichuan Province was ranked number 25 out of 31 in terms of GDP per capita in 2010 while Shanghai was ranked number 1, followed by Jiangsu at number 4 and Shandong at number 9.

the weighted average[5]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 refrigerator MEPS in May 2009. The wide range in compliance rates across regions for a given product not only reflects enforcement issues, but it also illustrates persisting challenges in standardizing testing as discussed further below.

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 2009 test locations had much wider ranges 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, for other products. 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 in particular 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). Likewise, previous testing conducted by CNIS were more focused on the national-scale with a target of large cities and may not have highlighted the nuances in local conditions, particularly for the smaller cities.

Remaining Challenges in Local Efficiency Check-Testing

According to reports from the four pilot locations, several challenges emerged during the implementation phase of the check-testing project. Overall, the check-testing project's tasks and activities can be divided into three phases: preparation, implementation (sampling and check-testing) and wrap-up. The main challenge during the preparation phase was the lack of awareness among consumers, manufacturers and retailers as a result of insufficient publicity. This in turn has resulted in manufacturers failing to register their products in the label certification database, as was discovered during one of the inspections, and some retailers remaining resistant 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 quickly 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 resulted in different testing results for the same tested product. This challenge with testing

[5] In 2006 and 2007, the compliance rate was weighted by the number of sample units tested while in 2009 it was weighted by batches.

consistency was highlighted in the earlier 2006 and 2007 rounds of check-testing; some products that failed the first stage of testing passed re-testing at the same facility or at a different facility. In 2007, seven products failed the first stage of testing but upon manufacturers' requests, six of the seven products were retested and five out of six retested products were found compliant (Zhou et al. 2008). A 2009 round-robin testing initiative for air conditioners also found that while differences in inter-laboratory results were within the maximum allowable range of measurement uncertainty, differences in laboratory results as high as 7% for energy efficiency and 25% for measuring airflow rate were observed (Zhou et al. 2010). Unfortunately, detailed data on compliance rates for the first and second stages of testing and testing of the same product in different laboratories were not available for the 2009 check-testing. While it is difficult to determine the degree to which testing consistency impacted the large variability in compliance results, previous check-testing experiences and results of the 2009 round-robin testing suggest that consistency and accuracy of testing pose ongoing challenges for Chinese laboratories.

In addition, big 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 could not 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.

Overall Findings and Conclusions

The 2009 local enforcement project demonstrated that capacity for local check testing has continued to expand and strengthen, although a number of challenges remain, including funding, product sampling scope, testing consistency, and comparability of results. Nonetheless, participating locations have established infrastructure for local enforcement and organizations for technical support, and in some cities, government agencies have lent key support at the policy level, and media outlets have undertaken publicity campaigns to increase public support and understanding. The check testing program incorporated compliance to national energy efficiency standards as well as compliance to regulations on the use of the China Energy Label. The results of the labeling inspections and check testing found the lowest overall level of compliance—for both energy efficiency standards and labeling—in Sichuan. These reasons for lower compliance are not clear, but its 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 more stringent refrigerator standard went into effect in May 2009 but warrants further investigation.

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. Greater variation in compliance results was observed across product types and within the same product category, while overall the compliance rate was lower than the tests in 2006 and 2007, when the test focused on large cities and on fewer product types. Local media assisting in making the results public, and non-compliance was dealt with according to existing legal requirements, including measures such as fines and prohibitions on sales.

A number of challenges emerged in this round of testing. They include lack of awareness and lack of an initial publicity campaign which resulted 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. International experiences suggest further improvement in enforcement could come about through more awareness and educational campaigns both at the national and provincial level; more publicity for those who continuously excel in compliance and those who fail; both central and provincial governments should also setting aside of specific funding and staffing from central and provincial governments for the local enforcement projects; emphasis on targeting non-compliant manufacturers in subsequent years; and greater emphasis on implementing standardized testing tools and procedures among different laboratories.

Acknowledgments

This work was supported by the China Sustainable Energy Program of the Energy Foundation and the Collaborative Labeling and Appliance Standards Program through the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

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.

National People's Congress (NPC). 2008. "Energy Conservation Law of the People's Republic of China (Revised)." Beijing: National People's Congress. 1 April 2008.

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.

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)". Presentation. Shanghai, China.

Shanghai IQITR. 2011. “Work Summary of National and Local Enforcement of Energy Efficiency Standards and Labeling (in Chinese).” Presentation. 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 Quality and Technology Supervision Bureau (Sichuan QTSB). 2010. *Draft Sichuan Province’s Monitoring System for Energy Efficiency Products*. Internal report prepared for China National Institute of Standardization, Beijing, China.

Zhou, N. 2008. *Status of China’s Energy Efficiency Standards and Labels for Appliances and International Collaboration.* LBNL-251E. Berkeley, California: Lawrence Berkeley National Laboratory.

Zhou, N., Zheng, N., Fridley, D., Wang, R., and C. Egan. 2008. *Check-testing of Manufacturer Self-Reported Labeling Data and Compliance with MEPS.* 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 3502-E. Berkeley, California: Lawrence Berkeley National Laboratory.

Zhou N., N. Zheng & D. Fridley. 2012. *International Review of the Development and Implementation of Energy Efficiency Standards and Labeling Programs.* LBNL Report, *forthcoming*. Berkeley, California: Lawrence Berkeley National Laboratory.