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Evaluation of China's local enforcement of energy efficiency standards and labeling programs for appliances and equipment

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HIGHLIGHTS

- China's mandatory standards and labeling crucial to national energy saving goals.
- China's 2006–2009 pilot efficiency check-testing for standards and labeling evaluated.
- Wider geographic and product scope in 2009, but greater variation in compliance.
- Generally high compliance, but lower rates for less economically developed region.
- Local check-test capacity improving but methodological challenges remain.

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ABSTRACT

Aims: This paper aims to evaluate local enforcement of China's mandatory appliance and equipment energy efficiency standards and labeling programs, two increasingly important policies for meeting national energy and carbon reduction targets. The expected energy savings of efficiency standards and labels can be fully realized only with strong enforcement to ensure compliance for all products sold. This paper provides comprehensive retrospective evaluation of the methodologies, results, progress and remaining challenges in pilot enforcement projects initiated in the absence of consistent national check-testing focused on energy efficiency.

Scope: This paper's scope is focused on 2006–2009 pilot local check-tests conducted to verify appliance and equipment compliance with China's mandatory energy label and efficiency standards.

Conclusions: This paper finds both improvement and some backsliding in compliance rates over time. Compared to earlier efforts, 2009 check-tests covered a wider regional and product scope but demonstrated greater variation in compliance rates. Labeling display and energy efficiency compliance was generally high across regions and most products, but lower compliance rates were observed in less economically developed regions and for lighting and industrial products. Based on these findings, areas for improvement in local awareness, product sampling methodology, check-testing tools and procedures are identified.

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1. Introduction

After over twenty years of experience with standards and labeling programs, China now has minimum energy performance standards (MEPS) for over 40 products, a mandatory categorical energy information label (China Energy Label) covering 23 products and voluntary efficiency certification label covering over 50 products (China National Institute of Standardization (CNIS), 2011). MEPS help push the efficiency of products on the market by mandating the maximum allowable energy consumption (i.e., lowest energy efficiency) for a given product and inefficient, non-compliant products that cannot meet the standard are eliminated as a result. At the same time, the China Energy Label displays information and ranks the energy performance of a specific product model in five[1] categories of efficiency relative to other similar models from Grade 1 (highest efficiency) to 5 (lowest efficiency set at the MEPS level) based on self-reported energy consumption data from manufacturers. It seeks to pull the market for efficient products by providing information for consumers to identify and compare the energy efficiency of similar product

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[1] For some newer products such as room air conditioners with a smaller spread of efficiency amongst different models, the China Energy Label adopts three categories of efficiency where Grade 1 denotes the highest efficiency level and Grade 3 is set at the MEPS level.

models in their purchase decision-making process. Similarly, China's voluntary certification label endorses the most efficient models on the market and helps provide consumers with a simple visual guide to identifying high efficiency models.

A recent study showed that continued efficiency improvement of products covered under China's standards and labeling program in 2009 could achieve cumulative savings of 9503 TW h and 3851 million metric tons of CO_2 emission reductions by 2030 (Zhou et al., 2011). Both MEPS and the China Energy Label have gained increasing policy attention in recent years with China's commitment to reduce energy and CO_2 emissions intensity per unit GDP through 2015 and 2020 and have been used to support other complementary efficiency policies.[2] In 2009, for example, the Chinese government launched a subsidy program for energy efficient products estimated to have boosted sales by over 600 billion RMB (US$94.7 billion) and saved 28 TW h per year (Edwards, 2012). In September 2012, China announced that it will offer additional subsidies worth $2.2 billion for energy efficient electronics and appliances that qualify based on their efficiency grade in the China Energy Label. A 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 MEPS and the China Energy Label. The necessary market transformation and associated energy savings for China's standards and labeling programs, as well as the newly launched energy efficient product subsidy programs, can be realized only through full enforcement to ensure that all products sold have a properly displayed label and its energy performance complies with the MEPS efficiency requirements and the labeled efficiency grade.

The two common types of enforcement mechanisms for standards and labeling programs are product certification or registration by a product manufacturer prior to retail distribution and product compliance verification after retail distribution. Product certification or registration is a one-time process that occurs before a product can be sold in which the manufacturer tests each basic model's energy performance and certify via a compliance statement and certification report that the tested model meets the MEPS requirement for that product class. After certification, product compliance verification may also be conducted through inspections of label display compliance and product verification check-testing for energy efficiency compliance. Besides helping identify weaknesses in the enforcement of standards and labeling programs, compliance rates can also be incorporated into ex-post evaluations of standards programs as a correction factor for determining the program's real impact. In California, the 2007 state standards evaluation study incorporated estimates of compliance rates by product category based on certification testing to refine the official estimated energy savings (Khawaja et al., 2007).

This paper focuses on inspections to verify label display requirements are met and verification check-testing in which samples are purchased from retailers or distributors and tested to verify compliance with MEPS and efficiency requirements in qualified laboratories. In instances of non-compliance, manufacturers are 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 (UK) have two of the most established and extensive product compliance programs, both of which include budgets for label display inspections and check-testing within their standards and labeling programs. Both programs test the energy performance of products to verify compliance with MEPS, as well as conduct inspections to validate labeling accuracy and conformity. Australia's check-testing program has been in place since 1991, with over 1000 check-tests completed as of 2010. Australia's program is also unique in that it features targeted sample selection based on risk of failure and likely impact rather than random selection, and purchases samples anonymously from both retailers and wholesale suppliers (Zhou et al., 2012). The latest rounds of check-testing in 2011 shows improved compliance results compared to previous rounds of check-testing with an average compliance rate of over 90% compared to an average of 80% from 1991 to 2010 (Equipment Energy Efficiency (E3), 2011). The UK has conducted label display inspections and compliance testing since 2004, and recent results found that manufacturer non-compliance rate for meeting the claimed energy level on the EU Energy Label is estimated to be around 10% to 15% with labeling display non-compliance rate of 20% for products without a correct label at the retail level (Department of Environment, Food and Rural Affairs (Defra), 2010). Outside of the UK, enforcement activities amongst the EU member states have varied due to limited laboratory testing capacity, human and financial resources (Waide et al., 2011). The United States also recently began pilot check-testing programs for both MEPS and ENERGY STAR programs, but do not regularly inspect the display compliance of its mandatory EnergyGuide information 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 mandatory labeling requirements. In practice, enforcement is more difficult due to organizational coordination challenges and resource constraints. While the China National Institute of Standardization (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) 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 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, because enforcement of the mandatory China Energy Label has historically relied on manufacturer self-declaration where manufacturers self-declare and certify the energy performance of their product as part of the label registration process, enforcement and compliance have remained challenging. Moreover, verifying and ensuring high compliance with mandatory efficiency standards and labeling requirements have continued to be difficult because AQSIQ and related organizations are not allocated sufficient resources to undertake consistent 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 et al., 2010). In response to 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

[2] In 2006, China set its first quantitative and binding target of reducing energy intensity per unit of GDP by 20% from 2005 levels by the end of its 11th Five-Year Plan period in 2010. In 2009, China pledged to reduce its CO_2 emissions intensity per unit of GDP by 40% to 45% from 2005 levels by 2020. For the 12th Five-Year Plan Period from 2011 to 2015, China has set targets of reducing energy and carbon intensity per unit of GDP by 16% and 17%, respectively.