

# ChinaFAQs

## The Network for Climate and Energy Information



# Appliance Energy Efficiency Standards

## Key Points

- China has become one of the world's largest and fastest-growing markets for household appliances, such as televisions, clothes washers and refrigerators.
- To improve the energy efficiency of these products, China has developed an array of mandatory and voluntary standards and labeling programs.
- These programs promise to significantly reduce energy use and greenhouse gas emissions, but stepped up compliance testing and enforcement could enable China to reap even bigger gains.
- International collaboration – including with experts from the United States – has played an important part in China's appliance efficiency efforts.

## Contact an Expert

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It's a remarkable shift. Just 25 years ago, few Chinese consumers owned a refrigerator, television or clothes washer – much less cared about how much energy these common household appliances consumed. Today, however, China is one of the world's largest producers and consumers of household appliances. And when Chinese consumers go to the store, they now can review a label that tells them just how much energy that refrigerator uses – and whether it meets government efficiency standards.

These appliance labels and standards – developed with help from international collaborators, including key experts from the United States -- are just one part of China's broader effort to curb rising energy use and greenhouse gas emissions. And several recent studies\* from the U.S. Department of Energy's Lawrence Berkeley Laboratory show that these measures are paying off in lower energy bills for consumers, and significant reductions in future energy consumption and emissions. Still, the studies suggest that ripe opportunities remain to harvest even more energy savings in China's booming appliance market – and that international collaboration could be key to realizing those gains.

## A RAPID RISE

The growth of China's appliance market has been remarkable. In 1981, "ownership of appliances was extremely limited and even televisions were an uncommon commodity," notes one of the studies, *Impacts of China's Current Appliance Standards and Labeling Program to 2020*, by LBNL staff scientist David Fridley and colleagues.<sup>i</sup> By 2005, however, "each of China's nearly 190 million urban households had on average 1.3 color televisions, and nearly all owned a clothes washer, refrigerator, and air conditioner. In just 7 years, personal computer ownership rates jumped from zero to over 40%."<sup>ii</sup>

The boom, however, has had major implications for China's energy use. Between 1980 and 2004, for instance, residential electricity use rose by an average of 14% per year.<sup>iii</sup> In 1990, such numbers spurred the Chinese government to develop its first minimum energy use standards for common appliances including refrigerators, air conditioners, clothes washers, irons, rice cookers, televisions, radios and fans. But "these first standards were not particularly effective and some manufacturers ignored their guidelines," Fridley's team reports.

“Moreover, the standards were in general not consistent with international standards,” making it hard to compare Chinese appliances to those produced elsewhere.

That began to change in the late 1990s, with the rewriting of some standards and the passage of new laws, including the Energy Conservation Law of 1998, which emphasized the need for both minimum efficiency standards and appliance labels. By 1999, the arrival of a new approach to appliance energy efficiency was marked by the government’s release of revised standards and new voluntary labeling criteria for refrigerators and air conditioners.

## A THREE-PRONGED EFFORT

Today, China has three major programs related to appliance standards and labeling:

### 1. **Mandatory minimum efficiency standards:**

Developed by China’s National Institute of Standards (CNIS), these required standards now cover more than 20 types of major products, including most residential and commercial appliances, and lighting, heating and cooling equipment. In recent years, CNIS has been developing two-tiered “reach” standards that require manufacturers to meet more stringent requirements over time. For instance, a 2008 target is replaced by a more stringent 2011 target.

**2. Voluntary energy efficiency labels.** Similar to the U.S. Energy Star program, this program encourages more than 300 manufacturers to produce energy efficient appliances by allowing them to use a special label if their products meet certain standards. To earn the label, manufacturers must submit to annual on-site audits of production facilities, undertake third-party testing in certified laboratories, and be in accord with ISO 9000 standards. Currently, the program covers about 50 products including home appliances, consumer electronics and office equipment.

**3. Mandatory energy information labels.** In 2005, China launched a “categorical” mandatory energy information label, adapted from a European Union program. The label shows consumers how close an appliance comes to meeting minimum efficiency standards, ranging from 100% (meeting the minimum standard) to 55% of the minimum standard. Such labels now appear on 19 products, including air conditioners, household refrigerators, and clothes washers. Unlike both the mandatory standard and the voluntary energy efficiency label, manufacturers are able to self-report the energy consumption of each model.

Many products, such as refrigerators and air conditioners, are both regulated both by the mandatory standards and

eligible for voluntary labeling. Other products, including printers, computers, and other consumer electronics, generally are not subject to the mandatory standards but can carry voluntary labels.

## A NOTICEABLE IMPACT

These efforts should significantly curb China’s future energy use, Fridley and his colleagues conclude in their study. For instance, in 2007 – even before China had ramped up standards for some major appliances – the team estimated that standards and labeling would cut residential electricity use by 9% by 2020 – the equivalent of the power generated by 27 1-gigawatt coal-fired power plants. (By comparison, U.S. appliance standards are expected to save 10% of residential electricity use by 2020.) And China’s emissions of carbon dioxide, the main warming gas, would be some 300 million tons less by 2020 than they would have been without the efficiency gains.<sup>iv</sup> And there are “clear opportunities for further savings,” the study concludes, as China ratchets up its minimum energy standards and covers more products.

A separate LBNL study of refrigerator labeling, for instance, found that labels could “essentially flatten the consumption of electricity for refrigerator use throughout most of the next decade, despite the expectations of continued growth in total stock by nearly 190 million units.”

That outcome alone would cut China's carbon dioxide emissions by some 67.5 million tons, the study notes, and save consumers a lot of money. "Billions of yuan in potential savings to residents and in avoided power plant costs over the next 12 years point to the desirability of developing programs today that ensure such savings could be delivered," the authors conclude.<sup>v</sup>

## SEIZING THE OPPORTUNITY

To fully realize such savings, however, China will need to beef up its monitoring and enforcement of its appliance efficiency programs, according to a third study. "These programs have had an important impact in reducing energy consumption of appliances in China," concludes LBNL's Nan Zhou in a March 2008 analysis, *Status of China's Energy Efficiency Standards and Labels for Appliances and International Collaboration*. Historically, however, she found that the government's primary focus has been on the technical requirements for efficiency performance, and that monitoring and enforcement programs have some weaknesses. One problem is that they underfunded, and tend to emphasize safety, not energy efficiency. When officials tested 30 models of washing machines in 2005, for instance, they checked to see if they met safety and performance standards – but not the energy standards. In addition, testing programs typically involve just a small fraction – perhaps 1% -- of the products available on the market. "Limited sample size is a significant weakness in

the existing testing," her study concluded. And there is no central registry where the government and manufacturers can report testing results, "making it difficult to monitor the compliance status of household appliances."<sup>vi</sup>

Despite these problems, however, there is evidence that stepped up testing can spur manufacturers to improve the efficiency of their products. In 2006 and 2007, for instance, LBNL's Collaborative Labeling and Appliance Standards Program (CLASP) helped Chinese officials see if energy labels were accurate on hundreds of models of refrigerators, air conditioners, clothes washers and freezers sold in a number of cities. Overall, they found that the labels tended to very slightly overstate efficiency – but that manufacturers were quick to fix incorrect labels if testing found problems. In 2006, for instance, label compliance ranged from 71% for freezers to 91% for air conditioners. By 2007, overall compliance had risen to 96%. The results show that "spot testing has the meaningful impact of forcing manufacturers to ensure compliance," Zhou concludes. And the experience "could be quite helpful in developing a full-scale national verification testing program."<sup>vii</sup>

To develop that program, China has been working with CLASP and other international partners. Goals include establishing a network of standardized testing labs (results can currently vary from lab to lab), and a method of reporting results to a central repository. Such collaboration, the experts say, could make China's household appliance market –

already one of the world's largest and most dynamic – also a leader in saving energy.

This fact sheet is drawn from three studies:

- Fridley, David et al. *Impacts of China's Current Appliance Standards and Labeling Program to 2020*. LBNL-62802. Lawrence Berkeley National Laboratory, March 2007.
- Zhou, Nan. *Status of China's Energy Efficiency Standards and Labels for Appliances and International Collaboration*. LBNL-251E. Lawrence Berkeley National Laboratory. March 2008.
- Fridley, David et al. *China Refrigerator: Specification, Development, and Potential Impact*. LBNL-246E. Lawrence Berkeley National Laboratory Report. February 2008.

**This fact sheet is a product of ChinaFAQs, a joint project of the World Resources Institute and experts from leading American universities, think tanks and government laboratories. Find out more about the ChinaFAQs Project at: <http://www.ChinaFAQs.org/>.**

### Notes

<sup>i</sup> Fridley, David et al, "Impacts of China's Current Appliance Standards and Labeling Program to 2020," March 2007.

<sup>ii</sup> Fridley et al, 2007, page 8

<sup>iii</sup> Fridley et al, 2007, page 9

<sup>iv</sup> Fridley et al, 2007, page 1

<sup>v</sup> Fridley et al, "China Refrigerator," 2008.

<sup>vi</sup> Zhou, N., 2008, page 6.

<sup>vii</sup> Zhou, N., 2008, page 8.

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