

OVERCOMING THE BOUNDED RATIONALITY OF CHINA'S ENERGY-INTENSIVE FIRMS THROUGH GOALS

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Overview

Like in many other countries, energy efficiency is critical for China's energy strategy. The energy efficiency gap - energy saving opportunities at negative costs - could be the lowest hanging fruit and its narrowing provides cost-effective solutions to curb China's rapid growth of energy consumption. Such a gap is hard to be fully explained with the rational choice model.

In the 11th Five-Year Plan (2006-2010), the Chinese government established a special energy conservation program for 1000-strong large energy-intensive firms ("Top 1000 Program" for short), each receiving a clear goal to reduce energy consumption by a certain amount. The program achieved great success with nearly all firms still remaining in 2010 not only reaching the goals, but greatly outperforming them (Fig. 1). The phenomena raised two puzzles. First, why did the firms overdo the assigned job from the government by a substantial margin? The rational choice model could provide a satisfactory answer: because the actions would save money. Then a second puzzle comes out: why did not the firms take the actions before, such as in the previous 10th Five-Year Plan (2001-2005)? A clear difference between the two Five-Year Plans is the establishment of the Top 1000 Program and the specific energy conservation goals. In order to shed light on how to effectively narrowing the energy efficiency gap, this paper examines the behavior of China's energy-intensive firms responding to the energy conservation goals.

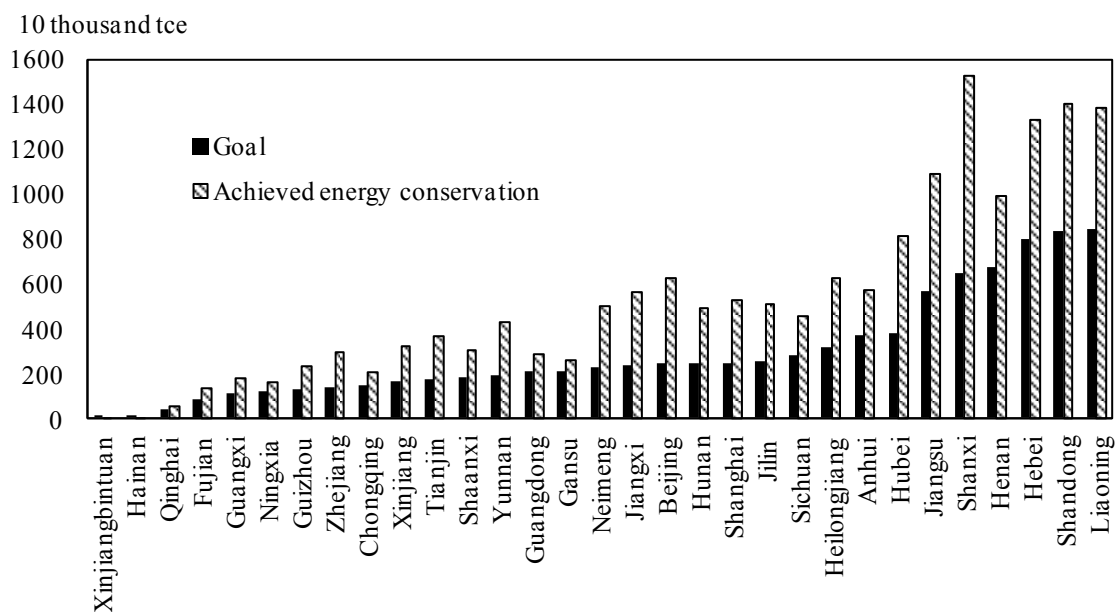


Fig. 1 Energy conservation goals and achieved results in the Top 1000 Program in the 11th Five-Year Plan (firm-level data are organized into various provinces) (NDRC, 2011)

The paper is organized as follows. A theoretical model will be constructed in Section 2 to guide data analysis. The explanation of the above-stated phenomena will be provided in Section 3 from the demand and supply perspectives of energy conservation technologies and services. Section 4 will conclude the paper with implications drawn for future energy conservation policies in China and the world.

Methods

Quantitative and qualitative data are analyzed under the guidance of a theoretical model. The model is built on three theories: the goal setting theory to discuss the impacts of goals on task performance (Locke & Latham, 2002), the behavioral economics theory on bounded rationality (Camerer, Loewenstein, & Rabin, 2004), and an investment model on energy efficiency (Allcott & Greenstone, 2012).

Results

From the supply perspective, the energy conservation goals created a huge prospective market for the industries providing energy conservation technologies and services. Lower financial risk and significant business opportunities encouraged active market entry to drive rapid learning, innovation and commercialization of technologies and services as well as the associated economy of scale to reduce costs and enhance their energy-saving performance.

From the demand perspective, the prices of energy, especially coal as the dominant fuel for the Top 1000 firms, went up significantly from the 10th Five-Year Plan to the 11th. It could push the firms to demand more energy conservation, but is difficult to fully explain the two puzzles. Instead, energy conservation goals motivated the firms to pay more attention to the previously neglected area of energy conservation and actively seek relevant information and opportunities. The more mature technologies also reduce the associated risks and uncertainties to enhance their demand.

Conclusions

Because of their demonstrated effectiveness and the absence of extra economic burden such as that inherently in tax policies, energy conservation goals provide a powerful and likely politically more acceptable policy tool to overcome bounded rationality of firms and other energy-consuming entities, narrow the energy efficiency gap and achieve significant energy conservation. The goals do not need to reach the energy conservation limits or be accurate as they will serve mainly the role to kickstart actions for harvesting the energy-and-cost-saving opportunities.

Although the research is conducted in the Chinese context, the research findings could potentially be applied in other parts of the world because the energy efficiency gap widely exists.

References

- Allcott, H., & Greenstone, M. (2012). Is There an Energy Efficiency Gap? *Journal of Economic Perspectives*, 26(1), 3-28.
- Camerer, C., Loewenstein, G., & Rabin, M. (2004). *Advances in behavioral economics*. New York; Princeton, N.J.: Russell Sage Foundation; Princeton University Press.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation - A 35-year odyssey. *American Psychologist*, 57(9), 705-717.
- NDRC. (2011). *Public Announcement No. 31*. Beijing, China.