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## Evaluating the Energy Efficiency Gap: Research and Practice

A project of the

Duke University Energy Initiative and the Harvard Environmental Economics Program

Co-Directors: Richard G. Newell (Duke) & Robert N. Stavins (Harvard)

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**Motivation for the project:** Energy-efficient technologies offer considerable promise for reducing the costs and environmental damages associated with energy use. However, these technologies appear not to be used by consumers and businesses to the degree that would apparently be justified based on their private financial net benefits. Broader societal benefits of energy efficiency, including to the environment, add further to this gap if they are not reflected in individual decisions.

**Objective of the project:** The initiative will advance understanding of this “energy efficiency gap” and the diverse factors that affect the adoption of energy-efficient equipment and practices. It focuses on differences between predicted and observed adoption of these technologies. The initiative’s findings will inform future research and policy.

### Project Summary:

Adoption of energy-efficient technologies could reap both private and social rewards, in the form of economic, environmental, and other social benefits from reduced energy consumption. The social benefits include improvements in air quality, reduced greenhouse-gas emissions, and increased energy security. In response, governments and firms around the world have adopted policies to increase energy efficiency and attain these benefits. Still, there is a broadly held view that various barriers to the adoption of energy-efficient technologies have prevented the realization of a substantial portion of these benefits.

This project is motivated by the need to understand this “energy efficiency gap” (or “energy paradox”) — the *apparent* reality that many energy-efficient technologies are not adopted even when it makes sense for consumers and businesses to do so, based on their private costs and benefits. Decision makers appear to “under-invest” in energy-efficient technologies, relative to the predictions of some engineering and economic models.

Explanations for the energy efficiency gap tend to fall into three broad categories: (1) market failures, such as lack of information or misplaced incentives; (2) behavioral effects, such as inattentiveness to future energy savings when purchasing energy-consuming products; and (3) modeling flaws, such as assumptions that understate the costs or overstate the benefits of energy efficiency.

Determining the validity of each of these explanations — and the degree to which each contributes to the energy efficiency gap — are crucial first steps in crafting appropriate public policy responses. Likewise, firms may identify different internal policies or marketing strategies in response to each explanation.

The project will help inform future research and policy by synthesizing past work and identifying key gaps in knowledge. The project staff is conducting a comprehensive review and assessment of published and ongoing social-science research on the adoption of energy-efficient technologies. This will include scholarly literature, industry case studies, reports from national and sub-national governments, and, to the extent possible, consulting reports evaluating specific programs. There will be a special emphasis on empirical research.

The project includes a structured workshop of social scientists — including scholars from economics, psychology, and other disciplines — to examine the various possible explanations of the energy paradox and thereby to help identify the frontiers of knowledge on the diffusion of energy-efficient technologies and important gaps in the existing body of research.

The project Co-Directors will prepare a monograph on the state of social-science research on the diffusion of energy-efficient technologies and a preliminary agenda for future research. The project will distribute this monograph widely to researchers, business practitioners, and policy makers. This effort will help decision makers in industry and government better understand the energy efficiency gap and will contribute to decisions that maximize the potential economic, environmental, and other social benefits associated with optimal adoption of energy-efficient technologies.

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