Explaining the Energy Paradox

American Economic Association

Allied Social Science Association Annual Meeting Boston, Massachusetts January 3, 2015, 2:30-4:30 pm

Background and Motivation for this Session

- *Builds upon* a joint project of the Duke University Energy Initiative and the Harvard Environmental Economics Program, "Evaluating the Energy Efficiency Gap"
- *Global energy consumption* is on a path to grow 50% over next 25 years
 - increased CO₂ emissions, local air pollution, and oil consumption
- *Energy efficiency improvements* are mechanism for decreasing energy use (account for nearly one third of CO₂ cuts globally in cost-effective scenario)
- But a key and contentious issue surrounding energy efficiency markets and policies
 - is the "energy paradox" or "energy efficiency gap"
- There are multiple interpretations of the "gap" ...



A Research Workshop Conducted by:

Duke University Energy Initiative & Harvard Environmental Economics Program

Supported by the Alfred P. Sloan Foundation

October 24-25, 2013 Harvard Kennedy School



Alternative notions of the gap



Deconstructing the Energy Efficiency Paradox/Gap

- **Basic definition (energy** *paradox***):** the *apparent* reality that some energyightarrowefficiency technologies that would pay off for adopters ... are *not* adopted
- **Broader definition (energy-efficiency** *gap*): apparent reality that some energy-efficiency technologies that would be *socially efficient* are not adopted
- Why are such technologies **not adopted**? What explains the paradox/gap?
- Answers have very important policy implications.
- We sort potential explanations into three categories

Deconstructing the Energy-Efficiency Gap: Conceptual Frameworks and Evidence By TODD GERARDEN, RICHARD G. NEWELL, AND ROBERT N. STAVINS*

veril Kannedy School, 79 John F. Kannedy S bridge, MA 02138 (o-mail: geneden)(de herverf.obs); Nevell: eles School of the Environment, Duke University, 140 Science

anh); Steries: Herved Kennedy School, 79 ed, as well as on Generike, Newall, and Stavias (2014).

L Potential Explanations

First, potential market-failure expl musty to, Cambridge, MA 20118 (a-mail for the EE gap include information asymmetries and imperfections in markets for energy, capital, and innovation.

nergy-efficient (EE) technologies offer include myopia, cognitive limitations, for reducing the chnologies appear not to be adopted to the measurement explanations. These feature degree that appears justified, even on a purely reasons why the adoption rate of EE

for understanding the EE gap. First, we build measurement error include unobserved costs upon previous literature (Jaffe and Stavins or overstated energy savings from adoption, by dividing potential explanations for the gap across potential adopters, use of inappropriate market failures, discount rates, and uncertainty.

magnitude

Second, potential behavioral expl inattentiveness, loss aversion and reference nvironmental damages dependence, and systematically biased beliefs. nergy use, but these Third, there are potential model and technology may not be as paradoxical as it We present two complementary frameworks first appears. Potential sources of model and 994; Gillingham, Newell, and Palmer 2009) ignored product attributes, heterogeneity

explanations, and model and Determining the validity of ent errors. Second, we examine the explanations-and the degree to which each elements of cost-minimizing EE decisions, the contributes to the EE gap-are crucial for typical benchmark used in assessing the gap's crafting sensible public policy respon

Potential Explanations of the Paradox/Gap

• Market-Failure Explanations

- Information problems (principal-agent issues, asymmetric information)
- Energy market failures (externalities, average-cost electricity pricing)
- Capital market failures (liquidity constraints, particularly in LDCs)
- Innovation market failures (R&D spillovers)

Behavioral Explanations

- Inattentiveness/salience issues
- Myopia/short sightedness
- Prospect theory/reference point issues
- Bounded rationality & heuristic decision-making
- Systematically biased beliefs

• Model and Measurement Explanations

- Understated costs of adoption & ignored product characteristics
- Overstated benefits of adoption
- Incorrect discount rate
- Uncertainty, irreversibility, & option value
- Heterogeneity in benefits & costs across potential adopters

For More Information

Harvard Environmental Economics Program

www.hks.harvard.edu/m-rcbg/heep

Website

www.stavins.com

Blog http://www.robertstavinsblog.org/

> Twitter @robertstavins