

GHG Abatement and the Role of Energy Efficiency

MIT-Nescaum Symposium August 11, 2009

McKinsey&Company

Project background

During our research on U.S. GHG abatement, McKinsey encountered the **puzzle of energy efficiency**.

We recently completed research to validate the potential, analyze the barriers inhibiting energy efficiency, and identify solutions that can overcome those barriers

Project scope

- Analyzed stationary uses of energy across residential, commercial, and industrial sectors, including CHP
- Examined over 675 efficient end-use measures, but only existing technologies
- Focused on productivity; not on conservation (no changes in lifestyle or behavior)
- Analyzed NPV-positive applications of energy efficiency; based on incremental capital, operations, and lifetime energy costs – excluded program costs and indirect benefits – discounted at 7 percent
- Identified the potential for energy efficiency, the barriers, and potential solutions – no attempt to declare how much potential will be achieved

Central Conclusion of our work

Energy efficiency offers a **vast, low-cost energy resource** for the U.S. economy – but only if the nation can craft a comprehensive and innovative approach to unlock it.

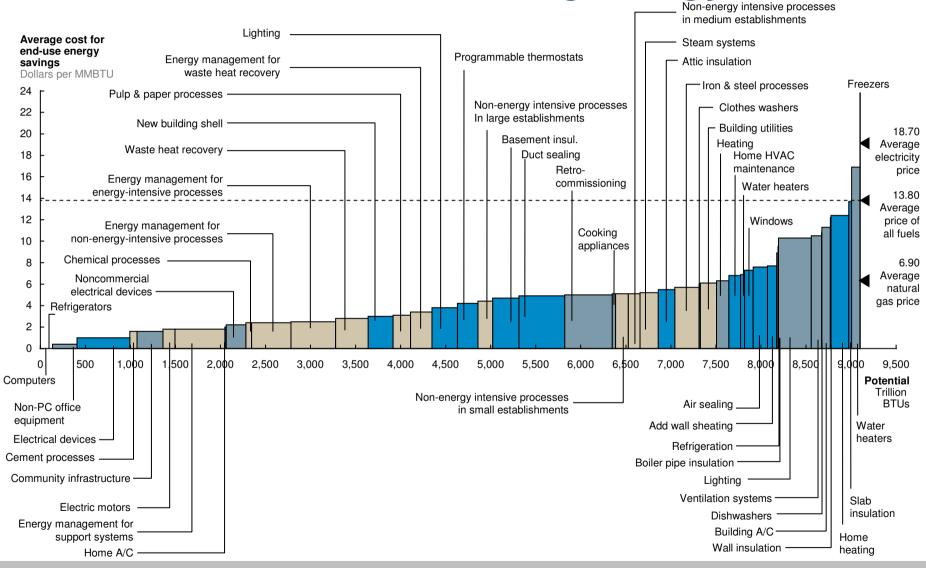
Significant and persistent barriers will need to be addressed at multiple levels to stimulate demand for energy efficiency and manage its delivery across more than 100 million buildings and literally billions of devices.

If executed at scale, a holistic approach would yield gross energy savings worth more than \$1.2 trillion, well above the \$520 billion needed for upfront investment in efficiency measures (not including program costs).

Such a program is estimated to reduce end-use energy consumption in 2020 by 9.1 quadrillion BTUs, roughly **23 percent of projected demand**, potentially abating up to **1.1 gigatons of greenhouse gases annually.**

Energy efficiency offers the most affordable means of delivering energy

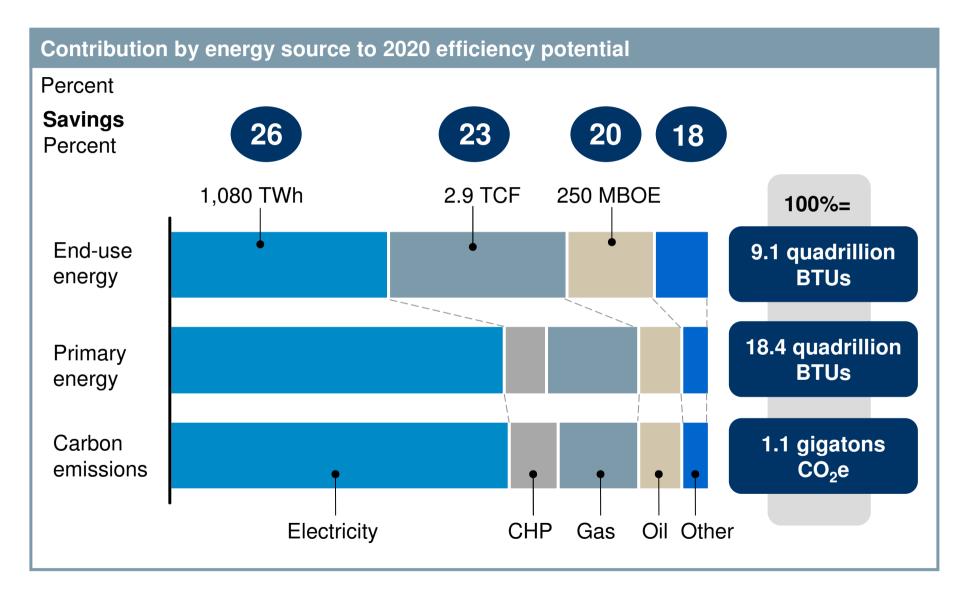




McKinsey & Company | 4

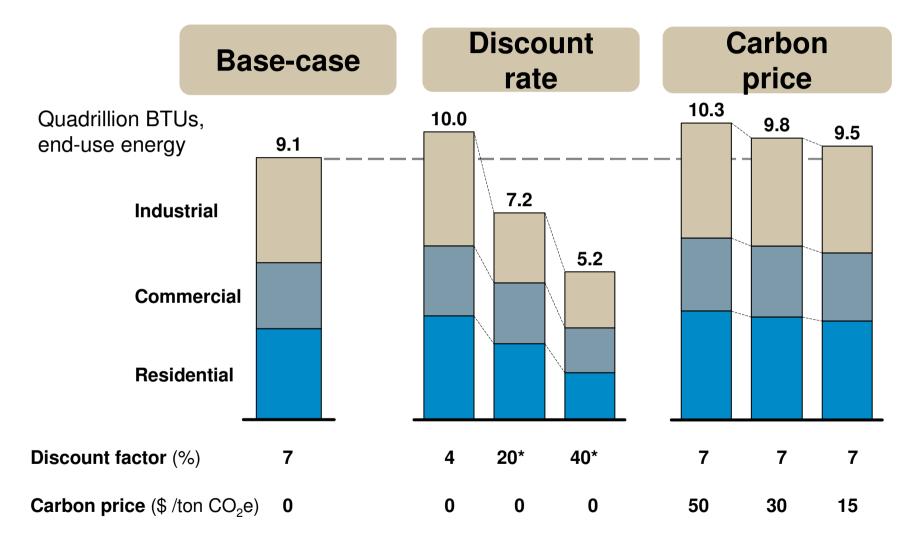
Source: EIA AEO 2008, McKinsey analysis

Significant efficiency potential across fuel types



Source: EIA AEO 2008, McKinsey analysis

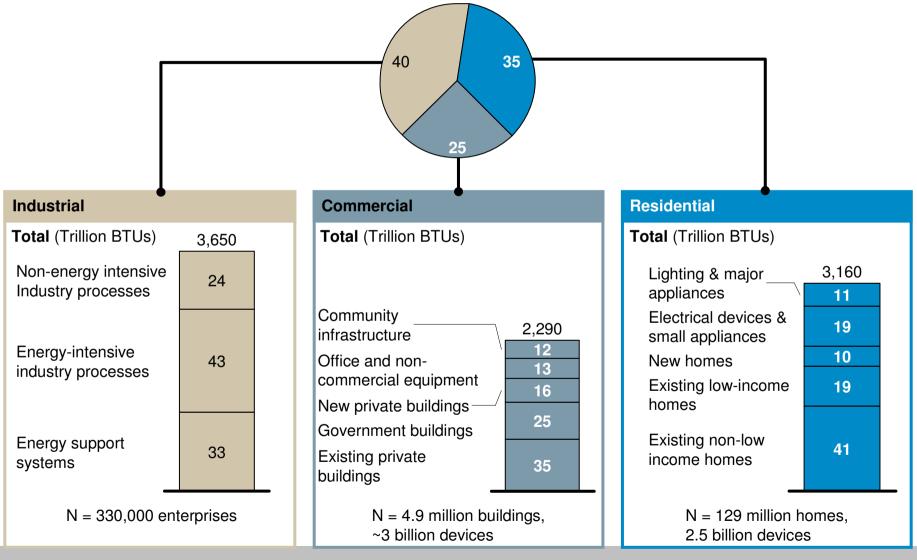
Potential remains attractive even under significant changes in assumptions



* Utilizes retail rates (vs. lower "avoided cost" rate proxy of industrial rates)

Clusters of opportunity emerge

Percent, 100% = 9,100 trillion BTUs of end-use energy efficiency potential



Source: Energy Information Agency's Annual Energy Outlook 2008; McKinsey analysis

The fundamental nature of energy efficiency creates challenges

FUNDAMENTAL ATTRIBUTES OF ENERGY EFFICIEN	ICY

Requires outlay	Full capture would require upfront outlay of about \$50 billion per year, plus program costs
Fragmented	Potential is spread across more than 100 million locations and billions of devices

Low mind-	Improving efficiency is rarely the primary focus
share	of any in the economy

Difficult to
measureEvaluating, measuring and verifying savings,
is more difficult than measuring consumption

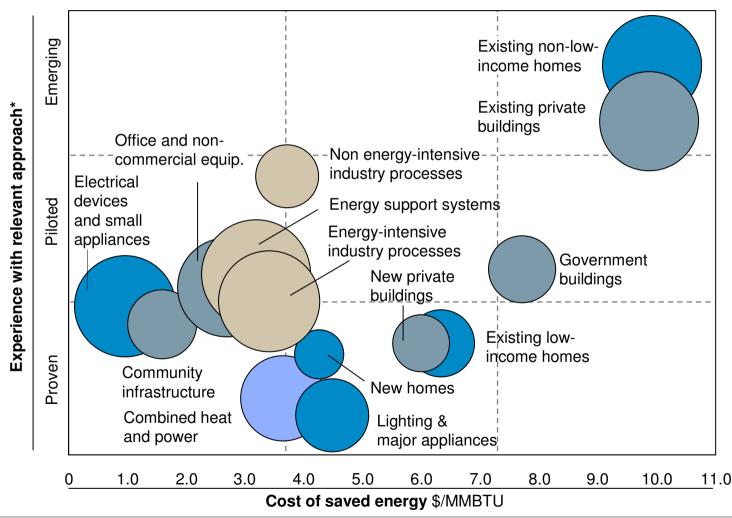
Addressing barriers in non-low income homes

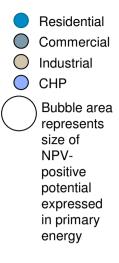
Ba	rriers	Manifestation of barrier		Potential approach	9	Solution strategies	
	Agency issues	Landlord-tenant issues		Home labeling and assessments		Educate users on energy consumption	Infor
tural	Transaction barriers	Research, procurement and preparation time	-			Promote voluntary standards/labeling	Information flow
Structural	Pricing distortions					Establish pricing signals	flow
	Ownership transfer issues	Limits payback to time owner lives in home					
	Risk and uncertainty*					Increase availability	Cap
vioral	Awareness and information	Limited understanding of energy use and potential	-			of financing vehicles Provide incentives	Capital outlay
Behavioral	Custom and habit					and grants	tlay
	Elevated hurdle rate	Behavioral 40% discount factor					
	Adverse bundling					Raise mandatory codes + standards	
bility	Capital constraints	Competing uses for a constrained budget					
Availability	Product availability	Limited availability of contractors					
	Installation and use	Improper installation and use of measures				Support 3 rd -party installation	

Addressing barriers in non-low income homes

Ba	rriers	Manifestation of barrier		Potential approach	:	Solution strategies
Structural	Agency issues	Landlord-tenant issues	5	Home labeling and assessments		Educate users on energy consumption
	Transaction barriers	Research, procurement and preparation time				Educate users on energy consumption Information Promote voluntary standards/labeling flow Establish priging signals flow
	Pricing distortions					Establish pricing signals
	Ownership transfer issues	Limits payback to time owner lives in home				
	Risk and uncertainty*			Innovative financing vehicles		Increase availability
Behavioral	Awareness and information	Limited understanding of energy use and potential		Tax and other		Increase availability of financing vehicles Provide incentives and grants
	Custom and habit			incentives		and grants
	Elevated hurdle rate	Behavioral 40% discount factor				
	Adverse bundling		╟	Required upgrades at point of sale/rent		Raise mandatory codes + standards
Availability	Capital constraints	Competing uses for a constrained budget				
	Product availability	Limited availability of contractors				
	Installation and use	Improper installation and use of measures		Develop certified contractor market		Support 3 rd -party installation

Portfolio representing cost, experience, and potential of clusters possible with specified solution strategies





Important observations

 Recognize energy efficiency as an important energy resource while the nation concurrently develops new energy sources

- Launch an integrated portfolio of proven, piloted, and emerging approaches
- Identify methods to provide upfront funding
- Forge greater alignment among stakeholders
- Foster development of next-generation energy efficient technologies