

Energy efficiency potential studies

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Technical Forum:

Unlocking Energy Efficiency in the U.S. Economy

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McKinsey's "Unlocking Energy Efficiency in the U.S. Economy" (July 2009)

- Quantifies **"economic" potential** of energy efficiency
 - Cost-effective reductions if barriers are removed
 - Economic benefits and CO₂ reductions
- Analyzes the **barriers** that prevent this potential from "naturally occurring"
 - E.g., landlord/tenant / "split incentives"
- Identifies **policy strategies** that may address barriers
 - E.g., building codes and appliance standards, energy efficiency resource standards, energy performance information, innovative financing strategies



Energy efficiency potential studies

- Definition and types
- Recent national studies
- EPRI/McKinsey reconciliation
- Results in context
 - Impact on electricity demand growth
 - Impact on CO₂ emissions
- How states can use the studies

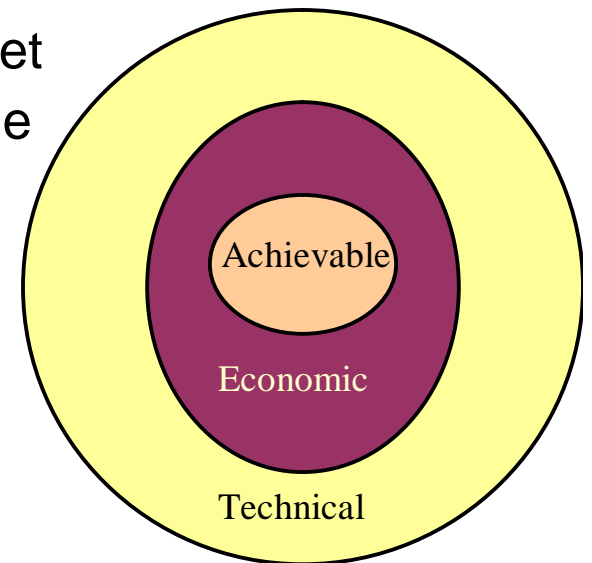


Definitions of potentials

Potential study: Analysis of the amount of energy savings — usually electricity, natural gas — that either exists, is cost-effective, or could be realized through programs and policies

- Three main types:
 - **Technical potential:** theoretical maximum, independent of costs
 - **Economic potential:** “Cost-effective” subset
 - **Maximum achievable potential:** achievable through aggressive programs
- Fourth category:
 - “**Program potential**”: based on specified funding levels (also called “achievable” potential)

Venn
Diagram of
Potentials



Not drawn to scale!



Source: National Action Plan on Energy Efficiency, 2007. Guide for conducting energy efficiency potential studies. (Hereafter referred to as “Action Plan”)

Information on potential studies

- Technical Forum (November 2007)
 - <http://www.epa.gov/cleanenergy/energy-programs/state-and-local/state-forum.html#twelve>
- National Action Plan for Energy Efficiency, Guide for Conducting EE Potential Studies (November 2007)
 - http://www.epa.gov/cleanenergy/documents/potential_guide.pdf
- More methodology details: California's secret energy surplus, Rufo and Coito (2002)
 - http://www.ef.org/documents/Secret_Surplus.pdf



Recent potential studies

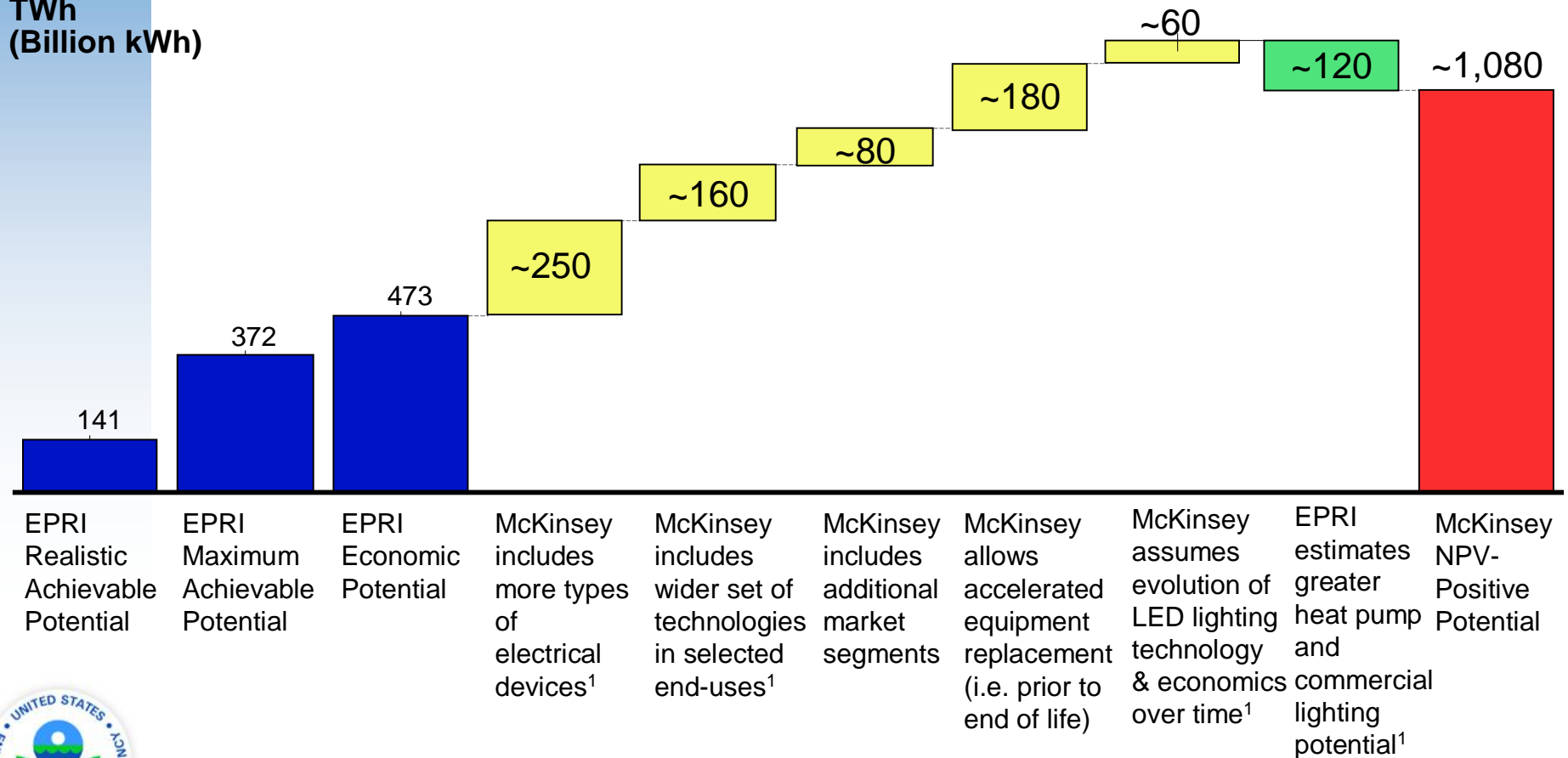
- Two recent national studies
 - McKinsey, Unlocking Energy Efficiency in the U.S. Economy, 2009 (*economic potential*)
 - EPRI, Assessment of Achievable Potential from Energy Efficiency and Demand Response, 2009 (*all potential types*)
- Many state/regional studies
 - NPCC: Draft 6th Northwest Power Plan (2009)
 - SWEEP: The New Mother Lode (2002)
 - ACEEE state studies
- Common findings
 - Energy efficiency offers a vast low-cost energy resource
 - U.S. economic potentials of 25% (McKinsey) and 11% (EPRI) of 2020 elec demand (~ 2%/y and 1%/y)
 - Econ potentials in state studies ~10 - 30% (~ 1 - 4%/y)
 - Significant barriers need to be addressed on multiple levels



Comparing EPRI and McKinsey 2020 economic potentials

2020 Electricity Energy Efficiency Economic Potential (Relative to AEO 2008 Reference Case)

TWh
(Billion kWh)



¹ Includes small differences in technology performance and cost assumptions, discount rates, and electricity rates between the reports

Reconciling the differences between the EPRI and McKinsey estimates

1. McKinsey report addresses additional end-uses of energy
 - Additional market segments, types of electrical devices, wider set of technologies in some end-uses
 - Account for 490 TWh of the higher potential in the McKinsey report
2. McKinsey allows accelerated deployment prior to end of life
 - Accounts for an additional 180 TWh of the McKinsey potential
3. EPRI applies existing technology performance and economics; McKinsey assumes some improvement over time
 - Accounts for an additional 60 TWh of McKinsey potential
4. EPRI analysis uses more aggressive assumptions in the technology characteristics of some technologies, lower discount rate, and customer-specific retail rates
 - Drives an increase in the EPRI potential by 120 TWh



Source: McKinsey & Co, "EPRI and McKinsey Reports on Energy Efficiency: A Comparison"
http://www.mckinsey.com/client-service/electric-power-natural-gas/downloads/EPRI_McKinsey_report_comparison_211009.pdf

Results in context

- Electricity demand growth and average annual growth rate (2008-2020)

	Demand growth	Avg annual growth
– Reference case ¹ :	~ 490 TWh	~1.0%/y
– Mckinsey econ pot'l:	~ -590 TWh	~-1%/y
– EPRI econ pot'l:	~ 10 TWh	~0%/y
– EPRI max achievable pot'l:	~ 115 TWh	~0.3%/y
– EPRI realistic pot'l:	~ 350 TWh	~0.7%/y

- Potential CO₂ emission reductions

– Waxman-Markey 2020 reduction:	~ 960 MMTCO ₂ e
– Mckinsey econ pot'l (elec):	~ 710 MMTCO ₂
– EPRI econ pot'l ² :	~ 310 MMTCO ₂
– EPRI max achievable pot'l ² :	~ 240 MMTCO ₂
– EPRI realistic pot'l ² :	~ 90 MMTCO ₂



¹ AEO 2008 (shown for consistency with studies). For reference, AEO 2009 (April) shows demand growth of ~ 400 TWh or 0.9%/y

² Applying an emission factor consistent with the Mckinsey analysis

Uses of energy efficiency potential studies

- Evaluate/establish statewide energy savings targets
- Estimate potential CO₂ reductions from energy efficiency
- Support funding levels of energy efficiency programs

