

EPRI and McKinsey Reports on Energy Efficiency: A Comparison

The Electric Power Research Institute (EPRI) and McKinsey & Company recently released separate reports on the topic of energy efficiency in the United States. McKinsey's *Unlocking Energy Efficiency in the U.S. Economy* released in July 2009 analyzes the NPV-positive potential for energy efficiency, identifies barriers to capturing that energy efficiency opportunity, and explores the solutions that could address those barriers. EPRI's *Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S.* released in January 2009 provides analysis of the Technical and Economic potential for energy efficiency, then uses historical energy efficiency program performance to estimate Maximum Achievable and Realistic Achievable Potential for energy efficiency.

Despite differences in methodology and potential sizing, both reports are in agreement on the following key messages:

- Energy efficiency offers a vast low-cost energy source for the U.S.
- Significant and persistent barriers to energy efficiency exist and will need to be addressed on multiple levels to stimulate demand for energy efficiency measures
- New sources of no- and low-carbon energy generation will still be necessary in conjunction with energy efficiency as part of a portfolio of energy solutions.

EPRI and McKinsey reports approach the question of energy efficiency from different perspectives: EPRI focuses on understanding existing programs and best practices to capture energy efficiency and analyzing likely achievability based on current experience. McKinsey focuses on understanding the opportunity available, and exploring ways to significantly change the status quo in ways that will overcome the significant barriers currently facing the energy efficiency opportunity.

Additionally, EPRI and McKinsey employ different methodologies, with differences in scope, technologies considered, and assumptions in characteristics of these technologies. These factors lead to differences in the sizing of the energy efficiency potential. Comparing EPRI's estimate for Economic potential of 473 TWh in the year 2020 to McKinsey's estimate for NPV-positive potential of 1080 TWh for the same year yields the following four sources of difference¹:

- *McKinsey report addresses additional end-uses of energy.* The McKinsey report included within its scope additional sources of end-use energy consumption, such as: community infrastructure (e.g., street lighting, traffic lighting, water distribution facilities, waste water treatment plants and telecom infrastructure); additional industrial processes; additional categories included in residential and commercial electronic devices and small appliances; and additional commercial and residential building shell measures. These differences in scope (which on the chart include the additional market segments, additional types of electrical devices, and a wider set of technologies utilized in some end-uses) account for 490 TWh of the higher potential in the McKinsey report.
- *McKinsey report allows accelerated deployment of energy-efficient technology prior to end of life.* If the energy savings produced by an efficiency measure would fully pay for itself (i.e., total levelized cost including capital, operation and maintenance, and energy costs of the new measure is less than the current stock's levelized energy cost only), then the current stock is replaced with the new technology in McKinsey's methodology, but not in EPRI's calculations. For example, McKinsey allows an incandescent bulb to be replaced with a CFL or LED without waiting for the incandescent bulb to reach its natural end of life replacement cycle if this cost-effectiveness test is met. This acceleration drives an additional 180 TWh in the potential found in the McKinsey report. (Note: this is in essence a timing difference between the two

¹ Both the EPRI Economic- and McKinsey NPV-Positive- potentials are expressed relative to the U.S. Energy Information Administration's 2008 Annual Energy Outlook Reference Case forecast of U.S. electricity consumption for the year 2020.

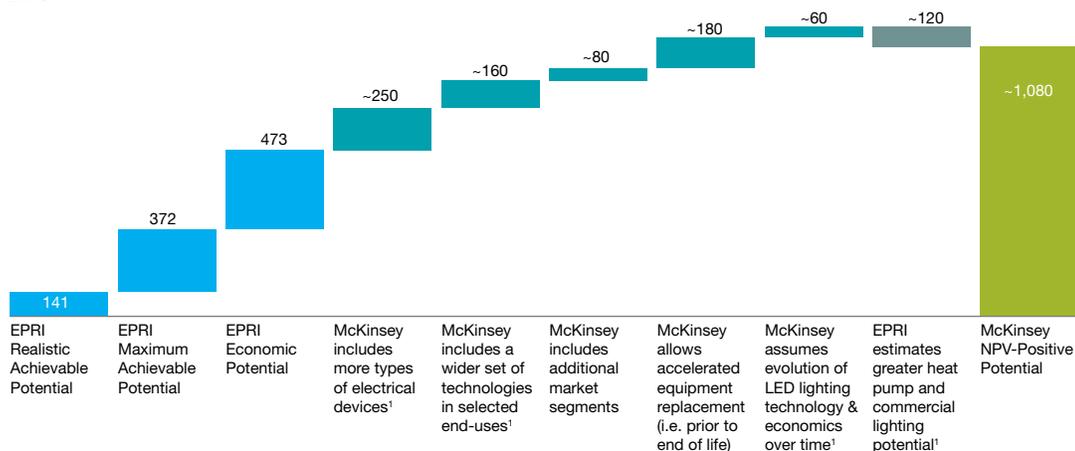
reports, as both methodologies would ultimately recognize cost effective savings to the extent they use similarly efficient technologies)

- *EPRI report applies existing technology performance and economics, while McKinsey report assumes advancement of technology and economics over time.* The EPRI report utilizes current, verifiable, technology cost and efficiency data through the forecast horizon. The McKinsey report, in contrast, uses datasets from the National Energy Modeling System that factor in conservative technology cost and efficiency improvements overtime. In general, this means that technologies decrease in cost over time in the McKinsey methodology (e.g., LED light bulbs will be more expensive in the near-term, and trend down over time with manufacturing scale and expected deployment, as well as improvements in their technology). This difference in underlying data accounts for another 60 TWh of increased potential found in the McKinsey report.
- *EPRI report uses more aggressive assumptions in the technology characteristics of some technologies, a lower discount rate, and customer-specific retail rates to value the energy saved.* The calculation of economic potential requires assumptions in the discount rate, the value of energy saved, and the technology characteristics of the measures being utilized. EPRI uses a 5% discount rate while McKinsey employs a 7% discount rate, which has the effect of making measures generally more economic in EPRI's analysis. In addition, McKinsey employs industrial retail rates as a proxy for the avoided cost of energy, while EPRI uses customer-specific (i.e., participant) retail rates. Lastly, for some technologies (e.g., heat pumps and commercial lighting), EPRI has differing technology assumptions that make these measures economic, driving additional potential from the McKinsey report, which does not consider these technologies economic. Contrary to the prior three differences, this difference causes EPRI to find a higher potential than the potential found in the McKinsey report. These differences in methodology drive an increase in the potential found by EPRI of 120 TWh

Comparison between EPRI and McKinsey energy efficiency potential values, year 2020

2020 Electricity Energy Efficiency 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 two reports