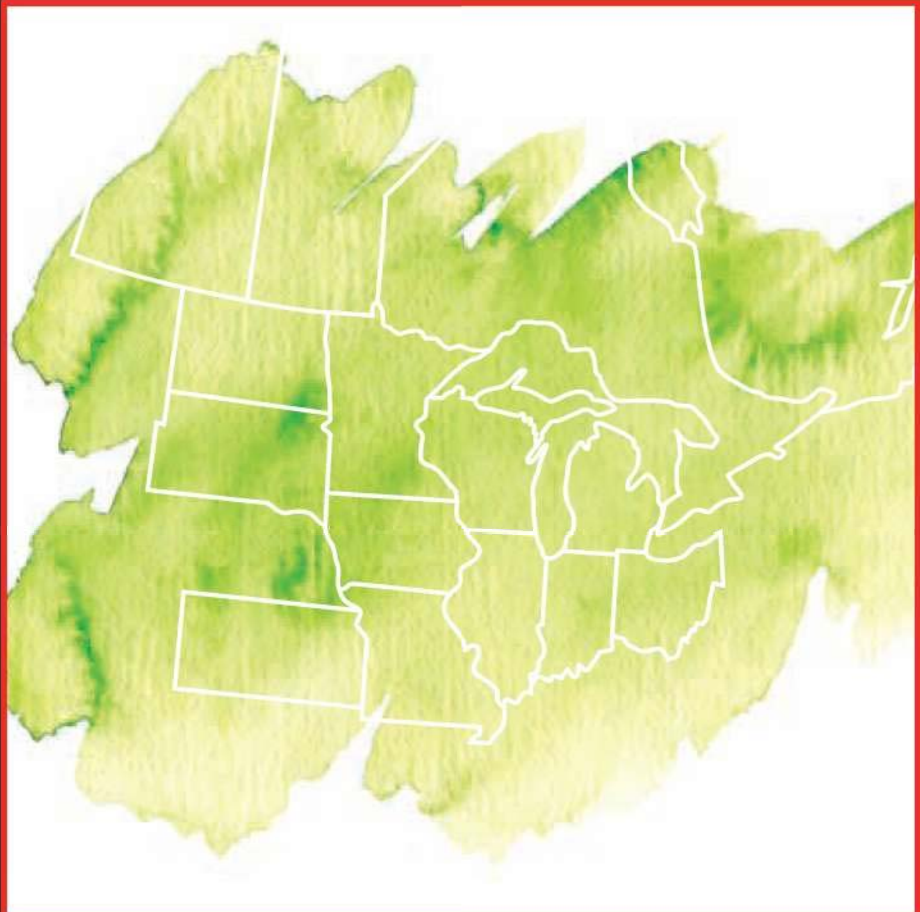
# A REVIEW AND ANALYSIS OF EXISTING STUDIES OF THE ENERGY EFFICIENCY RESOURCE POTENTIAL IN THE MIDWEST



A POLICY WHITE PAPER IN SUPPORT OF THE MIDWESTERN GOVERNORS ASSOCIATION ENERGY AND CLIMATE CHANGE PLATFORM

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**PREPARED BY**

ENERGY CENTER OF WISCONSIN

ACEEE American Council for an Energy-Efficient Economy



**WITH THE ASSISTANCE OF**
Energy Efficiency Advisory Group of the Midwestern Governors Association

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A policy white paper in support of the Midwestern Governors Association Energy and Climate Change Platform

AUGUST 2009


## PROJECT MANAGER

Susan Stratton, Energy Center of Wisconsin

## SUBCONTRACTOR

Dan York, American Council for an Energy-Efficient Economy

Energy Center of Wisconsin
455 Science Drive, Suite 200, Madison, WI 53711
608.238.4601
**www.ecw.org**





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**Energy Center of Wisconsin staff who contributed to this project include:**
Steve Kihm, Nick Sayen, Cherie Williams, Melanie Lord

**Sub contractor staff who contributed to this project include:**
Dan York, Katherine Friedrich

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# Executive Summary

Energy efficiency improvements have the potential to slow the growth of electricity and natural gas use and reduce utility greenhouse gas emissions in the Midwest. Currently, the best programs in the region (Iowa, Minnesota and Wisconsin) are capturing savings from energy efficiency of 0.7 percent of annual retail energy sales. Raising that level of savings to two percent of annual retail sales of natural gas and electricity is a bold, aggressive and challenging goal that would put the Midwest in a leadership position in addressing climate change. Achieving such an aggressive target would not be unprecedented, however, as Efficiency Vermont recently reported that it achieved savings of 2.5 percent in 2008.[1]

The Energy Security and Climate Stewardship Platform endorsed by the governors of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Ohio, South Dakota and Wisconsin and the premier of Manitoba in 2007 acknowledged the value of energy efficiency and set the goal of meeting two percent of the Midwest's annual retail sales of natural gas and electricity through energy efficiency improvements by 2015. Recognizing that this goal is substantially greater than current policies and programs are achieving, the Energy Efficiency Advisory Group of the Midwestern Governors Association initiated a study to collect, catalog and analyze information about the achievable potential of energy efficiency in the region. The intent of this analysis is to report the results of those studies, and to contrast them with the preliminary stated goal of achieving two percent annual savings. These prior studies describe past practices and therefore should not be interpreted as limiting future achievements. *The key question under review here is not whether we should strive to replicate typical historical results and estimates, but whether we can exceed them and by how much.*

Studies identifying energy efficiency potential were a staple of utility integrated resource planning and demand-side management activities in the 1980s and early 1990s. These studies were used to identify energy efficiency opportunities and screen the applicable technologies for cost effectiveness in order to develop programs and budgets for utility-delivered conservation efforts. As utilities restructured in the mid- to late-1990s, they relied more on competitive market forces to direct their resource investments and the energy efficiency potential study fell by the wayside. However, with growing concerns over climate change and greenhouse gas emissions, energy efficiency has reemerged as a viable utility resource and potential studies are again being conducted to identify energy efficiency opportunities. We identified ten studies conducted in the Midwest since 2001 to estimate the potential for energy efficiency to meet a portion of the energy need.

The Energy Center of Wisconsin and the American Council for an Energy-Efficient Economy undertook a review and analysis of these recent energy efficiency potential studies conducted in the Midwest to help explain the gap between existing efforts and new initiatives and to determine how realistic the annual two percent savings goal is. The studies identify ranges of savings from energy efficiency potential of 0.5 to 1.6 percent per year. These are clearly lower rates of savings than called for in the Energy Security and Climate



[1] Efficiency Vermont, Year 2008 Preliminary Savings Claim, March 23, 2009.

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Stewardship Platform. However, because of a number of disparities among the studies and the lack of consistent assumptions, we conducted further analysis to understand how these differences affected the results and to determine the conditions under which greater efficiency savings potential might be identified.

## DISPARITY AMONG THE MIDWEST STUDIES

We found several reasons for the differences in results among the studies we reviewed: (1) the studies varied in terms of which types of potential were being determined; (2) the studies were not consistent in which sectors were included (residential, commercial and industrial); and (3) the vintage of the data used to determine energy savings varied considerably. Some of the data used to determine energy efficiency potential is 20 years old. More recent data is difficult to obtain.

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The most important of these differences lies in the first category. There are three perspectives commonly used to determine energy efficiency potential. They are technical, economic and achievable. Technical potential estimates the energy savings from replacing existing technologies with more energy-efficient technologies regardless of cost or practicality. Economic potential is a subset of technical potential in which a cost-effectiveness criterion is used to screen out technologies whose benefit (energy cost savings) is less than the cost to purchase, install and operate. Finally, achievable potential is a subset of economic potential. It considers practical realities that inhibit markets from delivering efficiency savings. These include budget constraints and lack of information. Achievable potential is the most direct estimate of the impacts that policies and programs can have on influencing customer energy use. Among the studies we reviewed some estimated both economic and achievable potential while others estimated only one or the other.

## ADDITIONAL STUDIES

As a result of all these differences there were not enough common data points from the Midwest studies to draw robust conclusions from them. In order to get a more comprehensive picture of what these studies reveal about the potential for energy efficiency savings, we drew on a larger set of studies from throughout the United States and Canada. While these studies also varied in scope, we were able to draw some conclusions from this broader sample. Nine out of the 20 non-Midwestern studies identified either achievable or economic potential of 1.9 percent per year or above. Even though these studies produced higher estimates of potential than those produced for Midwest states, our analysis of how these studies were conducted suggests that they were designed with what David Goldstein refers to as a standard conservative bias, one that underestimates the amount of achievable energy efficiency.

> Many studies have looked at the cost effective potential for efficiency by examining the supply curves for saved energy in detail for major end uses. Yet virtually all of these studies rely on methodologies that are excessively conservative if the goal of policymakers is to meet aggressive climate change emissions reduction goals. (Goldstein 2008)

*Yet, despite underestimating achievable energy efficiency potential, almost half of these studies found annual achievable potential of nearly two percent.* If we apply a new paradigm in which energy efficiency is an explicit component of a climate change policy and we use innovative approaches to deliver comprehensive programs, we'll find that the Energy Security and Climate Stewardship Platform goal of two percent, while aggressive, is realistic. We must recognize energy efficiency as a least-cost resource in order to align stakeholder interests, provide adequate program funding and remove the barriers that prevent us from achieving these higher levels of energy efficiency.

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## IDENTIFYING GREATER ENERGY EFFICIENCY SAVINGS POTENTIAL

Achievable potential, as explained previously, is a subset of both technical and economic potential. The focus for achievable potential, however, is on the impact that policies or programs have on reducing energy use. In this context, the overarching policy goal stated in the Energy Security and Climate Stewardship Platform is to reduce $CO_2$ and other greenhouse gas emissions. This context is different than any of our previous experience with energy efficiency funding and goal setting, and has not driven estimates of achievable energy efficiency potential in the past. This suggests that we should expect to see upward revision in energy efficiency potential estimates in future studies.

Our analysis suggests that designing a study of energy efficiency potential that accounts for the policy goal of reducing $CO_2$ and other greenhouse gas emissions and that eliminates the conservative biases of earlier studies will result in annual savings potential of two percent or higher. More importantly, recent experience shows us the potential for energy efficiency and conservation to significantly reduce our energy use. In 2000–2001 California responded to its electric reliability crisis by enacting an unprecedented level of energy efficiency and conservation programs supported by a broad public information campaign. The results were dramatic—6.7 percent reduction in total electricity use in 2001. While this effort was in reaction to a crisis, it clearly indicates that energy efficiency and conservation programs can achieve high levels of savings. Achievable energy efficiency, then, is clearly a function of financial investment, programmatic efforts, public outreach and political will.

## CONCLUSIONS

In this era of heightened concern over climate change and looming legislation regulating carbon emissions, aggressive goals for energy efficiency and conservation are appropriate components of Midwestern energy policy. Estimates of achievable energy efficiency potential derived from studies done in the past do not reflect the different social, political and economic contexts that exist today and should not be relied on to define or limit current program efforts.

Policy initiatives to address climate change provide the impetus to change the paradigm for determining achievable energy efficiency savings. When we consider the cost of carbon, the cost to build low-carbon generating plants or develop renewable resources to meet growing electrical demand, then greater investment in energy efficiency captures more savings while remaining both cost effective and less costly than the alternatives.

The Midwest is well positioned to raise its overall energy efficiency efforts. Several Midwestern states have mature, long-running utility or state-wide public benefit energy efficiency programs in place. These programs, when combined with new initiatives, more timely adoption of codes and standards, use of combined heat and power as a source of industrial efficiency, and governments leading by example will serve the region well in achieving the efficiency goals of the Energy Security and Climate Stewardship Platform.

# Introduction

The Energy Efficiency Advisory Group (EEAG) of the Midwestern Governors Association (MGA) collaborated with the Energy Center of Wisconsin and the American Council for an Energy-Efficient Economy to determine whether there is data to support the aggressive goal of two percent reduction in annual energy use from energy efficiency strategies endorsed in the Energy Security and Climate Stewardship Platform. To accomplish this task, we reviewed and analyzed recent studies estimating the potential for energy efficiency to reduce energy use. We reviewed these studies from the policy objectives they were attempting to meet, the methods used to determine the amount of energy efficiency that could be achieved as well as the sectors of the economy they covered. We concluded that:

- The goal of two percent savings per year for the region from a combination of electricity and natural gas is aggressive but supportable. While it may be difficult for an individual state without past experience with energy efficiency programs to meet the two percent goal in the near term, the region as a whole can do it with utility programs, updated codes and standards, combined heat and power and government leading by example. Additionally, it would be difficult to achieve two percent savings for natural gas with utility programs alone, but when we combine electric savings with gas savings from all efforts, the two percent average reduction in total BTUs is achievable.

- The two percent target will stretch state and utility energy efficiency programs. States with strong, well-established programs are in a better position to reach the higher goals. States restarting programs after long periods without activity have a bigger challenge, but also have large amounts of relatively low-cost and easy-to-achieve energy savings (from commercial lighting, for instance).

- Our energy and economic policy context has changed dramatically making higher investments in energy efficiency cost effective. In a world in which new electrical generation will have to have no or low carbon emissions, energy efficiency is the least costly action because it curtails the growth in electrical energy use and delays the need to build more costly clean power plants.

## POLICY OBJECTIVES

Changing policy objectives provide one context for reevaluating the role of energy efficiency. The energy policy landscape has changed dramatically in the past few years as the U.S. attempts to grapple with the problem of climate change. This changing landscape includes:

- Realization that some form of monetizing carbon costs is inevitable.
- Recognition that energy price volatility is increasing.
- Increases in the costs of constructing new power plants.
- Concerns about the ability to finance and secure cost-recovery for large electric generation construction projects.

- Shrinking reserve margins and concerns about electric system reliability.
- Increasing impact of energy costs on all customers in an economic recession.

These are some of the factors that have elevated energy efficiency resources and provide the backdrop for our analysis of existing studies of energy efficiency potential in the Midwest.

# Studies of Energy Efficiency Potential

Studies to estimate the potential for energy efficiency improvements and associated energy savings are fundamental to the planning, development, implementation and evaluation of energy efficiency programs provided to energy utility customers. Energy efficiency potential studies examine customer markets and end-use applications for the full spectrum of technologies and products that use energy in our homes, businesses, institutions and industries. These studies seek to identify energy efficiency opportunities and quantify the savings possible through implementation of measures that capture such opportunities. Such studies provide a ready road map showing where program efforts should be directed, as well as help to establish baselines against which to measure improvements in energy efficiency.[2]

The practice of conducting energy efficiency potential studies is not new. As integrated resource planning and demand-side management arose and were applied in the 1980s and into the 1990s, such studies were commonly performed. Through these studies, utilities and other program administrators identified available energy efficiency opportunities and screened such measures for cost effectiveness to determine what types of programs should be developed and provided to customers. Such studies also were helpful in determining allocation of program budgets across different customer segments and end-use applications (such as lighting, air-conditioning, space heating, motor-drive systems, water heating, and industrial processes). The number of energy efficiency potential studies diminished greatly from the mid to late 90s into the early 2000s as many utility jurisdictions restructured their markets to introduce competition at the retail level or otherwise relied on greater use of competitive forces within energy markets to direct utility resource investment.

However, changing market conditions and a re-examination of restructuring in many of these same jurisdictions has led to a new wave of interest and policy focus on energy efficiency as a bonafide utility resource—a resource fully valued in development of energy resource portfolios that include both supply and demand resources.

This rise, fall and re-emergence of energy efficiency potential studies seen nation-wide also occurred in the Midwest. *Table 1* identifies the set of studies that we found in our research for recent energy efficiency potential studies.

## OVERVIEW OF METHODOLOGIES AND DATA USED IN POTENTIAL STUDIES

The studies that we reviewed share the overall objective of identifying energy efficiency opportunities for selected customer segments. The data and methodologies vary among the studies, but generally use disaggregated market and end-use data on selected energy technologies and applications to create estimates of potential energy savings from implementing more energy-efficient improvements. This is done end-use by end-use to create an aggregate estimate for all selected end-uses in

[2] These studies, however, do not measure non-utility efficiency efforts such as those included in the Energy Security and Climate Stewardship Platform.

a given study. The quality and availability of such end-use data vary significantly. Data that are used include:

- Appliance and technology saturation surveys
- Sales data
- Housing stock characteristics
- Commercial building stock characteristics
- End-use load profiles (energy use patterns by technologies)
- Historical energy use by type of customer, building and industry

The vintage of these data vary considerably, too. There are certain types of data that are difficult and costly to obtain, such as detailed customer end-use profiles. We have found in our work (York, Kushler and Witte, 2007) that much of the available end-use load profile data are 10–20 years old. Other data, such as sales data from manufacturers and suppliers, may be difficult to obtain as the information is often proprietary and the companies do not wish to reveal data that competitors may find advantageous.

Often, studies are conducted with proprietary models which may not reflect the policy questions posed by the stakeholder. Such models while effective in cataloging end use opportunities are not generally flexible enough to address a changing landscape with respect to climate change issues. Such models can extend the business-as-usual practices with current technologies, but may fail to take into account how policymakers may encourage the public and utilities to more actively engage in efficiency strategies.

**Table 1—Summary of Midwestern Studies Reviewed**

| Title | State/ Region | Date Published |
|---|---|---|
| Energy Efficiency and Customer-Sited Renewable Energy: Achievable Potential in Wisconsin 2006–2015 | WI | 2005 |
| Illinois Residential Market Analysis | IL | 12–May–03 |
| Assessment of Energy Efficiency Potential: 2006–2025 | Ontario | 7–Oct–05 |
| Kansas Energy Council DSM Potential Study and Plan | KS | 2008 |
| Duke Energy Indiana DSM Market Assessment and DSM Action Plan: Final Report | IN | 2007 |
| 2006 Missouri Statewide Residential Lighting and Appliance Efficiency Saturation Study | MO | 15–Nov–06 |
| Assessment of Energy and Capacity Savings Potential in Iowa | IA | Feb–08 |
| Midwest Residential Market Assessment and DSM Potential Study | Midwest | Mar–06 |
| Summary Document for Minnesota Market Assessment Studies | MN | 2004 |
| Energy Efficiency and Customer-Sited Renewable Resource Potential in Wisconsin for the Years 2012 and 2018 | WI | 2009 |
| Energy Efficiency and Demand Response Potential for Iowa Municipal Utilities for the Years 2012 and 2018 | IA | 2009 |
| Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S. (2010–2030) | U.S. | Aug–08 |
| Minnesota Gas Energy Efficiency Potential | MN | 2009 |

There are three perspectives commonly used in defining different energy efficiency potentials:

- Technical
- Economic
- Achievable

Technical potential is an estimate of how much energy savings could be achieved by replacing existing technologies with more energy-efficient technologies without consideration of costs and practicality. Consequently, technical potential typically defines an upper boundary of the potential for energy efficiency.

Applying cost effectiveness as a criterion is used to screen measures according to their costs relative to benefits. If the value of the benefits (usually measured as the value of energy savings and in some cases, additional quantified customer benefits) is greater than the costs for procuring, implementing and operating a given measure, it is determined to be cost-effective. The economic potential is thus a subset of the technical potential.

As a final screen of energy efficiency potential, many studies include an estimate of the achievable energy efficiency potential. This is a subset of the economic potential. The achievable energy efficiency potential is an estimate of the magnitude of energy efficiency improvements that can be made, accounting for practical limits and barriers towards implementing measures that are cost-effective (or economic). This requires estimating how mechanisms used to promote greater energy efficiency can influence customer choices and behavior related to energy use. These mechanisms include utility demand-side management programs, public benefits energy efficiency programs, building codes and appliance standards. Estimating the achievable potential is thus an estimate of the possible impacts that various policies and programs can have on influencing customer energy use through adoption and implementation of more energy-efficient technologies.

To illustrate what these different potentials mean, consider the case of compact fluorescent light bulbs (CFLs) for use by residential customers. The technical potential would estimate the amount of energy savings that could be achieved by replacing all existing incandescent light bulbs and assuming that all future purchases of light bulbs would be CFLs. The economic potential for residential CFLs would add a cost-effectiveness criterion identifying only those applications of CFLs where the benefits are equal to or greater than the costs of replacing incandescent light bulbs. CFLs generally have a greater purchase cost that can be offset—or paid back—by the lifetime energy and cost savings that would accrue. However, not all applications may yield such lifetime savings; typically those applications with limited hours of operation (such as closets or garages). Finally, not all customers will purchase and use CFLs for applications where they are cost-effective. In addition, many customers wait until existing incandescent bulbs burn out before replacing them. Therefore, the achievable potential is an estimate of the energy savings that would result from all those CFLs actually purchased, installed and used by customers through the influence of energy efficiency programs and related policies (such as codes or standards). This requires estimating how many customers will participate in a program or be affected by other policies and the associated number of applications for each customer that would be changed to CFLs.

Installation of CFLs to replace incandescent bulbs is one of many energy efficiency measures included in most energy efficiency potential studies. Clearly the accuracy of the estimates is a direct function of the accuracy of baseline data and of the assumptions used to develop the estimates, such as program participation and end-use profiles (how customers actually use a device and how it performs in a given application).

## COMPARING THE STUDIES

*Table 2* presents the summary results and comparisons based on our review of the Midwestern energy efficiency potential studies. For this table and our comparisons we focused on just the economic and achievable potentials as these are the most relevant to discussions of establishing policy and program goals since they account for costs, benefits and practical implementation of energy efficiency measures. The values shown in *Table 2* show the achievable potential savings on an annual basis, i.e., the energy savings possible each year as a percentage of estimated total annual energy sales.

Please note that the gross discrepancy between the economic potential and achievable potential figures reflects the differences in the constructs more than anything else. *Economic potential has no time dimension.* It assumes that all the cost-effective measures are implemented *immediately*. The achievable potential estimates reflect the fact that energy savings occur over time, and not in one fell swoop. The economic potential estimates, therefore, are of limited usefulness when setting an annual savings target, as is the intent here.

One finding immediately apparent from *Table 2* is that the studies vary considerably as to which potential—economic or achievable—is included. Some studies include both estimates; others include only the achievable potential while others include only economic potential. The reasons behind these differences are functions of the objectives of a given study as well as the available resources and scope of the study. In some cases, estimating the economic potential may be required to set the level of funding and associated program activity to capture a certain desired fraction of that potential. In other cases the policy and program questions addressed may be focused on savings achieved for a given level or range of program funding and activity.

Another key difference among the studies is which customer sectors are included—residential, commercial and industrial. Some studies examined and reported results only for the residential sector. Others estimated only an aggregate—or all sector—total. Some studies included estimates for residential, non-residential (commercial and industrial) and combined sectors.

The differences in which savings potentials are estimated and which sectors are included in the estimates make it difficult to draw strong, robust conclusions about theses studies. The number of data points for any given metric (e.g., residential economic potential) is limited—two to four across these studies. Despite these limitations, some observations about the available data can be made. Economic potential savings estimates for all sectors range from 14 percent to 45 percent for the studies for which such values are available (median of 20 percent, mean of 24 percent). Achievable potential savings estimates for all sectors range from 0.4 percent to 1.8 percent for the studies for which such values are available—with a median value of 0.9 percent and mean of 1.0 percent.

Given the limited data set of Midwestern energy efficiency potential studies, we drew upon a much larger set of such studies that ACEEE recently reviewed. As discussed earlier, there has been a relatively recent resurgence in the completion and application of energy efficiency potential studies to guide program, policy and planning decisions within the utility industry. ACEEE (Eldridge et al, 2008) completed a study of about 20 recent (year 2000 or later) energy efficiency potential studies from throughout the United States and Canada. This much larger data set provides a more complete, comprehensive picture of what these studies reveal about the potential savings that could result from increased levels of energy efficiency.

*Table 3* (page 14) presents the summary data from ACEEE's review. We excluded the few Midwestern studies that were included in ACEEE's review to avoid redundancy and allow a clearer comparison of Midwestern and non-Midwestern studies. We also added the potential study prepared by the Electric Power Research Institute (EPRI), which was released after the ACEEE analysis was completed. Like the set of Midwestern studies, there are gaps and differences across the type of potentials estimated and the sectors included in the studies. For economic potential the range of annual savings is 13 percent to 30 percent with a mean value of 20 percent. For the achievable potential the range of annual savings is 0.3 percent to 4 percent with a mean value of 1.5 percent. While higher, the absolute magnitude of these values is reasonably comparable—with the achievable potential for the Midwestern studies at about 0.9 percent/year and the non-Midwestern studies at 1.5 percent/year. With this broader set of non-Midwestern studies, though, it is important to look beyond the mean at the range—especially on the high side. Several of the non-Midwestern studies had an achievable potential of 1.90 percent/year or above. Natural gas savings may be smaller due to range of measures available.

**Table 2—Summary of Midwestern Studies**

**ELECTRICITY**

| State (year completed) | Economic Potential (% total savings) | | Achievable Potential (% savings/year) | |
|---|---|---|---|---|
| | Residential Sectors | All Sectors | Residential Sectors | All Sectors |
| Illinois (2003) | | | 0.5% | |
| Indiana (2007) | | | 0.8% | |
| Iowa, Investor-Owned (2008) | 30% | 17% | | |
| Iowa, Municipal (2009) | | 22% | 0.8% | 1.2% |
| Kansas (2008) | | 35% | 0.9% | 1.1% |
| Midwest (2006) | | | 0.5% | |
| Minnesota (2003) | 14% | | | |
| Wisconsin (2009) | | 18% | 1.0% | 1.6% |
| Wisconsin (2005) | | | | 0.8% |
| Ontario (2005) | 20% | 20% | | 0.7% |
| Median | 20% | 20% | 0.8% | 1.1% |

**NATURAL GAS**

| State (year completed) | Economic Potential (% total savings) | Achievable Potential (% savings/year) |
|---|---|---|
| | All sectors | All sectors |
| Illinois (2003) | | 0.6% |
| Indiana (2007) | | 0.6% |
| Iowa, Investor-Owned (2006) | 27% | |
| Iowa, Municipal (2009) | 21% | 1.8% |
| Kansas (2008) | 45% | 1.5% |
| Midwest (2006) | | 1.3% |
| Minnesota (2009)* | 23% | 1.6% |
| Wisconsin (2009) | 16% | 1.0% |
| Wisconsin (2005) | | 0.4% |
| Median | 23% | 1.0% |

*These are the median results for the three utilities studied.

To assess how well these estimates compare with actual results achieved by leading programs, we examined recent results of a set of 14 leading states in terms of their levels of funding and reported energy savings for the most recent years data are available, 2006 and 2007. *Table 4* presents these results. The values in the table for the metric, energy efficiency savings as a percentage of total

**Table 3—Other Energy Efficiency Potential Studies—Summary Findings**

| Region of Study | Technical | Economic | Years | Achievable |
|---|---|---|---|---|
| U.S. (2000) | NA | NA | 20 | 1.20% |
| Massachusetts (RLW 2001) | NA | 24% | 5 | NA |
| California (Xenergy/EF 2002) | 18% | 13% | 10 | 1.00% |
| Southwest (SWEEP 2002) | NA | NA | 17 | 1.90% |
| New York (NYSERDA/OE 2003) | 36% | 27% | 20 | NA |
| Oregon (2003) | 31% | NA | 10 | NA |
| Puget (2003) | 35% | 19% | 20 | 0.60% |
| Vermont (2003) | NA | NA | 10 | 3.10% |
| Quebec (Optimal 2004) | NA | NA | 8 | 4.00% |
| New Jersey (Kema 2004) | 23% | 17% | 16 | 0.70% |
| Connecticut (GDS 2004) | 24% | 13% | 10 | NA |
| New England (Optimal 2005) | NA | NA | 10 | 2.30% |
| Northwest (NW Council 2005) | 25% | 17% | 20 | 0.60% |
| Georgia (ICF 2005) | 29% | 20% | 10 | 0.90% |
| California (Itron 2006) | 21% | 17% | 13 | 0.60% |
| North Carolina (GDS 2006) | 33% | 20% | 10 | 1.40% |
| Florida (ACEEE 2007) | NA | 25% | 15 | 1.30% |
| Texas (ACEEE 2007) | NA | 30% | 15 | 1.20% |
| Utah (SWEEP 2007) | NA | NA | 15 | 1.70% |
| Vermont (GDS 2007) | 35% | 22% | 10 | 1.90% |
| EPRI (2009) | NA | NA | 22 | 0.3% |
| **Average** | **28%** | **20%** | **14** | **1.50%** |

sales (kWh), in 2006 range from 0.1 percent to 1.2 percent with a mean and median both of 0.7 percent. In 2007 the values range from 0.1 percent to 1.8 percent with a mean and median both of 0.8 percent. Vermont has achieved the highest savings as measured by this metric—at 1.8 percent in 2007, up from 1.1 percent in 2006. Connecticut and Rhode Island are two other states that have reached savings levels greater than 1 percent/year—at 1.3 percent and 1.2 percent respectively. Other recognized leading states such as Massachusetts, Oregon and California are just below this threshold at 0.9 percent savings each in 2007. The three leading Midwestern states included in this study and their 2007 savings levels are:

- Iowa: 0.7 percent;
- Minnesota: 0.7 percent; and
- Wisconsin: 0.7 percent.

A key objective of examining these actual program results is to assess what savings levels are possible through energy efficiency programs and related policies. From this set of programs and associated results, it appears that a few leading programs have crossed the milestone threshold of 1 percent savings per year and that a number of programs readily have achieved savings in the 0.5 percent to 1.0 percent range. These leading states vary considerably in the specific structures of their energy efficiency programs (how they are administered and implemented) and in the associated regulatory mechanisms and policies that support greater energy efficiency (program cost recovery, financial incentives for program administrators, decoupling, building codes, appliance standards, etc.). Based on these data it may be tempting to conclude that these results represent the maximum levels of savings that programs can achieve. Recall that estimates of the achievable potential generally show values in the range of 0.8 percent to 1.5 percent per year. Comparing these estimates to actual results suggests that programs are indeed at or very close to the achievable savings estimated in various energy efficiency potential studies. We do not believe this to be the case, however. We believe that existing studies of energy efficiency potential underestimate what is achievable and that policies and

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