Energy Efficiency Benefits the Iowa Economy

John A. "Skip" Laitner
Teresa Galluzzo

July 2008

The Iowa Policy Project
318 2nd Avenue North, Mount Vernon, Iowa 52314
(319) 338-0773
www.IowaPolicyProject.org

The Iowa Policy Project

July 2008

Energy Efficiency Benefits the Iowa Economy

By John A. "Skip" Laitner and Teresa Galluzzo

Iowa has the potential to vastly improve its energy productivity. A broad array of practices and technologies can be tapped for their energy efficiency (EE) benefits. These range from the purchase of Energy Star appliances and office equipment to the use of more energy-efficient industrial processes. EE also means achieving greater fuel economy in vehicle fleets and seeking more energy-efficient electricity production from combined heat and power plants or waste-to-energy generation systems. Compared to normal energy production and consumption patterns, studies typically find a potential savings of 25-30 percent through the year 2030 when cost-effective EE practices are implemented. With further research and development the amount of efficiency potential will likely grow over time.

Cost-effective improvements in overall EE allow Iowans to have the same or improved lifestyle and save money; provide a small but important net gain in jobs and the state's income; and reduce the carbon dioxide emissions that contribute to global climate change. What makes all these benefits possible?

While electricity production and consumption is an important part of the Iowa economy, the utility industry is not especially labor intensive compared to the rest of the economy. Nor does it contribute to the state's income at the same rate as other sectors of the economy. The critical data for Iowa (based on 2006 economic accounts) are summarized in the table below, where dollars indicate dollars of revenue.

Iowa Electricity Sector Contributes Less to Jobs and State Income than Other Iowa Sectors

Direct Impact	Electricity	All Other
Employment (jobs per million dollars)		
2006	2.2	7.9
2030	1.5	5.0
Contribution to Income (per dollar)	$0.216	$0.293

Based on Iowa-specific data, today's electricity production provides an average of 2.2 direct jobs per million dollars of revenue. All other sectors of the economy – from manufacturing to commercial services – provide an average of 7.9 jobs. Similarly, the electricity sector contributes only 22 cents of each dollar of revenue to wage and salary incomes, while all other sectors contribute 29 cents per dollar of revenue (IMPLAN 2008).

This economic context is not unique to Iowa. This pattern is repeated through all regions of the U.S. That is, energy-related sectors stimulate less economic activity per dollar of revenue than almost all other business activities. The electric sector is capital intensive and relies on resources that are manufactured outside the state. It also imports a great deal of its inputs, in Iowa's case coal and nuclear fuel. This means if Iowa invested in greater EE the resulting energy bill savings would allow consumers and businesses to spend money for other goods and services that actually increase the number of jobs and income compared to the jobs and income provided directly by the energy industry. With EE improvements, people are able to save money from reducing their own energy use and from a potential decrease in energy prices as demand is reduced.

Skip Laitner *is Director of Economic Analysis for the American Council for an Energy-Efficient Economy (ACEEE).* ***Teresa Galluzzo*** *is a Research Associate for the Iowa Policy Project.*

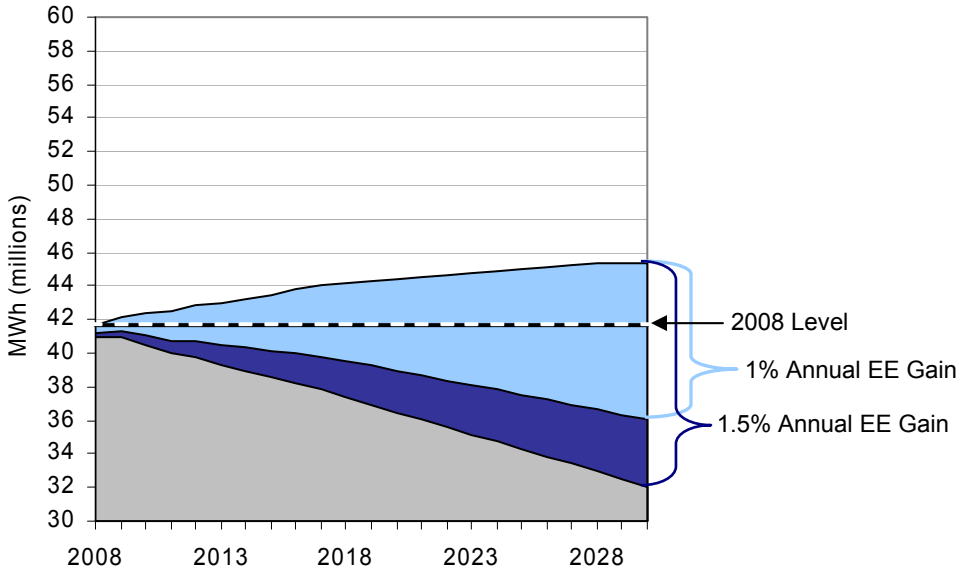
A number of good jobs could be created for directly implementing EE measures – installing energy efficient windows, lighting, insulation and thermostats. However, this number is small relative to the number of jobs created from the increased spending that comes when people have more money in their wallet from spending less on energy. Geller et al (1992) estimated only 10 percent of the jobs created as a result of EE are related directly to installing EE practices.

Energy Efficiency Impacts in Iowa

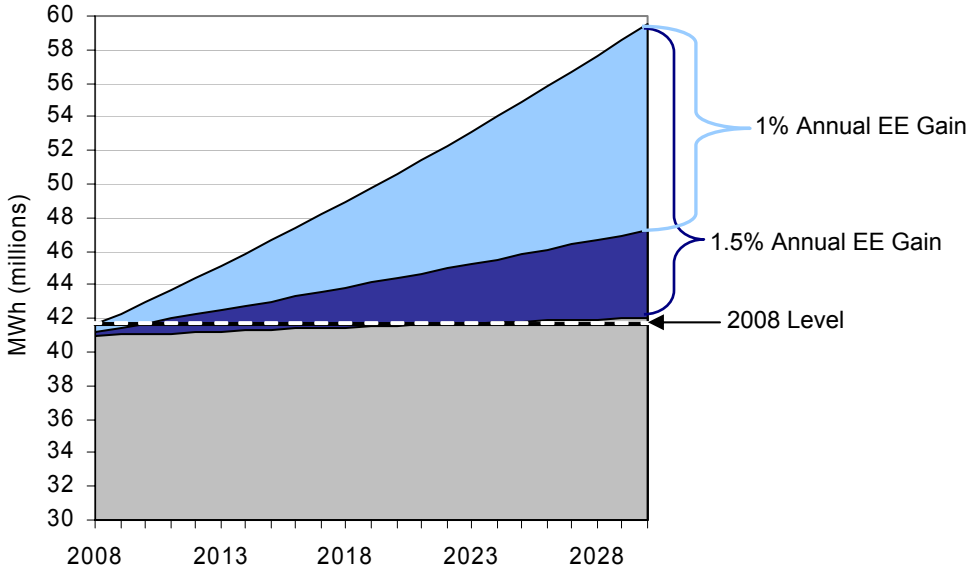
We can adapt the actual Iowa data shown in the table above to determine the potential impact on the state's economy if business and policy leaders promoted greater EE. Two reasonable scenarios are annual EE generated savings of 1.0 or 1.5 percent. Leading EE states have achieved these levels or more, and states – including our neighbors Illinois and Minnesota – have set goals for achieving 1.0 or 1.5 percent savings annually. In 2007, Governor Culver signed the Energy Security and Climate Stewardship Platform, calling for meeting at least 2 percent of annual retail sales of natural gas and electricity through EE improvements by 2015 and achieving an additional 2 percent of savings every year thereafter.

Throughout this report we will look at the impacts of these EE gains based on two different electricity consumption forecasts. One estimate is based on the Energy Information Administration's (EIA) regional forecast. By this estimation, if Iowa's future consumption is congruent with its neighbors, in 2030 it would be consuming 9.1 percent more electricity than in 2008. The second estimate is based on Iowa's two investor-owned utilities' (IOUs) predicted average annual electricity growth rate. Based on this growth rate, Iowa would see a 43.1 percent increase in electricity consumption from 2008. (See note at end of document for more information on how these estimates were calculated.)

Iowa's Electricity Consumption to 2030: Based on EIA Data



Iowa's Electricity Consumption to 2030: Based on IOU Data



If Iowa improves its EE by 1.0 percent annually, there will be a total reduction in electricity consumption of 20.6 percent over the period. If Iowa reduces electricity usage by 1.5 percent annually, there will be a total reduction in electricity consumption of 29.4 percent compared to estimated forecasts for 2030. This will save money for consumers and businesses. Presumably that electricity bill savings will be spent in other ways, and for this analysis we assume this spending occurs in Iowa in the same proportions as current non-electricity spending.

The latest data from the EIA shows Iowa spent an estimated $3,038 million for its total use of electricity in 2006.[1] If we use the EIA-based estimate we would expect the state's electricity bill to increase by 9.1 percent to $3,315 million in 2030 (expressed in constant 2006 dollars). If we use the IOU-based estimate, Iowa's electricity bill would increase by 43.1 percent, to about $4,347 million in 2030 (expressed in constant 2006 dollars). These estimates do not account for changes in cost of electricity any greater than all other consumer products, likely making them conservative estimates. At the same time, normal productivity gains can be expected to change both the number of jobs and Iowa's income by 2030 (Economy.com 2008). For this analysis we assume Iowa's income per dollar of economic activity will remain the same in 2030 with the end result that incomes per job will rise with the level of productivity gains through 2030.

Using this information we can estimate the impact of efficiency gains on both jobs and the state's income. In order to calculate net gains in employment due to EE, we multiply 2030 annual electricity spending ($3,315 million or $4,347 million) by the proposed EE reduction (20.6 percent or 29.4 percent) and then by the estimated difference between the jobs per million dollars of revenue in the electricity sector and jobs created in all other sectors:

[1] The latest data for total energy expenditures available at this point is for the year 2005 (EIA 2008a). This information was updated to 2006 using working estimates from the revised *Annual Energy Outlook 2030* (EIA 2008b).

Net Jobs from EE Gains: Based on EIA Data

1.0% Annual EE Gain: 3,315 * 20.6% * (5 – 1.5) = 2,390 net jobs
1.5% Annual EE Gain: 3,315 * 29.4% * (5 – 1.5) = 3,411 net jobs

Net Jobs from EE Gains: Based on IOU Data

1.0% Annual EE Gain: 4,347 * 20.6% * (5 – 1.5) = 3,134 net jobs
1.5% Annual EE Gain: 4,347 * 29.4% * (5 – 1.5) = 4,473 net jobs

In other words, if Iowa chooses to promote EE so that electricity consumption is reduced by 1.5 percent per year (29.4 percent in 2030) the state economy should provide 3,411 more jobs under the EIA-based estimate or 4,473 under the IOU-based estimate. While these numbers are small in absolute terms, such gains are significant in a state like Iowa with its relatively low population. For example, in 2007 Siemens Power Generation announced it would manufacture wind turbine blades in Fort Madison and Hendricks Industries said it will be producing wind turbine towers in Keokuk. These two companies will provide 883 jobs in Lee County. These jobs will constitute more than 5 percent of the nonfarm jobs in the county.

We can use a similar calculation to estimate the impact of efficiency gains on wage and salary incomes in the state. We multiply 2030 annual electricity spending ($3,315 million or $4,347 million) by the proposed efficiency reduction (20.6 percent or 29.4 percent) and then by the estimated difference between the electricity sector's impact on Iowa's income and all other sectors' impact on state income:

Increase in Iowa's Income: Based on EIA Data

1.0% Annual EE Gain: 3,315 * 20.6% * (0.29 – 0.22) = $47.8 million (in 2006 dollars)
1.5% Annual EE Gain: 3,315 * 29.4% * (0.29 – 0.22) = $68.2 million (in 2006 dollars)

Increase in Iowa's Income: Based on IOU Data

1.0% Annual EE Gain: 4,347 * 20.6% * (0.29 – 0.22) = $62.7 million (in 2006 dollars)
1.5% Annual EE Gain: 4,347 * 29.4% * (0.29 – 0.22) = $89.5 million (in 2006 dollars)

EE gains of 1.5 percent can generate a net income benefit of $68 million (according to the EIA-based estimate) or $90 million (according to the IOU-based estimate) for the Iowa economy. These numbers are conservative because they assume the electricity savings exactly offset the cost of the investments. (This still provides a net benefit for the state's income because the spending has shifted to other sectors such as construction, manufacturing or finance.) Even with a longer expected payback as the costs of EE grows, the EE investments would likely pay back within a five- to nine-year period. So with buildings and equipment that last 15 years and longer, it is still likely the productivity gains would be significantly larger than suggested here.

Conclusion

This analysis looks only at annual efficiency gains of 1.0 or 1.5 percent in Iowa's electricity sector and shows small but net positive benefits for Iowa by 2030 – a net gain of 2,390 or 3,411 (EIA-based estimate) or 3,134 or 4,473 (IOU-based estimate) jobs and $47.8 million or $68.2 million (EIA-based estimate) or $62.7 million or $89.5 million (IOU-based estimate) in state income. Setting these annual goals for a total reduction of electricity consumption of 21 or 29 percent by 2030 are in line with what

ACEEE and other studies suggest is possible with EE improvements. They suggest gains of 25 to 30 percent are achievable by 2030.[2]

By Either Measure, Increasing Iowa's EE Would Create Jobs, Income in 2030

	Annual EE Savings	Cummulative EE Gains	Net Jobs Created	Additional State Income Generated (2006 dollars)
EIA Data	1%	20.6%	2,390	$47.8 million
EIA Data	1.5%	29.4%	3,411	$68.2 million
IOU Data	1%	20.6%	3,134	$62.7 million
IOU Data	1.5%	29.4%	4,473	$89.5 million

If we had expanded our analysis to include all energy sectors, the gains in jobs and state income would have been larger. Also if we had looked at the combined possibilities of EE and renewable energy the benefits for jobs, the economy and for reducing carbon dioxide emissions would be larger. Other analyses have documented the job increases and economic benefits of increases in overall EE and/or renewable energy in Iowa (e.g. Madsen et al 2008 and Nayak 2005).

This short analysis suggests there is a very real possibility of an innovation strategy that emphasizes a cost-effective substitution of productivity for energy consumption and production. These findings show the good news about climate change policies. Rather than ratcheting down the economy, climate change policies accomplish just the opposite: They can spur investments that provide Iowa and the United States with needed goods and services while also providing them more efficiently.

*** Note on Details of Estimated Electricity Forecasts:**

Energy Information Administration (EIA) Regional Forecast
Because the EIA does not forecast electricity usage by state, we estimated Iowa's share of the regional consumption. To do this we divided the electricity consumed in Iowa's seven-state region by Iowa's population share. This produced consumption numbers fairly similar — an average difference of 3 percent — to actual electricity consumption from 1960 to 2004. This finding gives us some confidence that doing a similar calculation for the EIA's regional forecast through 2030 may be a fairly accurate indicator of Iowa's electricity consumption in coming years. By this estimation, in 2030 Iowa would be consuming 9.1 percent more electricity than in 2008.

Investor Owned Utilities' (IOU) Growth Rate Forecast
Iowa's two IOUs, MidAmerican and Interstate Power and Light, sell 75 percent of the electricity in Iowa. From 2008 to 2026 they predict a 1.64 percent average annual growth rate. We applied their growth rate to the 2008 EIA sales estimate. Appling a steady growth rate does not show the small yearly changes in growth rate the IOUs are predicting, but we use this average rate because we are extending their estimate out to 2030, four years beyond their forecast. Based on this growth rate Iowa would see a 43.1 percent increase in electricity consumption from 2008 to 2030.

[2] There is a very large literature and set of reports on the greater EE potential in the U.S. and around the world. See, for example: McKinsey Global Institute 2007 and 2006, Expert Group on Energy Efficiency 2007, and Laitner et al. 2006. There are also a large number of assessments completed for many of the states that also inform policymakers about cost-effective policy options. See: Eldridge et al. 2008 (Maryland), Elliott et al. 2007 (Texas), and Laitner and Kushler 2007 (Michigan).

References

[Economy.Com 2008] State Economic Forecast for Iowa 2008. Moody's Economy.Com. Accessed Friday, March 26, 2008.

[EIA 2008a.] Energy Information Administration. 2008. State Energy Price and Expenditure Report. Washington, DC: U.S. Department of Energy.

[EIA 2008b.] Energy Information Administration. 2008. Annual Energy Outlook 2030. Washington, DC: U.S. Department of Energy.

Eldridge, Maggie, R. Neal Elliott, et al. 2008. "Energy Efficiency: The First Fuel for a Clean Energy Future – Resources for Meeting Maryland's Electricity Needs." Washington, DC: American Council for an Energy-Efficient Economy.

Elliott, R. Neal, Maggie Eldridge, et al. 2007. "Potential for Energy Efficiency, Demand Response, and Onsite Renewable Energy to Meet Texas's Growing Electricity Needs," Washington, DC: American Council for an Energy-Efficient Economy.

Expert Group on Energy Efficiency. 2007. *Realizing the Potential of Energy Efficiency Targets, Policies, and Measures for G8 Countries*. Washington, DC: United Nations Foundation.

[Geller et al 1992] Geller, Howard, John DeCicco, and John A. "Skip" Laitner. 1992. "Energy Efficiency and Job Creation." Washington, DC: American Council for an Energy-Efficiency Economy.

[IMPLAN 2008] IMPLAN 2006 Data Files for Iowa. 2008. Stillwater, MN: Minnesota IMPLAN Group. Accessed March 26, 2008.

Laitner, John A. "Skip", Donald A. Hanson, Irving Mintzer, and Amber J. Leonard. 2006. "Adapting in Uncertain Times: A Scenario Analysis of U.S. Energy and Technology Futures." *Energy Studies Review*, 2006, 14(1), pp. 120-35.

Laitner, John A. "Skip" and Martin G. Kushler. 2007. "More Jobs and Greater Total Wage Income: The Economic Benefits of an Efficiency-Led Clean Energy Strategy to Meet Growing Electricity Needs in Michigan." Washington, DC: American Council for an Energy-Efficient Economy.

[Madsen et al 2008] Madsen, Travis, Elizabeth Ridlington, Becky Stanfeld, Andrew Hug, and Bruce Speight. 2008. "The Power of Efficiency: Opportunities to Save Money, Reduce Pollution and Expand the Economy in the Midwest." Des Moines: Environment Iowa Research & Policy Center.

McKinsey Global Institute. 2006. *Productivity of Growing Global Energy Demand: A Microeconomic Perspective*, San Francisco, CA: McKinsey & Company, Inc., 2006.

McKinsey Global Institute. 2007. *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?* San Francisco, CA: McKinsey & Company, Inc., 2006.

Nadel, Steven and Howard Geller. 2001. "Smart Energy Policies: Saving Money and Reducing Pollutant Emissions through Greater Energy Efficiency," Report E012, Washington, DC: American Council for an Energy Efficient Economy.

[Nayak 2005] Nayak, Navin. 2005. "Redirecting Iowa's Energy: The Economic and Consumer Benefits of Clean Energy Policies." Des Moines: Iowa PIRG Education Fund.

The Iowa Policy Project

The Iowa Policy Project was founded in 2001 to promote public policy that fosters economic opportunity while safeguarding the health and well-being of Iowa's people and the environment. By providing a foundation of fact-based, objective research and engaging the public in an informed discussion of policy alternatives, IPP advances accountable, effective and fair government.

The Iowa Policy Project is a 501(c)(3) nonprofit, nonpartisan organization. Contributions are tax-deductible. For more information, see our website, www.IowaPolicyProject.org, or call (319) 338-0773.