Energy Productivity: Efficiency Benefits to Power Illinois Jobs and the Economy

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Introduction

Illinois is rich in opportunities to improve its economy-wide energy productivity. Indeed, with implementation of the Energy Efficiency Section of the Public Utilities Act in 2007 (see, 220 ILCS 5/8-103) the state has already begun to take significant steps to do so. In this case the legislation sets up the Illinois Energy Efficiency Portfolio ("EEP") which, among other things, sets an incremental annual electric savings target that began at 0.2% of total electricity sales in 2008 and ramps up to a requirement of 2% annual savings in 2015 and thereafter. Investor-owned electric utilities are responsible for roughly 75% of program savings and spending, while the Illinois Department of Commerce and Economic Opportunity (DCEO) administers the remaining 25% of the funds, which are used to for efficiency programs serving government facilities, low-income households, and market transformation-oriented information and training programs.

The Natural Resources Defense Council (NRDC) asked the American Council for an Energy-Efficient Economy (ACEEE) to examine the potential net jobs impacts that are likely to follow from the implementation of cost-effective energy efficiency investments.

While energy is an important part of the Illinois economy, the energy industries are not especially labor intensive compared to the rest of the economic sectors within the state. The critical data for Illinois – based on the 2009 economic accounts for the state – are summarized in the table below (IMPLAN 2011).[1] These are expressed as the number of jobs per millions of 2009 dollars for both the electric utility sector and the average among all other economic sectors within the state.

Table 1. Labor Intensities of Key Illinois Economic Sectors

	Electricity Sector	All Other Sectors
Direct Jobs Per Million 2009 Dollars	1.4	6.5
Total Jobs Per Million 2009 Dollars	5.2	12.9

[1] IMPLAN® (**IM**pact analysis for **PLAN**ning) is a national database and a set of analytical software tools that provide an array of economic and structural data for both the U.S. and for each of the states and counties within the U.S. For more information, see http://www.implan.com.

Based on Illinois-specific economic data, the electric utility sector of the state's economy provides an average of 1.4 direct jobs per million dollars of revenue. These include the jobs of those people who work directly for the state's electric utilities, consisting of the crews operating the local power plants within the state as well as the accountants, engineers, and administrative staff necessary to maintain reliable operation. If we also include the total jobs which supported by revenues earned by the state's utilities – reflecting all of the direct, indirect, and induced jobs associated with the production, transmission, and distribution of electricity within the state – the labor intensity grows to about 5.2 jobs per million dollars of revenues. All other sectors of the economy – ranging from agriculture, manufacturing, and construction to wholesale and retail trade, business and financial services as well as government services – provide, on average, 6.5 direct jobs and 12.9 total jobs per million dollars of revenue (IMPLAN 2011).

This economic context is not unique to Illinois. It turns out that this pattern is repeated throughout all regions of the U.S. economy. That is, all energy-related sectors stimulate less employment activity per dollar of revenue than almost all other business activities. This means that where Illinois can invest in greater levels of energy efficiency – and do so in ways to save money – the resulting energy bill savings will allow consumers and businesses to spend money for other goods and services that actually increase the number of jobs compared to the jobs provided by the energy industry.

An Economic Thought Experiment

We can adapt the actual Illinois data shown in the table above to determine the potential impact on the state's economy if business and policy leaders were to promote greater energy efficiency as a means to reduce carbon dioxide emissions and reduce electric costs.

In 2001, for example, the American Council for an Energy-Efficient Economy (ACEEE) recommended a series of energy productivity measures that might have been adopted by the U.S. Congress (Nadel and Geller 2001). Had that series of measures actually been adopted, both the U.S. and the Illinois economies might have improved their respective efficiencies by about six percent compared to their actual performance in 2009.[2] This would have saved money for consumers and businesses. Presumably that energy bill savings would have been spent in other ways, and for this analysis we assume that this spending occurs within the State.

The latest data from the Energy Information Administration (EIA 2011a) shows that Illinois spent an estimated $12.4 billion for its total use of electricity in 2009.[3] While this amount has undoubtedly grown since then – driven primarily by higher prices we now pay for energy – we can use this information to show the magnitude of impact on the Illinois economy had the state been just 6 percent more energy-efficient with respect to its use of electricity.

Using that information we can set up the following calculations to estimate the impact of efficiency gains on both jobs and the state's economy. For net gains in employment, we would show

$$12{,}400 * 0.06 * (12.9 - 6.5) = 4{,}761 \text{ net jobs}$$

[2] Author's calculations based on the implied impacts of total energy efficiency gains suggested by Nadel and Geller (2001).
[3] The latest data for total electricity expenditures available at this point is for the year 2009 (EIA 2011).

In other words, had Illinois promoted a slightly different mix of productive investments so that the state was just six percent more energy efficient than it was otherwise, it could have supported about 4,761 more jobs than now otherwise provided. While this number seems small compared to a population of 12.8 million people, it is a significant total in a state looking to increase overall employment and economic development opportunities. Moreover, an even greater level of efficiency improvements, extended to all end uses of energy might expand that number of jobs.

We can also examine the impact of efficiency gains on the State's larger economy by extending the magnitude of efficiency gains across all uses of energy within the economy, as follows:

$$40{,}473 * 0.25 * (12.9 - 6.5) = 64{,}757 \text{ net jobs}$$

As it turns out, the total energy bill paid by Illinois businesses and citizens – whether for gasoline or for electricity and natural gas consumption in the state's homes, schools, and businesses – was an estimated $40,473 million in 2009 (EIA 2011b). Had Illinois moved more aggressively to improve energy efficiency since the 1973-74 oil embargo and cut energy consumption by 25 percent through more productive investments in energy efficient technologies and infrastructure, we show a net benefit of just under 65,000 jobs. This estimate is consistent with the scale of the energy efficiency potential highlighted by a 1995 ACEEE assessment for the Midwestern states of Illinois, Indiana, Ohio, and Michigan. That study found that if cost-effective energy efficiency investments were made in Illinois to reduce energy use by 26 percent over the period from 1995 through 2010, those savings would support a net gain of 62,700 net jobs by the year 2010 (Laitner et al. 1995). In other words, our thought experiment is very consistent with past modeling assessments completed for Illinois

Examining the Impact of Energy Efficiency

Against this backdrop we can explore the net employment benefits that might follow from the Illinois Energy Efficiency Portfolio as implemented by Commonwealth Edison and Ameren Illinois (see, ComEd 2010 and Ameren Illinois 2011).

As it turns out, the portfolio of energy efficiency programs implemented by these two electric utilities will spend an estimated $219 million to promote energy efficiency improvements among its many residential, commercial and industrial customers in 2011.[4] In return, they anticipate consumers will save nearly 1.1 billion kilowatt-hours (kWh) of electricity in 2011 and for a number of years to come. Based on an average retail price of 9.1 cents per kWh, that means consumers will save nearly $98 million dollars annually as a result of that first year of investment. In effect, the program will pay for itself in about 2.2 years. Under current plans the utilities will continue to invest about the same amount of money through the year 2025. This will increase total efficiency efforts each year so that by 2025 the overall electricity savings will grow to nearly 18 billion kWh.

We can examine the economic impacts of these annual investments and resulting electricity bill savings by integrating the ComEd and Ameren financial data into a modeling framework that also taps into the economic structural data which provides us with the critical IMPLAN employment coefficients (2011) similar to those shown in Table 1 and the anticipated long-term labor productivity and price indexing trends suggested by the Annual Energy Outlook (EIA 2011c).

[4] This budget amount is less than the total amount needed to meet the standards, but was calculated by the utilities to meet the terms of a statutory budget cap limiting spending on these programs under current law, and was approved by the Illinois Commerce Commission in 2011.

For background material on how this kind of impact assessment is undertaken, see a characterization of the ACEEE **D**ynamic **E**nergy **E**fficiency **P**olicy **E**valuation **R**outine, or DEEPER Modeling System, as summarized in Laitner (2011). Table 2 highlights the current program impacts as reported in constant 2009 dollars (reflecting the base year of the IMPLAN data set) and in net annual job per year for key benchmark years.

The first noticeable impact of the program design appears to be a declining investment in energy efficiency upgrades. This is because the data reported by ComEd and Ameren appears to be in nominal or current dollars. When the effects of inflation are taken into account that that we bring all future values back to constant 2009 dollars, the real program spending does, indeed, appear to decline. But the savings continue to grow over time, rising almost eight-fold over the period 2012 through 2025, growing from $529 million in 2015 to $1.6 billion by 2025.

Assuming a five-percent discount rate this pattern of expenditures and total energy bill savings shows a total resource cost or benefit-cost ratio of 1.61. This means that over the time horizon studied here, every dollar of program cost and consumer contribution will generate a savings of $1.61. This suggests, in turn, that the energy efficiency portfolio is shown to be highly cost-effective. And as we suggested previously, a cost-effective energy efficiency program that redirects money from low-labor intensive economic activity into higher labor-intensive economic sectors should provide a small but net positive employment impact for Illinois. Table 2 underscores this point by showing a net gain in jobs that rises from 3000 total jobs in 2015 to 8,200 total jobs by 2025.

Table 2. Financial and Economic Impacts of Current Program Efforts

	2015	2020	2025	Benefit Cost Ratio
Total Program Cost (in millions of 2009 $)	204.4	184.6	168.5	
Consumer Match (in millions of 2009 $)	284.1	256.5	234.3	
Consumer Savings (in millions of 2009 $)	528.8	1,064.5	1,600.2	
Net Gain in Total Jobs (Actual)	3,000	5,900	8,200	1.61

There is even better news on the horizon, however, as a new law will allow ComEd and Ameren to expand their program to capture more cost-effective efficiency opportunities within the residential sector – proving more relief to the state's households. Table 3 below summarizes the larger total electricity bill savings and the resulting larger impacts for jobs within the state.

Table 3. Financial and Economic Impacts of Expanded Program Efforts

	2015	2020	2025	Benefit Cost Ratio
Total Program Cost (in millions of 2009 $)	267.6	241.6	220.6	
Consumer Match (in millions of 2009 $)	327.7	295.9	270.2	
Consumer Savings (in millions of 2009 $)	651.9	1,392.7	2,133.5	
Net Gain in Total Jobs (Actual)	3,500	7,500	10,800	1.76

Under the new provisions consumer savings might grow from $1.6 billion to $2.1 billion by 2025. Similarly, the number of jobs would increase to nearly 10,800.

Conclusions

Based on the available data for the State of Illinois, there does seem to be good news about cost-effective energy efficiency opportunities the state's electricity consumers. Such policies do not have to be about ratcheting down the economy; rather, they can be about more productive investments which provide Illinois and the U.S. with the needed goods and services while providing them more efficiently.

Perhaps even better news is that the analytical findings reported here are entirely consistent with past studies included in a recent meta-review of 48 previous studies that cover state and regional energy policy assessments within the United States (Laitner and McKinney 2008). In short, this analysis suggests the very real possibility for an innovation-led energy policy strategy which emphasizes a cost-effective substitution of energy productivity gains for inefficient energy consumption. To the extent that higher levels of energy productivity is actually pursued within the state, it should lead to a small but net positive economic impact for Illinois as well as the U.S.

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