STATE OF IOWA
BEFORE THE IOWA UTILITIES BOARD

IN RE:	)	
	)	
APPLICATION OF INTERSTATE POWER AND LIGHT COMPANY FOR APPROVAL OF AN ENERGY EFFICIENCY PROGRAM	)	**DOCKET NO. EEP-08-01**
	)	

SURREBUTTAL TESTIMONY OF CHRISTOPHER A. JAMES ON BEHALF OF THE COMMUNITY COALITION (COMMUNITY ENERGY SOLUTIONS, IOWA FARMERS UNION, IOWA PHYSICIANS FOR SOCIAL RESPONSIBILITY)

NOVEMBER 6, 2008

List of Exhibits

INTRODUCTION

Q. Please state your name and your business address.

A. My name is Christopher A. James, and my business address is 22 Pearl Street, Cambridge, Massachusetts 02139.

Q. Are you the same Christopher A. James who previously filed direct testimony in this proceeding?

A. Yes.

Q. Please state the purpose of your testimony.

A. In response to my direct testimony, submitted August 29, 2008, Mr. Hossein Haeri raised several issues in his rebuttal testimony, submitted October 16, 2008, related to energy efficiency program goals and administration. Key points from Mr. Haeri's testimony are summarized as follows:

1. Achieving the 1.5% annual energy savings goal by 2011 through energy efficiency is aggressive;
2. There are few cases where utilities have achieved 1.5% annual energy savings. If there are such cases, the level of savings is not sustained over multiple years;
3. The January 14, 2008, Iowa Utility Board order directs the utility to submit a scenario showing 1.5% annual energy savings through energy efficiency, not a plan that could be implemented;
4. It is correct to assume that future per unit costs of energy savings will increase in the future with higher levels of required savings;
5. Verified savings and cost data are not available and/or not reliable and thus Synapse's analysis of historical cost of saved energy versus energy savings is not valid; and,

6. Renewable technologies may be mature, but they are not yet cost-effective.

Q. Are you sponsoring exhibits and supporting schedules in the filing?

A. Yes. Exhibit 1 provides levelized costs of several fossil-fuel technologies, including coal and nuclear. Exhibit 2 provides levelized costs of several renewable energy technologies, including wind.

Q. Do you agree with Mr. Haeri's statement on page 7, line 14-17, that achieving about 1.0 percent of annual retail sales in 2011 and about 1.3% of annual retail sales in 2013 are aggressive compared to those achieved historically in other areas such as California, the Northwest, and New England?

A. I do not agree with his point because, as I presented in Figure 1 of my testimony, at page 9, line 6, there are several utilities that are currently achieving greater than 1.0% reductions of annual sales through efficiency programs. These include energy efficiency programs in Connecticut, Massachusetts, Vermont, Minnesota and California. As I explain later, future savings levels in these states and many others is expected to be much higher, as a result of recently adopted legislative and regulatory requirements.

Q. Do you agree with Mr. Haeri's statement: on page 7 line 20-22, that "There are very few utilities that have achieved savings of 1.5 percent of retail sales; and, in cases where savings at this level have been achieved, it occurred in sporadic years,"; and on page 8 line 16-17, "There is no evidence savings of this magnitude, assuming the data are accurate, would likely persist over time."

A. No. Of the data Synapse Energy Economics collected and analyzed (including 17 data points that represent utility or state programs), 7 utilities and one state have achieved a savings of 1.5 percent or more of retail sales in a single year. These include Interstate Power & Light Company of Minnesota (IPL), Minnesota

Power, Western Mass Electric (WMECO), Efficiency Vermont, Sacramento Municipal Utility District (SMUD), San Diego Gas & Electric (SDG&E), Southern California Edison (SCE) and Pacific Gas & Electric (PG&E). So, it is possible for IPL to achieve this level of savings.

Furthermore, 2 utilities have achieved a savings of 1.5 percent of more of retail sales for multiple years. These include Sacramento Municipal Utility District (SMUD) and Interstate Power & Light Company of Minnesota (IPL). Thus, achieving this level of savings for multiple years is not an unprecedented effort. I therefore conclude that it is possible for IPL to achieve this level of savings for multiple years.

I agree that historically relatively few energy efficiency program administrators have achieved reductions of 1.5 percent reductions in retail sales and even fewer have achieved these reductions over multiple years. However, due to rising energy prices, the lower cost of energy efficiency, the strong connection between energy efficiency and reduced emissions of greenhouse gases and emissions that contribute to smog and acid rain, many states have already mandated significant increases in energy efficiency during the same the timeframe as IPL's proposed plan. As a result, more energy efficiency program administrators plan to reach and sustain a 1.5% level of savings (or higher) between now and 2013. Specific examples include:

1. Efficiency Vermont, which expects to achieve annual savings levels of 4% in 2008;

2. Utilities and program administrators in Massachusetts, responding to the mandate by the Green Communities Act that "electric and natural gas resource needs shall first be met through all available energy efficiency and demand reduction resources that are cost effective or less expensive

than supply"[1]; Illinois program administrators, responding to Senate Bill 1592 (August 2007) which requires that the level of energy efficiency achieved increases from 0.2% in 2008 to 2.0% in 2015;

3. Illinois program administrators, responding to Senate Bill 1592 (August 2007) which requires that the level of energy efficiency achieved increases from 0.2% in 2008 to 2.0% in 2015;

4. New York State Energy Research and Development Authority (NYSERDA), responding to direction to develop and implement a plan to reduce per capita energy consumption 15% by 2015;

5. Maryland program administrators, per the Empower Maryland Act, Senate Bill 205 (2008) which requires Maryland to develop and implement a plan to reduce energy consumption 15% by 2015;

6. Connecticut program administrators, per RPS class III that requires that energy efficiency and combined heat and power provide increasing savings levels, increasing from 1% in 2007 to 4% in 2010 (PA 05-01, 2005);

7. Minnesota program administrators, per direction to reduce fossil fuel use 15% by 2015 through energy efficiency and renewable energy;

8. In addition to the Massachusetts example above, Connecticut, Maine, Rhode Island, Vermont and Washington have also recently passed legislation or regulations that require all cost-effective energy efficiency to be procured.[2]

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[1] *Chapter 169 of the Acts of 2008. An Act Relative to Green Communities.*
http://www.mass.gov/legis/laws/seslaw08/sl080169.htm

[2] See http://www.ferc.gov/market-oversight/mkt-electric/overview/2008/09-2008-elec-ovr-archive.pdf For further information on state climate change action plans, see http://www.climatestrategies,us

During the 1990s, I would agree that few utilities achieved savings levels of 1% annually, and fewer still achieved these levels on a sustained basis. However, the basis of my testimony is not on what occurred in the 1990s or even from 2000 to present, but what I am seeing today, as a result of the combined factors that I mentioned above:

1. energy efficiency is the most cost-effective resource;
2. the results of robust monitoring and verification efforts document the savings and the cost-effectiveness of energy efficiency;
3. states that have completed climate change planning efforts (about thirty so far) consistently rank energy efficiency programs in the "top ten" policy actions that will reduce greenhouse gas emissions, and
4. legislation and regulations adopted by the states mentioned above (with many others currently in process) will help to ensure that future energy efficiency programs achieve the required level of savings on a sustained basis.

Q. Mr. Haeri mentioned on page 7 line 22-23, "Data on sales and actual, verified savings are generally difficult to obtain." Do you have any response to this comment?

A. Yes.

In general, sales data are easy to obtain. EIA collects sales data from every utility under Form 861 every year and makes it publicly available on its website.

Data on verified savings are generally more difficult to obtain than sales data. In some cases, such as when data are not reported in annual reports, it may be difficult to obtain the verified savings. In other cases, verified savings are readily available. For example, NYSERDA provides savings data for the initial estimate, net of spillover and free riders, and the verified estimate in one report. However, the estimated savings reported in annual utility efficiency reports is often a reasonable and reliable estimate for most types of analyses. Such estimates are often based on deemed savings which are the estimate that has been subjected to a measurement and verification process in the past. For example, California's CALMAC provides data for verified savings for many measures at http://www.calmac.org/default.asp There are more than 800 M&V reports available on this website. California utility efficiency programs are relying on these reports for savings estimates.

Q. Mr. Haeri mentioned on page 7 line 22-23, "Available data often tend to be unreliable due to reporting entities using different metrics for estimating savings and costs." Do you have any response to this comment?

A. For the purposes of the Synapse analysis, cost and savings data was taken from energy efficiency annual reports and/or was data provided by state agencies. In some cases where lifetime savings data was not available, Synapse used extrapolated lifetime savings based on the average lifetime of efficiency measures for a specific program or sector within a specific utility from other years for which lifetime savings for that utility were available. In a few cases where no lifetime savings data was available for a specific utility or program, Synapse used a 12 year average lifetime that has been recognized as an industry rule of thumb estimate.[3] In addition, because some data sources did not provide levelized cost of saved energy (CSE), Synapse used a 4% real discount rate to estimate levelized CSE across all cases to make it easier to compare them each other (while comparison among cases are not the primary purpose of the analysis).

[3]U.S. Department of Energy and U.S. Environmental Protection Agency 2006. National Action Plan For Energy Efficiency. Washington, DC: U.S. Department of Energy and U.S. Environmental Protection Agency; Kushler, M., D. York, and P. Witte 2005. Examining the Potential for Energy Efficiency to Help Address the Natural Gas Crisis in the Midwest: Washington, DC: American Council for an Energy Efficient Economy, 2005; Bender, S., M. Messenger, and C. Rogers 2005. Funding and Savings for Energy Efficiency Programs for Program Years 2000 through 2004. Sacramento, CA: California Energy Commission.

In general, the metrics used in annual reports or data provided by state agencies are defined in a standard way (such as annual spending by a utility, cost benefit ratios, cents/kWh, gross and net savings). It is the assumptions used to calculate these cost and savings metrics that can, and often should, be different (e.g., the level of free ridership, spillover effects, measure life and discount rate). Savings estimates are often based on deemed savings which have been subjected to measurement and verification. For example, California's CALMAC provides data for verified savings for many measures at http://www.calmac.org/default.asp There are more than 800 M&V reports available on this website. California utility efficiency programs are relying on these reports for savings estimates.

In sum, the available cost and savings data and assumed lifetime savings data is reliable and reasonable for the purposes of Synapse's analysis. This is especially true given that the Synapse analysis looks at cost-savings trends within each utility, not across utilities. However, cost and savings data obtained from utility annual reports can also be useful for comparing different programs (though this is not the focus of the Synapse analysis).

For the purposes of the Synapse analysis, sales data was taken from EIA. EIA is considered a reliable source for sales data.

Q. Mr. Haeri mentioned on page 8 lines 22-23 and page 9 lines 1-3 that "the Board's order…directed utilities to "include a scenario in which the proposed performance goals reach a level equal to 1.5 percent" of retail sales. (Emphasis added) The Board did not direct utilities to "submit a plan which, when implemented, would result in annual savings equal to 1.5%". Do you have any response to this comment?

A. Yes.

The Iowa Utilities Board order issued January 14, 2008 says the following:

"*Item 2. A utility shall provide additional information to extend the analysis of the* *utility's annual energy efficiency goals required under 199 IAC 35.8(1)"e" and "f" and its proposed energy efficiency plan required under 199 IAC 35.8(2). 199 IAC 38.1(1)(e), states in part: "An identification of the utility's proposed performance goals for peak demand and energy savings from utility implementation of cost-effective energy efficiency programs and special programs. The utility shall identify annual goals, by energy efficiency program and total plan, for five years sub-sequent to the year of the filing. The utility may constrain or accelerate projected utility implementation of programs from estimates of economic or phase-in potential, based on its assessment of market potential. The utility may consider market factors including, but not limited to, market barriers to implementation of programs, the effects of rate impacts, lost opportunities which decrease future implementation of measures or programs, the non-energy benefits and detriments of programs, uncertainty associated with industry restructuring, the strategic value of energy efficiency to the utility and other market factors it deems relevant. The utility shall fully describe its data and assumptions."*

199 IAC 38.1(f) provides for "An optional sensitivity analysis. If the utility's proposed standards differ from the level of energy and capacity savings resulting from the utility's current plan by more than 25 percent, the utility shall provide a sensitivity analysis identifying key variables, including levels of spending, and showing their impact on cost-effectiveness, energy savings, and capacity savings. The purpose of the sensitivity analysis shall be to explore the range of potential for utility implementation of programs."

The scenarios listed below may be used as a substitute for the scenario analysis required under 199 IAC 35.8(1)"f."

a. For electric utilities, include a scenario in which the proposed performance goals reach a level equal to 1.5 percent of the utility's retail MWh sales (as an *average of sales for three previous years). The scenario should attain the level of 1.5 percent of retail sales on or before December 31, 2011."*[4]

While I agree with Mr. Haeri's statement that the exact language in the Order allows for the substitution of a scenario, and not a specific plan per se, the larger point is the purpose behind the request for additional analysis. If this scenario is feasible and at a reasonable cost, there should be no reason why the Commission could not direct the Company to implement this scenario.

Additionally, the Order also clearly relates the 1.5% of the utility's retail MWh sales to energy efficiency, and states that this level of savings is to be attained by December 31, 2011. IPL's alternative scenario includes both demand response and renewable energy program measures as part of IPL's 1.5% scenario. As such, the amount of energy efficiency included in IPL's 1.5% scenario is only 1.2%. Therefore, IPL's submission does not comply with the IUB Order. In contrast, MidAmerican's energy efficiency submission under this docket does reflect an analysis of the programs and costs associated with achieving the goals requested by the IUB order. MidAmerican includes this as their pro forma filing.

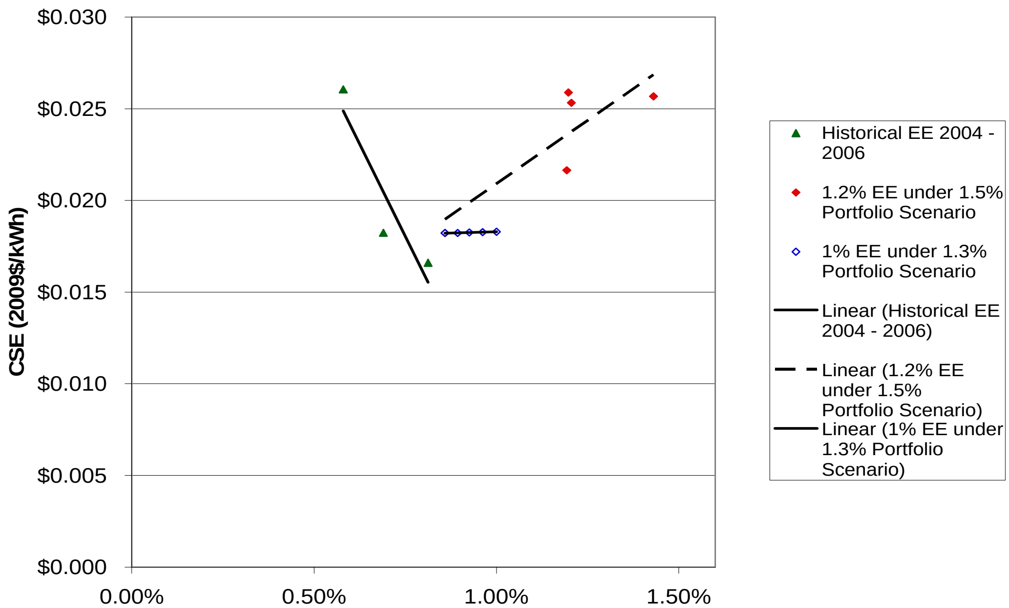
Q. Is there any problem with IPL's approach for estimating per unit cost of energy savings that is presented on page 9 line 10-11 "The assumed higher costs in IPL's scenario are based on the basic proposition that the supply curve for energy efficiency has a positive slope"?

A. A. Yes. I have concerns about the differences between IPL's recent energy efficiency programs, which have been very cost-effective, and IPL's estimates for the costs of future programs, which are shown to be dramatically escalating. I cannot offer to explain why IPL would not base its future program costs and cost effectiveness on its own data. For example, it appears that IPL's per unit cost of

[4] Iowa Utility Board, Order Requiring Filing of New Energy Efficiency Plans and Additional Information, January 14, 2008.

saved energy for IPL has been declining in real terms over the past several years, as saved energy has increased. This is consistent with the trend I have observed in other programs. Figure 1 below illustrates the basis for my concerns. In this figure, you can see that IPL programs for the period 2004-06 achieved savings at costs that decline from about 2.5 cents per kWh to about 1.6 cents per kWh as the level of savings increases. In the past, IPL's programs have been very cost-effective and have demonstrated increased cost effectiveness as the level of savings increased. IPL's projections for their 1.5% scenario during the 2009-2013 period achieve savings at costs that increase from about 2.2 cents per kWh to about 2.6 cents per kWh. This shows decreased cost effectiveness as the level of savings increases. IPL's recent experience and trend looks nothing like the trend of IPL's 1.5% scenario estimates for future program cost effectiveness. Comparing the slope of IPL's 2004-06 past experience with that shown for their future program causes me to question the assumptions that were used to determine future program costs. These two slopes are very different, and also not consistent with actual experience that has occurred elsewhere.

Figure 1. Historical and Projected of Energy Efficiency Programs for IPL



Additionally, the idea of conservation supply curve (CSC) is a useful tool for 1) comparing the relative costs of energy efficiency measures and 2) understanding the aggregate potential for cost-effective energy efficiency that is available up to any given cost of saved energy level. It is, however, inappropriate to use it as a way to predict future cost of efficiency "programs" because of the following reasons:

1. CSC includes only demonstrated and currently well-understood measures;
2. Program and measure cost reductions that may happen in the near future are not considered;
3. CSC usually just includes incremental measure costs (part of which is often funded through rebates) and excludes other program costs associated with marketing, administration, planning, implementation, and M&V are

often not included. These costs could account for a sizable portion of the total program costs (e.g., 20% to 40%);

4. Actual program design is often a portfolio of various measures and does not follow the CSC; and

5. Even actual incremental costs of measures could be lower than estimated in a potential study if a utility program engages in bulk purchase of a certain efficiency product with a wholesaler.

CSC is a very useful tool when several measures or programs are being considered for implementation in parallel at the same time. Measures can be ranked according to their cost-effectiveness, and then prioritized by in order to their expected level of savings. CSC is less useful and should not be applied when considering the cost-effectiveness of programs that are already in place (i.e., using a CSC to evaluate increased penetration of compact fluorescent light bulbs or CFLs). CFL per unit cost has decreased dramatically due to increased market penetration. Wal-Mart and Home Depot are now selling CFLs for $1 each or less, without any subsidies.

Q. Mr. Haeri states on page 10 line 14-17, "The cost/saving relationships shown in the diagram represent many different programs offered to diverse market segments at different times by different utilities and with different incentive amounts" as one of the reasons that Mr. Haeri feels that for in appropriateness of our analysis of the relationship between cost and savings is not appropriate. Do you agree with this point?

A. No. As mentioned above, the difference across entities is not a critical issue for our analysis because our analysis focuses on the relationship between cost and savings within each entity. Each company listed in the data set will have a slightly different mix of customer types and end uses targeted. One can observe some scatter in the data that are plotted. That does not however invalidate the basic point which is that the cost-effectiveness of a program improves as the annual incremental level of energy savings increases.

I believe there are many reasons for this trend that can be observed, such as:

1. Administrative costs, as a portion of the total program budget, can be higher for programs that are just starting out and/or which have low savings goals. However, administration (e.g., administrative staff, planning, program designs), marketing, and measurement and verification gain economies of scale with aggressive efficiency programs. Costs associated with these are relatively fixed in the short-term. Thus, if energy savings increase, costs can be spread over more savings when estimating the levelized cost of savings per kWh. I mentioned Vermont's energy efficiency program earlier, now considered to be the best performing program in the US. Vermont has a relatively low population, and its population density is also low. The largest city, Burlington has a population of 38,889 according to the 2000 US Census. In order to achieve the high level of savings that is contractually required for Efficiency Vermont, program administrative costs have to be kept to a minimum.

2. Equipment costs also start higher for programs that are just starting out. However, higher market penetration drives market transformation, which can significantly reduce costs on a per unit basis.

3. As technologies are deployed in increasing numbers, the supply curve shifts further to the right. Savings levels of 1% per year are normal now, and 1.5% is considered good. However, as technologies are developed, and as they are installed in increasing numbers, their costs decrease, allowing programs to go after even deeper savings without increasing costs per unit.

Q. In connection to Mr. Haeri's argument described in the above question, he also states the following: "More importantly, the analysis provides no

information on the actual relationship between costs and cumulative savings, thus it misses the underlying point about the behavior of supply curves in general and the potential effects of market barriers in impeding the penetration of energy efficiency programs in particular, especially for new measures targeted at new market segments." Does the absence of this information undermine the objective of your analysis?

A. No. I believe this kind of information is not required for the Synapse analysis. I do not believe the method suggested by Mr. Haeri is better than Synapse's approach for determining changes in the levelized cost of energy efficiency "programs" over time. I expect that the overall cost of saved energy would increase noticeably if a utility was only targeting at the least expensive options first and then targets more expensive measures after the utility has exhausted the potential of the cheapest measures. Mr. Haeri's approach would work if this was true. However, to our knowledge, this is not how utility efficiency programs are being implemented. Utility efficiency programs are more comprehensive (i.e., composed of a variety of programs and measures for each sector with a range of costs). Utility efficiency programs are not designed to exhaust the cheapest resources first. For example, CFLs have been the most cost-effective measures for years, but the penetration rate of CFLs is still low. Also, if Mr. Haeri's assumption that programs target and exhaust the potential of the cheapest measures was correct, states like California and Massachusetts which have saved significant amount of energy over two decades should be currently saving energy at much higher costs than any other states. However, California and Massachusetts are still saving energy at 2 to 3 cents/kWh. I believe there are many factors to provide for continued cost-effectiveness of programs as future energy saving goals are increased. I believe that past experience in California and Massachusetts, and current experience in Connecticut and Vermont is more indicative of what I would expect to occur in Iowa (i.e. that as the level of savings increases, that the cost effectiveness will either remain flat or continue to decrease). It is also worth pointing out that even if the cost of energy efficiency per kWh doubled, it would still be less expensive than constructing new fossil-fuel or nuclear generation.

With respect to barriers, I agree that identification of barriers, and a plan to overcome them are important aspects of any good energy efficiency program. This is why the Community Coalition in its data requests asked IPL to describe the barriers the company has experienced or expects to experience, and to provide a plan for how they will be overcome. IPL's response to the Community Coalition data request was general. The answers could have applied to any program being implemented anywhere in the United States. If there are exceptional barriers in IPL's service territory to achieving a higher level of energy savings, IPL should have provided this information in response to data requests, along with a plan for how the company is going to overcome such obstacles.

Q. Mr Haeri provides an answer to your direct testimony regarding the level of savings to be achieved from IPL's demand response program. Do you agree with his explanation?

A. A. Yes, in part, and no, in part. Mr Haeri's testimony (page 12, lines 5-21) reflects that the amount of savings estimated from implementation of IPL's demand response program is contained in the Joint Assessment, along with targets for future years. However, neither Mr Haeri nor previous documentation by IPL provide specifics related to when demand response resources are called, what operating rules, if any, are in place, and how effective IPL's demand response program is to both provide reliability and to decrease peak hourly electricity prices. The apparent absence of feedback into IPL's program is consistent with my observations of other IPL demand-side programs. It is clear from IPL's filings that the company has thought about demand response and energy efficiency measures, in general. IPL clearly has the capacity to develop and implement great programs. What I don't see is how IPL plans to consider and integrate information provided about the success or weaknesses of a program. Another question I have is how IPL will use information about programs to adjust delivery of future programs to achieve the same or higher rates of savings more cost-effectively? Having evidence that IPL will accept and integrate feedback would really help improve the transparency of IPL's programs, offer assurances to regulators and ratepayers that the programs are credible, and that IPL is committed to achieving and sustaining the planned level of savings.

Q. Mr. Haeri provides an answer to your direct testimony regarding the maturity and cost-effectiveness of deploying renewable energy technologies (page 13 ,lines 4-13) . Do you agree with his explanation?

A. No. New wind projects (at 4-9 cents/kWh with the federal production tax credit and at 6-11 cents/kWh without the federal production tax credit) are more cost effective today than new coal (at 7-14 cents/kWh). In addition, the entire coal plant must be constructed and operated before it generates even 1 MW of electricity. If financing is less than expected, or there are delays in receiving it, the new coal plant sits idle until it is 100% complete. In contrast, wind and grid connected solar can be built in smaller modules, that can more easily adjusted, if necessary, to varying and/or uncertain financing conditions. If, for example, only 95% of the financing is provided for a particular wind project, several wind turbines will still be constructed, and they will generate electricity.

Exhibit 1 reflects costs, on a levelized basis, for several fossil-fuel generation technologies, including coal and nuclear. Exhibit 2 reflects the same analysis for several renewable energy technologies, including wind.

Renewable generation could help protect IPL and Iowa ratepayers from rising energy costs in several ways:

1. Distributed solar PV, like CHP, provide for generation close to the load source, and utilize supply side resources more effectively;

2. Grid connected wind, solar and biomass take advantage of Iowa's indigenous resources

3. Constructing generation that is of a scale that it can synchronize better with Iowa's electric demand saves on capital costs. Adding increments of 10, 20 or 50 MW of renewable generation, rather than one unit of 500 or 600 MW, controls costs and maintains flexibility. This method of generation addition also helps utilities to respond quickly to and connect with the cumulative benefits and effects of energy efficiency. Achieving the level of energy efficiency required by the IUB order may obviate the need to build any new large-scale generating plants in Iowa;

4. IPL can take advantage of the investment tax credits for solar PV that were included in the recently passed Congressional financial package.

Like my comments earlier, both here and in my direct testimony, this testimony supports the conclusion that IPL has the capability to be one of the leading utilities in the US in terms of its success in achieving high rates of energy efficiency and in integrating renewable energy into its portfolio. What is missing from IPL's proposal is a defined and replicable process that promotes feedback and accountability, accommodates revisions and corrections as appropriate, features known and established links between program design and implementation, and demonstrates sustained and robust communications internally and externally that encourage connections between programs (e.g., such as the links between energy efficiency and renewable energy, or the links between renewable energy and energy security and reduced risk).

Q. Mr Haeri, in his rebuttal testimony to witness Crandall (page 16, lines 9-23+)discusses the process IPL intends to follow regarding implementation of the Energy Independence and Security Act (EISA), and its potential effect on the amount of present and future savings. Do you agree with his explanation?

A. No, but I can understand its basis. Determining the baseline from which savings are measured is critical to establishing program credibility and ensuring that ratepayer funds are appropriately used. When energy efficiency programs are being designed, the baseline must take current laws, codes and standards into effect when estimating the level of savings that can be achieved in the future. The newly passed lighting standards that are included in the EISA must be reflected in the future baseline from which savings are to be measured. IPL (and other utilities) cannot double-count savings that are already required, or will be, by laws, codes and standards. Credit for savings must be in addition to, or beyond, those savings already occurring, or known to occur.

I can appreciate IPL's argument, since I am aware that lighting measures are an important component of IPL's current and future energy efficiency programs. But, being aware of, and taking into account changes in laws, codes and standards are integral parts of annual efficiency program planning. Utilities need to be aware of what codes and standards have been adopted, to which sectors they are applicable, when the standards become effective, and their estimated effects.

Laws, codes and standards are critically important to improving energy performance, and help to "lock in" savings for the future. They free utilities to focus on deeper savings, and savings in those areas that are not covered by standards. However, code and standard enforcement is crucial, so utilities should be both permitted and encouraged to work with local and state building inspectors, and to provide for training of existing and new inspection staff to ensure that the anticipated level of performance is achieved and sustained.

Q. Does this conclude your surrebuttal testimony?

A. Yes.

EXHIBIT 1. FOSSIL FUEL COSTS

	Units	IGCC[b]	Gas Combined Cycle	Gas Peaking[c]	Coal[d]	Nuclear[e]	Fuel Cell[f]
Net Facility Output	MW	580	550	150	600	1,100	2.3
EPC Cost	$/kW	$2,500 - $3,375	$700 - $875	$500 - $1,150	$1,825 - $3,825	$3,750 - $5,250	$3,000
Owner's Cost	$/kW	$1,250 - $1,700	$200 - $225	$150 - $350	$725 - $1,525	$2,000 - $2,300	$800
Total Capital Cost[a]	$/kW	$3,750 - $5,075	$900 - $1,100	$650 - $1,500	$2,550 - $5,350	$5,750 - $7,550	$3,800
Fixed O&M	$/kW-yr	$26.40 - $28.20	$5.50 - $6.20	$6.80 - $27.00	$20.40 - $31.60	$12.80	$169.00
Variable O&M	$/MWh	$6.80	$2.00 - $3.50	$28.00 - $4.70	$2.00 - $5.60	$11.00	$11.00
Heat Rate	Btu/kWh	8,800 - 10,520	6,800 - 7,220	10,880 - 10,200	8,870 - 11,900	10,450	6,240 - 7,260
Capacity Factor	%	80%	85% - 40%	10%	85%	90%	95%
Fuel Price	$/MMBtu	$2.50	$8.00	$8.00	$2.50	$0.50	$8.00
Construction Time	Months	57 - 63	36	25	60 - 66	69	3
Facility Life	Years	20	20	20	20	20	20
CO_2 Equivalent Emissions	Tons/MWh	0.93 - 0.11	0.40 - 0.42	0.40 - 0.42	0.94 - 0.13	—	0.36 - 0.42
Investment Tax Credit	%	—	—	—	—	—	30%
Production Tax Credit	$/MWh	—	—	—	—	—	—
Levelized Cost of Energy	$/MWh	$104 - $134	$73 - $100	$221 - $334	$74 - $135	$98 - $126	$115 - $125

Source: Lazard estimates.

Note: Assumes 2.5% annual escalation for production tax credit, O&M costs and fuel prices, 40% tax rate, financing with 60% debt at 7% interest rate and 40% equity at 12% cost.

(a) Includes capitalized interest costs during construction.

(b) High end incorporates 90% carbon capture and compression.

(c) Low end represents assumptions regarding GE 7FA. High end represents assumptions regarding GE LM6000PC.

(d) Based on advanced supercritical pulverized coal. High end incorporates 90% carbon capture and compression.

(e) Does not reflect potential economic impact of federal loan guarantees or other subsidies.

(f) Low end incorporates illustrative economic and efficiency benefits of combined heat and power ("CHP") applications.

Source: Lazard 2008. Levelized Cost Of Energy Analysis – Version 2.0, page 12.

EXHIBIT 2. RENEWABLE ENERGY COSTS

	Units	Biomass Direct	Wind	Geothermal	Landfill Gas	Biomass Cofiring[b]
Net Facility Output	MW	35	100	30	5	2% - 20%[c]
EPC Cost	$/kW	$2,750 - $3,500	$1,900 - $2,500	$3,000 - $4,000	$1,500 - $2,000	$50 - $500
Owner's Cost	$/kW	included	included	included	included	included
Total Capital Cost[a]	$/kW	$2,750 - $3,500	$1,900 - $2,500	$3,000 - $4,000	$1,500 - $2,000	$50 - $500
Fixed O&M	$/kW-yr	$83.00	$40.00 - $50.00	—	—	$10.00 - $20.00
Variable O&M	$/MWh	$11.00	—	$25.00 - $30.00	$17.00	—
Heat Rate	Btu/kWh	14,500	—	—	13,500	10,000
Capacity Factor	%	80%	36% - 28%	80% - 70%	80%	80%
Fuel Price	$/MMBtu	$0.00 - $2.00	—	—	$1.50 - $3.00	$0.00 - $2.00
Construction Time	Months	36	12	36	12	12
Facility Life	Years	20	20	20	20	20
CO_2 Equivalent Emissions	Tons/MWh	—	—	—	—	—
Investment Tax Credit	%	—	—	—	—	—
Production Tax Credit	$/MWh	$10	$20	$20	$10	—
Levelized Cost of Energy	$/MWh	$50 - $94	$44 - $91	$42 - $69	$50 - $81	$3 - $37

Source: Lazard estimates.
Note: Assumes 2.5% annual escalation for production tax credit, O&M costs and fuel prices, 40% tax rate, financing with 60% debt at 7% interest rate and 40% equity at 12% cost.
(a) Includes capitalized interest costs during construction.
(b) Represents retrofit cost of host coal plant.
(c) Additional output to a coal facility.

Source: Lazard 2008. Levelized Cost Of Energy Analysis – Version 2.0, page 13.