LINCOLN COOPERATIVE

INTEGRATED RESOURCE

PLAN

Prepared for:
Lincoln Electric System
University of Nebraska at Lincoln
Other State Agencies in Lincoln:
- Nebraska State Penitentiary
- Nebraska State Office Building
- Lincoln Regional Center

Prepared by
Power Supply Planning Department

Lincoln Electric System

March 21, 2008

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1.0 Executive Summary

This Integrated Resource Plan (IRP) is being submitted to Western Area Power Administration (WAPA) to meet the contractual requirements of the Lincoln Cooperative members. It has had multiple levels of public input, meets the WAPA requirements, and lays out a plan to enhance service to the Cooperative member's customers in Lincoln, Nebraska.

1.1 Lincoln Cooperative IRP and Sustainable Energy Program (SEP)

The Lincoln Cooperative consists of Lincoln Electric System (LES), the University of Nebraska – Lincoln (UNL), and other State Agencies (the Lincoln Regional Center, the Nebraska State Office Building (NSOB), and the Nebraska State Penitentiary (NSP)) in Lincoln. These are the public entities receiving power under contract from WAPA.

The IRP is developed to identify the most economical Supply Side and Demand Side Management (DSM) options, for the period from 2008-2017. To get a longer term perspective the study analysis included 2008-2025.

In addition to the normal IRP, LES is attempting to establish a Sustainable Energy Program (SEP). This program would be stakeholder (customers, LES Administrative Board, and Lincoln City Council) driven. The intent of SEP is to specifically fund all, or in part, the renewable or conservation options determined to be desirable by the Lincoln area stakeholders. By structuring the program as a customer supported effort, options can be pursued which may not meet the standard IRP economic test.

Both IRP & SEP options are incorporated in this report.

1.2 IRP and SEP Scope

The IRP includes a review of 45 DSM options and 15 Supply Side options. A screening analysis was conducted to identify 26 DSM options and 7 supply side cases for more detailed evaluation.

Each option evaluated in detail is evaluated as a separate case. That case is then compared back to the base case to determine if that option provides an incremental benefit.

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Acronyms and abbreviations as used in this report:

AC	Air Conditioner
ADM	Archer Daniel Midlands
Avg	Average
BEPC	Basin Electric Power Cooperative
Btu	British Thermal Units
B/C	Net Benefit to Cost Ratio
CC	Combined Cycle
CFL	Compact Fluorescent Lights
CO_2	Carbon Dioxide
CRT	Cathode Ray Tube- Computer Monitor
CT	Combustion Turbine
DOE	US Department of Energy
DSM	Demand Side Management
Eff	Efficiency
EGEAS	Electric Generation Expansion Analysis System – EPRI expansion and production model
EMS	Energy management System
EPA	US Environmental Protection Agency
EPAct	1992 Energy Policy Act
EPAMP	Western Area Power Administration's Energy Planning and Management Program
EPRI	Electric Power Research Institute
GCHP	Ground Coupled Heat Pump
GS	General Service Class
GSD/LLP	General Service with Demand Billing/Large Light and Power Classes
gWh	Gigawatt hours = 1,000 Megawatt Hours and 1,000,000 Kilowatt Hours
Hg	Mercury
HP	Heat Pump
HPSV	High Pressure Sodium Vapor – Parking Lot Light
HVAC	Heating Ventilation and Air Conditioning
IGCC	Integrated Gas Combined Cycle Unit
IRP	Integrated Resource Plan

kV	Kilovolts or 1000 volts
kW	Kilowatt Measure or Capacity used on a Peak Hour Basis
kWh	Kilowatt Hours of Energy Use
lb.	Pound
LC	Load Control
LCD	Liquid Crystal Display- Computer Monitor
LEB	Lincoln Electric Building
LES	Lincoln Electric System
LED	Light Emitting Diode lighting
LFG	Landfill Gas
LPS	Lincoln Public Schools
LRC	Lincoln Regional Center
LRS	Laramie River Station
MEC	MidAmerican Energy Company
MAPP	MidContinent Area Power Pool
MBPP	Missouri Basin Power Project
MMBtu	Millions of BTU's
MV	Mercury Vapor – Parking Lot Lights
MW	Megawatts = 1000 kW
MWh	Megawatt Hours = 1000 Kilowatt Hours
NG	Natural Gas
NO_x	Nitrous Oxides
NPA	Nebraska Power Association
NPPD	Nebraska Public Power District
NPRB	Nebraska Power Review Board
NSOB	Nebraska State Office Building
NSP	Nebraska State Penitentiary
NUCorp	Interlocal between LES and UNL to provide energy services for UNL
OPPD	Omaha Public Power District
PHEV	Plug-in Hybrid Electric Vehicle
PPA	Power Purchase Agreement
PPP	LES Power Purchase Program
PURPA	Public Utility Regulatory Policy Act
PV	Present Value

PV	Photo Voltaic
PVC	Pulverized Coal
PVRR	Present Value Revenue Requirement
PW	City of Lincoln Public Works Department
R^2	Coefficient of Determination
RCS	Residential Conservation Service – a class of customer audit
Res	Residential Class
RFP	Request for Proposal
RPS	Renewable Portfolio Standard
SCR	Selective Catalytic Reduction
SEP	Sustainable Energy Program
SO_2	Sulfur Dioxide
SVGS	Salt Valley Generating Station
T&D	Transmission and Distribution
TF	Task Force
TOU	Time of Use - Rates
UNL	University of Nebraska at Lincoln
WAPA	Western Area Power Administration
WS3	Walter Scott Unit 3
WS4	Walter Scott Unit 4
ZEH	Zero Energy Home

Detailed cost and performance characteristics were prepared for the 26 DSM options. The customer's load shape change was determined on an hourly basis for a full year. The hourly LES load projections were adjusted by this load change. The revised loads were used as inputs into a production model cost run. The production model cost run determined the resulting power costs, after the DSM driven load change, and then a financial model was run to determine the revenue requirements for the DSM case. This process was completed for the years 2008-2025 to determine Present Value Revenue Requirement (PVRR) estimates for the LES electric system. The difference between the option's PVRR and the PVRR for the base case was the total electric system cost or benefit. In some cases this benefit accrues to the customer doing the DSM as well as non-participants. Other times the DSM customer benefits and the non-participants don't and some cases provided a net cost to all parties.

In addition to the electric system cost changes, calculated from the above process, CO_2 emissions were also tabulated for additional analysis. The production model was run with the base assumptions for CO_2 cost. By separately tabulating the CO_2 emissions impacts for each case, the CO_2 pricing can be easily changed for sensitivity analysis. A zero CO_2 cost case and a high cost CO_2 case were evaluated in addition to the base case assumption.

In addition to the electric system benefit/costs, there are other impacts accruing to the customer implementing the DSM option. These can include equipment cost differences between the DSM option and the Base option (what would have been done instead of the DSM option). There may be operating cost changes (other than electric system changes calculated in the above process). There may be customer fuel switching such as from natural gas, oil or gasoline. Fuel switching changes will result in corresponding customer emission changes. All of these customer impacts are calculated for the Base option, and the DSM option. The difference between the DSM case and the Base case is calculated and added to the electric system difference for a total DSM option impact. This total incremental cost difference is then allocated to the DSM customers and nonparticipating customers (the remaining LES customers). The final step is to take the total benefit and divide that by the total equipment cost of the DSM option, creating a net benefit to cost ratio.

Supply Side Options were handled in a similar manner also resulting in a net benefit to cost ratio compared to the base case.

Finally all the options evaluated in detail were ranked by the highest to the lowest net benefit to cost.

For the 2008 Sustainable Energy Program, ten options were identified and the customers were surveyed to rank these as to their preference. This ranking was utilized to determine which options were favored to be developed under any SEP allocated funding.

In December a public meeting discussing IRP options and introducing the SEP was held. Comments from that meeting and those accumulated for approximately one month following the meeting on the SEP were utilized to both modify the IRP options and rank the SEP options.

A public meeting in March was then held to discuss the IRP results with the public. Finally, LES Administrative Board approval of the IRP occurred in late March.

1.3 Summary Results

The Options with a positive net benefit to cost ratio (all costs are covered and there is still a benefit) in order from highest to lowest were:

Compact Fluorescent lights
Exit light replacement
*Energy Star Home
*Maintenance of Commercial HVAC equipment
Power purchase program
*Landfill gas generation
*Weatherization
*Commercial Light Efficiency
*Ground Coupled Heat Pump (GCHP) (Commercial)
*Plug-in Hybrid compared to conventional vehicle
*Plug-in Hybrid compared to standard hybrid
Commercial Energy Star Program

All but the Commercial Energy Star Program were beneficial under all CO_2 cost ($/ton of CO_2) assumptions. That option was beneficial under a high CO_2 cost case but had very small negative benefits for the other CO_2 cost assumptions. The ranking of all options does shift

depending on the CO_2 cost assumption. The options with (*) in front of them have benefits for both the customer doing the option and those that do not.

The top seven SEP options in the order ranked by LES customers were:

Additional wind generation
Promotion of energy efficient lighting
Energy conservation kits for home owners
Incentive program for customer purchase of Energy Star appliances
Carbon footprint reduction program
Energy efficiency programs for low income
Revitalization of home or business audits

1.4 Conclusions and Action Plan

The focus of this IRP was the period from 2008-2017. The study identified DSM options that provide benefit to Lincoln Cooperative members and/or their individual customers. Table 1-1 lays out the action plan for 2008-2012. It combines the beneficial options from the IRP analysis and the SEP options as indicated in the "Driver" column.

In 2008 the focus of the IRP will be in developing programs. For beneficial IRP options, existing programs in each area will be reviewed, modified or new programs created to include these options. For SEP options, that were not beneficial in the IRP analysis, or were not evaluated, implementation of programs will depend on the ranking of the option and the funding that is available.

Table 1-1
Action Plan

	Class	Driver	2008	2009	2010	2011	2012
DSM							
Lighting							
Exit lights	Com/Ind	IRP/SEP2	DP	IP	CP	CP	CP
Equipment change outs	Com/Ind	IRP/SEP2	DP	IP	CP	CP	CP
Compact Fluorescent (CFL)	Res	IRP/SEP2	DP	IP	CP	CP	CP
Energy Star							
Homes	Res	IRP	DP	IP	CP	CP	CP
Appliances	Res	SEP4	SP	IPF			
Businesses	Com	IRP	DP	IP	CP	CP	CP
Heating and Cooling							
Weatherization	Res	IRP /SEP6	DP	IP	CP	CP	CP
Ground Coupled HP -Com	Com	IRP	DP	IP	CP	CP	CP
Maintenance and recommissioning of commercial HVAC	Com	IRP	DP	IP	CP	CP	CP
Community Base							
Energy-efficiency programs for low-income customers [1)]	Res	SEP6	SP	IPF			
Funding for UNL's Nebraska Center for Energy Sciences Research	NA	SEP8	SP	IPF			
Development of a Children's Museum exhibit featuring energy conservation and efficiency	NA	SEP10	SP	IPF			
Informational							
Development of energy conservation kits for homeowners	Res	SEP3	SP	IPF			
Revitalization of home or business energy audits	Res/Com	SEP7	SP	IPF			
Development of carbon footprint reduction programs	Res/Com	SEP5	SP	IPF			
Peak demand assistance							
Power Purchase program	Com/Ind	IRP	CP	CP	CP	CP	CP
Fuel Switching							
Plug in Hybrid Electric Vehicle	Res	IRP /SEP9	DP	IP	CP	CP	CP
Supply							
Landfill gas	System	IRP	WPW				
Wind	System	SEP1	PPA09/ SP	IPF	IPF		

1) Such as energy conservation workshops, energy audits, energy-efficiency devices, among others

IRP	Beneficial in IRP
SEPxx	SEP Option ranked "xx" in survey

CP	Continue Program
DP	Develop Program
IP	implement Program
IPF	implement Program if funded
SP	Scope program for potential funding from SEP
WPW	work with public works to implement
PPA09	Investigate Power Purchase for late 2009 or 2010

2.0 Introduction and the Lincoln IRP Cooperative

Lincoln Electric System (LES), the University of Nebraska – Lincoln (UNL), and other Nebraska State Agencies in Lincoln are all customers of Western Area Power Administration (WAPA) and are combined in this Lincoln Cooperative IRP.

2.1 IRP Requirement and Sustainable Energy Program Development

The requirement to submit an Integrated Resource Plan (IRP), in compliance with Western Area Power Administration's (WAPA) Energy Planning and Management Program (EPAMP) was established in Section 114 of the Energy Policy Act of 1992, Public Law 102-486 and published in the Code of Federal Regulations at 10 CFR part 905.

Integrated Resource Planning (IRP) is a planning process that evaluates a full range of alternatives, including new generating capacity, power purchases, energy conservation and efficiency, cogeneration, district heating and cooling applications, load management and renewable energy resources. LES has used integrated resource planning since the 1980's.

The goal of the IRP is to provide the most economic set of resources, both demand side management (DSM) and supply side options to reliably meet the customer needs.

In addition to the normal IRP process LES has initiated a Sustainable Energy Program (SEP) process. This is an effort to increase LES utilization of renewable energy resources and promote increased energy conservation and efficiency, over and above what may be identified as economical in the IRP. LES initially budgeted an amount equivalent to about one-half of one percent of its revenue to be specifically used for the SEP, nearly 1 million dollars. Ten projects were identified as possible options to be ranked by customers and the LES Board as stakeholders in Lincoln Electric System. The full rate increase required to support the SEP was not approved by the Lincoln City Council, at their 2/11/08 meeting so adjustments will have to be made to the original $1 million estimate.

2.2 Lincoln Cooperative

The Lincoln Cooperative is made up of LES, UNL and other Nebraska State Agencies in Lincoln. A description of each of these entities and changes that have occurred since the previous IRP are discussed in Sections 2.2.1, 2.2.2 and 2.2.3.

2.2.1 Lincoln Electric System (LES)

Background

In 1971 the Administrative Board of LES was created to handle administrative activities for the electric system in the Lincoln area. Since then LES has: determined Lincoln's needs based on forecasts that LES has prepared, planned for future resources, negotiated contracts and developed resources to meet the energy needs of its Lincoln area customers including the supplemental needs for the other IRP Cooperative members.

The LES service territory, as approved by the Nebraska Power Review Board (NPRB), covers approximately 199 square miles within Lancaster County, Nebraska.

About four percent of LES customers are located outside the Lincoln City limits including several small communities around Lincoln. Lincoln is the sole supplemental electric supplier for the other Cooperative members. Pertinent LES demographic data is shown in the following table.

Lincoln Electric System Summary

Number of Customers	126,043
Transmission Circuit Miles	236 miles
Primary Distribution Lines	1,805 miles
Peak Demand August 13, 2007	765 megawatts
Retail Sales 2007	3,179.7 gigawatt hours
Total Revenue in 2007	$221,386,209
Utility Plant in Service	$1,101,918,027
Average Retail Rate[1]	Less than 7¢ per kilowatt hour
Service Area Growth Over the Next Year	Average Annual
Number of Customers	1,997 per year
Peak Demand	13 megawatts per year
System Energy	67 gigawatt hours per year

[1] Includes a 5.5% surcharge for March through October of 2007 for storm related damage costs.

LES continues to be in the lower ten percent of the retail rates within the United States. The low retail rates are largely attributable to the low cost of power supply resources. These resources include a mix of hydro, coal, gas and oil; a mix of ownership and purchases; a diverse mix of marketers for wholesale sales and a diverse mix of fuel suppliers. This economical resource mix should be maintained or enhanced in the future to maintain the LES economic position and low retail rates.

LES is governed by an Administrative Board of nine members appointed by the Mayor and approved by the Lincoln City Council. The Lincoln City Council maintains authority to approve rate increases, budgets and the issuance of bonds. LES Administrative Board is assigned the balance of administrative responsibilities.

As a public body all LES Board meetings and City Council meetings are open to the public and the press if they choose to attend. Appendix A contains a list of public Administrative Board activities for 2003 through 2007. This covers the period between the last full Integrated Resource Plan and the current plan.

LES Updates from 2002

Supply Side Programs

Salt Valley Generating Station (SVGS)

LES has completed the installation of the SVGS which includes three aero-derivative combustion turbines each slightly less than 50 megawatts in size. The SVGS also includes a steam unit which is used in combination with two of the combustion turbines to create a combined cycle unit. The SVGS was completed in 2004. The aero-derivative units are very efficient when operating in the simple cycle mode. When operating in combined cycle mode with two combustion turbines providing heat for one steam unit the efficiency is even greater. There is also a small 1.6 MW diesel generator that can be used as a black start unit.

Laramie River Station (LRS) Upgrades

LES is a joint owner of the Laramie River Station (LRS). LRS is a coal-fired unit in eastern Wyoming. The LRS operator, Basin Electric Power Cooperative, is proceeding with steam turbine component replacements for each of the three units to increase the efficiency of the plant. LRS Unit 1, the unit LES receives its portion of the plant's power from, will have its

turbine replaced in 2009. The upgrade will allow the plant to produce an additional 8 – 10 MW while burning 10 – 20 tons per hour less coal.

Walter Scott Energy Center Unit 4 (WS4)

In June of 2007, the Walter Scott Energy Center Unit 4 (WS4) went into commercial operation. This is a nominal 800 megawatt coal fired unit installed at the existing Council Bluffs generating station, now called Walter Scott Energy Center. LES owns 12.66% of the plant and receives about 100 megawatts of generating capacity. This is a supercritical coal fired unit that has much greater efficiency than a conventional pulverized coal unit. This unit is also one of the cleanest coal fired units in the nation with environmental equipment that includes SO_2 scrubbers, over fire air, low NOx burners, Selective Catalytic Reduction (SCR), activated carbon for mercury control, and particulate bag houses.

Demand Side Management Updates

Ground Coupled Heat Pump Systems

Ground coupled heat pump systems are becoming the standard heating and cooling system design for Lincoln's Public School (LPS) System. This came about from initial work with LES providing design input, engineering support and performance risk management support. The project culminated with the completion of analysis for conventional and ground coupled heat pump schools constructed in the same time frame. The initial schools with the ground coupled heat pumps have demonstrated considerable operating experience now and LPS has been very satisfied with the technology. The schools have proven to be comfortable and very energy efficient. All new schools in the Lincoln area are being built with these systems and most existing schools are being retrofitted, or are scheduled to be retrofitted, with ground coupled systems.

Net Metering

In 2007 LES initiated a trial period for net metering. LES will allow, on a trial basis, net metering for our customers in order to help facilitate renewable applications. This is being conducted as a test to ensure that there are no major economical detriments to the other customers and to determine customer interest in the program.

Heat Pump Incentives

LES has discontinued paying customers incentives for the installation of air source heat pumps. LES has determined that the technology is mature, the customers and vendors have verified the heat pump advantages and the market in Lincoln is well established. These incentives were started in the 1980's and continued until 2004.

DEC

In 1989 LES, the City of Lincoln and Lancaster County formed the District Energy Corporation (DEC) under the State of Nebraska's Interlocal Corporation Act. This Act allows governmental entities to form non-profit corporations for the benefit of the citizens they serve. The primary mission of the DEC is to provide low-cost, reliable and efficient thermal energy services. With over 17 years of operating experience, the DEC is an excellent example of both partnership and efficiency in government, providing innovative, efficient and low-cost utility services to the City of Lincoln, Lancaster County and the State of Nebraska. Expansions in the DEC continues as new applications are determined.

2.2.2 University of Nebraska – Lincoln (UNL)

Background

The University of Nebraska - Lincoln (UNL) is a land grant college founded in 1869. UNL first purchased power from the Federal Government in 1966. The remainder of the power necessary to meet the electrical load is provided by LES as the supplemental power provider. UNL and its student population have grown over the years as has its electrical consumption. The current total electrical demand and energy consumption is about 37.6 megawatts and 188.9 gigawatt hours per year. This usage includes service to the State Capitol, the Fair Grounds as well as UNL's City and East Campuses.

In 2001 an interlocal organization was formed between LES and the University of Nebraska for the purpose of optimizing energy services to UNL and providing capital for energy efficiency projects. The establishment of the Nebraska Utility Corporation (NUCorp) has been approved by the LES Board and the UNL Board of Regents. NUCorp and LES continue to evaluate and implement facility upgrades, system optimization and energy conservation projects.

UNL Updates from 2002

UNL has actively engaged in the conservation of energy. Starting two years ago certain campus building air handling units, which serve as both air conditioning units and heaters, were shut down during non-business hours and were inspected to ensure they ran efficiently. Other projects include lighting upgrades, other air handling unit work, cooling tower upgrades along with auxiliary switchgear replacement. The calculated energy savings in 2006 for these projects totaled 18,015 MWh and a .562 MW peak load reduction.

2.2.3 Other Nebraska State Agencies: the Lincoln Regional Center, the Nebraska State Penitentiary, and the State Office Building.

These agencies receive WAPA power under a single contract titled "Contract for Electric Service to Nebraska State Penitentiary load". Total requirements are about 5 megawatts in capacity and 25.8 gigawatt hours per year. The primary electrical needs are met by the WAPA contract and supplemental power supplied by LES. These agencies also maintain slightly over three megawatts of stand-by generation for emergencies.

Other Nebraska State Agency Updates from 2002

The following is a list of State Agency projects undertaken in the last five years. It should be noted that a majority of the projects were deferred repair work and were not specifically defined as energy conservation projects. Nonetheless, energy savings as well as operations could be improved as a result of these projects.

Nebraska State Office Building:

Disconnected chillers, connected to UNL's chilled water system

Replacing magnetic ballasts in fluorescent lights with electronic ballasts

Lighting load management (electronic and manual)

HVAC load management (Preheat/cool and ramped starts)

Lincoln Regional Center:

Administration Building: Replaced chillers with more efficient units

Grounds/Campus: Installed more efficient outdoor lighting

Grounds/Campus: Installed monitoring and control equipment for LRC campus to monitor and control power factor continuously.

R Building: Currently replacing old fluorescent lights with new, more efficient lights.

State Penitentiary:

Central Utility Plant - Chiller Replacement: This project provided for the replacement of a 350 ton chiller with a new 900 ton unit to allow for redundant chilled water capacity for the facility. As such, this chiller replacement project did not reduce energy consumption.

Ancillary Building - Window Replacement: Replacement of approximately 40 windows.

2.3 LES Integrated Resource Plan and Sustainable Energy Program Process

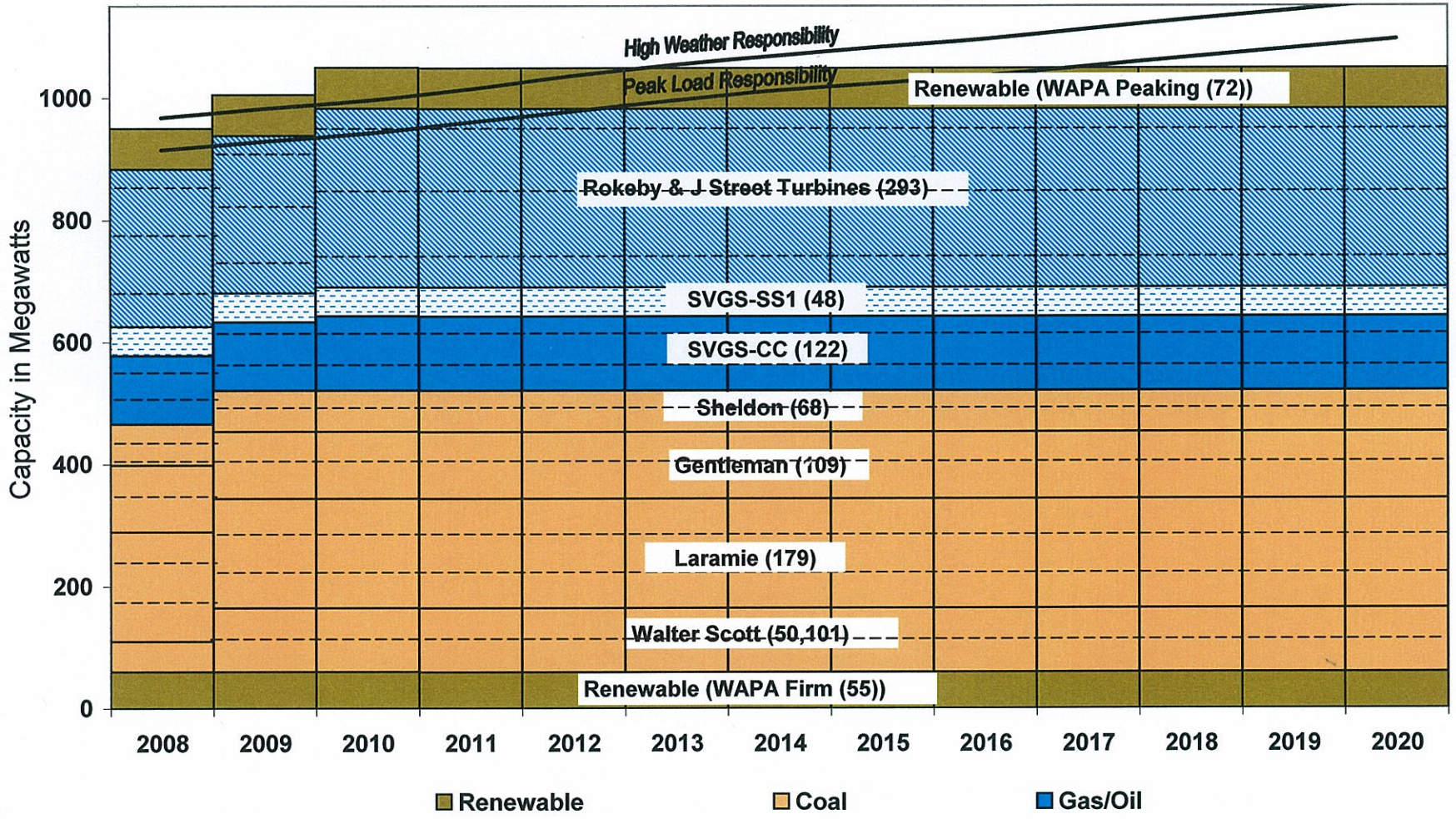
2.3.1 IRP Process

Figure 2.1 is the load and capability for the Lincoln Electric System given the 2007 forecast and the currently committed resources. The two lines in Figure 2-1 represent a peak load responsibility (which is the base forecast plus reserve responsibility) and a high weather responsibility. These lines cross the existing resources at a time where LES would be deficit in capacity. It can be seen under the high weather responsibility forecast that LES would need resources by 2013 and using the Peak Load Responsibility line, LES does not need additional resources until 2017. LES' goal is to maintain a set of resources that generally fall between the two projected load lines. For the purposes of the IRP, LES has utilized the base peak load responsibility line showing the deficit in 2017. Thus a supply side resource, or a reduction in load, is not required until 2017 to maintain our regional responsibility.

A base case was prepared using a generation expansion model that expanded resources with a deficit year starting in 2017. This optimal expansion plan was generally used for all cases; however, there were exceptions for some supply side options. Comparison cases for supply side and demand side options were then developed that are compared to the base plan to demonstrate the benefit to the customers and LES. These beneficial options are options that would need to be further investigated and programs investigated to obtain the benefits identified.

A list of supply side and demand side options were prepared and two public meetings were scheduled for December 11, 2007 and December 13, 2007 at Lincoln Public high schools. The December 11th meeting was cancelled due to weather. The December 13th meeting occurred on schedule. Based on comments at the meeting, options for inclusion in the IRP were modified.

Figure 2-1
LES-**Generating Capacity and Peak Load Responsibility**



These initial options were taken through a screening process where a preliminary evaluation of the options was conducted and some options were deleted from the detailed evaluation. The remaining options were evaluated by detailed analysis comparing the benefits back to the base case. The benefits were compared based on total benefit to cost ratio and as to customer benefit and/or LES benefit. The options were then ranked based on net benefit to cost ratio. Each of the options having a positive net benefit to cost ratio will be evaluated for potential programs.

A final public meeting was held on March 4, 2008 to review the outcome of the Integrated Resource Plan.

2.3.2 SEP Process

LES staff and the LES Administrative Board held several meetings discussing the development of a Sustainable Energy Program (SEP). This program would encourage and potentially fund renewable and conservation applications within Lincoln Electric System. The funding was proposed as part of the 2008 rate increase. The SEP funding was to be specifically set aside for this application. The selection of the options to be funded would be determined by a customer survey, public meetings and completed with feedback from the LES Administrative Board.

Ten options were included in the initial list for the Sustainable Energy Program (SEP). These options were presented at the same public hearing as the Integrated Resource Plan on December 13th, 2007. After the public hearing, the ten SEP options were placed on the LES website for ranking by customers. This ranking continued from mid December through January 10th. The responses from the public meeting and the rankings were reviewed to provide input as to where the SEP funds, made available through the 2008 rate increase, would be allocated. The LES requested a 5.5% rate increase at the February 11, 2008, Lincoln City Council meeting however only a 5% rate increase was approved. While the Sustainable Energy Program was not specifically eliminated, the rate action does require a reevaluation of funds now available for SEP development and for implementation of programming in 2008. Staff is in the business case development phase with plans to implement SEP programming in 2009 and beyond.

3.0 Integrated Resource Plan Development

3.1 Forecast

3.1.1 Load Forecast

The Long-Range Demand and Energy Forecast is the first step in the planning process. LES has been developing long range forecasts internally since the 1970's and they are usually updated annually. Every year improvements are made to the models and the data is updated. This IRP process uses the 2007 forecast.

Figure 3-1 is a plot of the Lincoln Long Range Energy Forecast for 2007 compared to the Long Range Energy Forecast from 2006. Figure 3-2 is a similar plot for the Lincoln Demand Forecast. In both cases the 2007 forecast has dropped considerably from the forecast that was prepared in 2006. The Lincoln energy is expected to grow from a normalized (actual adjusted for weather) 3,392.9 gigawatt hours in 2005 to 4,157.6 gigawatt hours in 2015, and 4,869.6 gigawatt hours in 2025. The compound annual growth rates for these periods are 2.1 percent and 1.6 percent respectively. This compares to the compound annual growth rates of 2.5 percent and 2 percent for the 2006 forecast. The maximum Lincoln demand is expected to grow from a normalized 750 in 2005 to 894 in 2015 and to 1028 by 2025. The compound annual growth rates for these periods are 1.8 percent and 1.4 percent respectively. This compares with the compound growth rates of 2.1 percent and 1.8 percent for the 2006 forecast.

Some of the improvements that were included in the 2007 forecast over prior forecasts were: the average weather use for the Lincoln energy forecast is calculated using 1987 through 2006 weather instead of 1971 through 2000 weather because recent weather has been warmer and a new vendor, Moody's/Economy.com, is used for economic and demographic data.

The forecast data base has been updated to include actual load and weather data for 2006 and current economic data. The 1976 data was dropped from the history used to estimate the current models.

Figure 3-1
Lincoln Energy
Actual and Forecasted by Year of Forecast

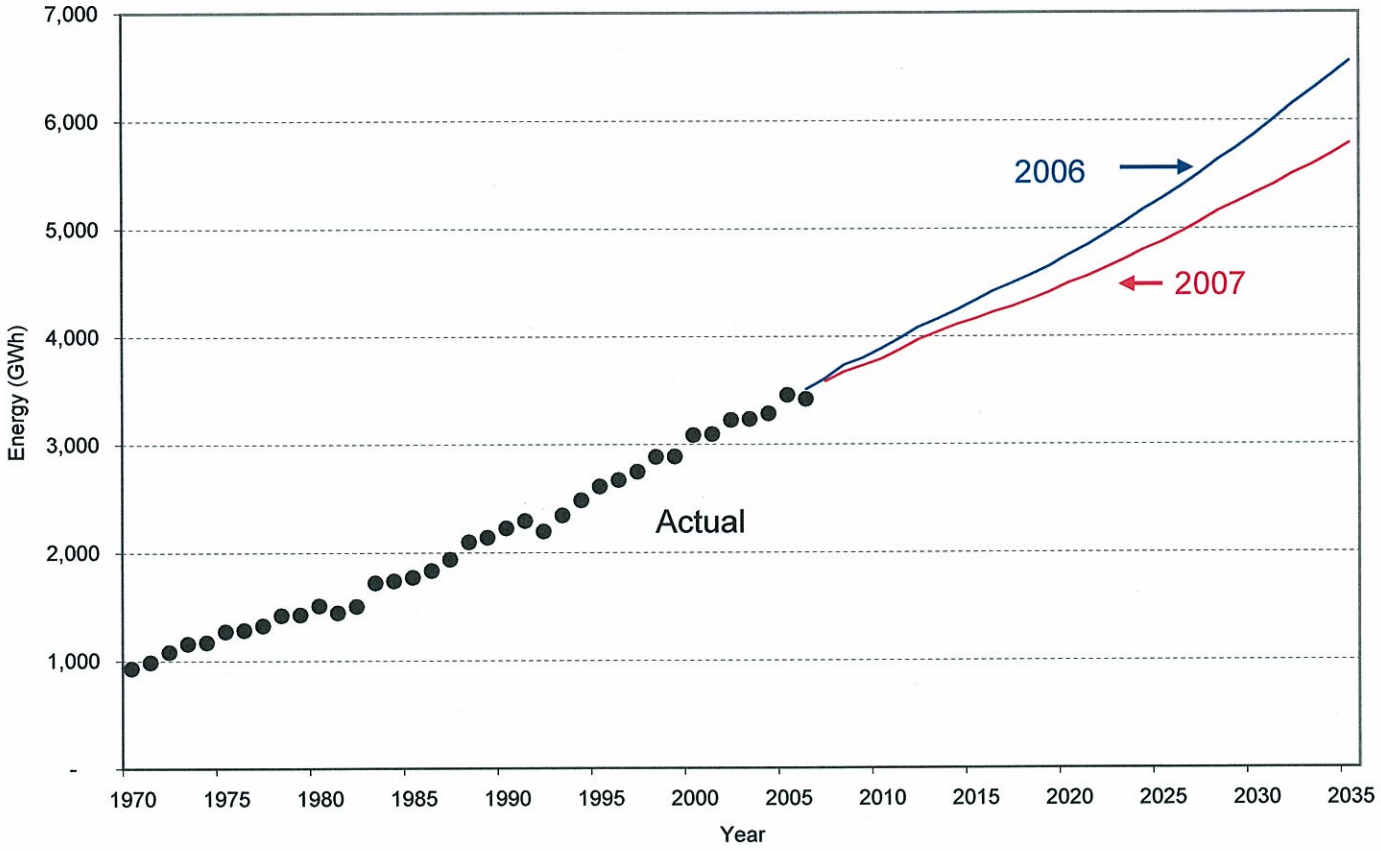
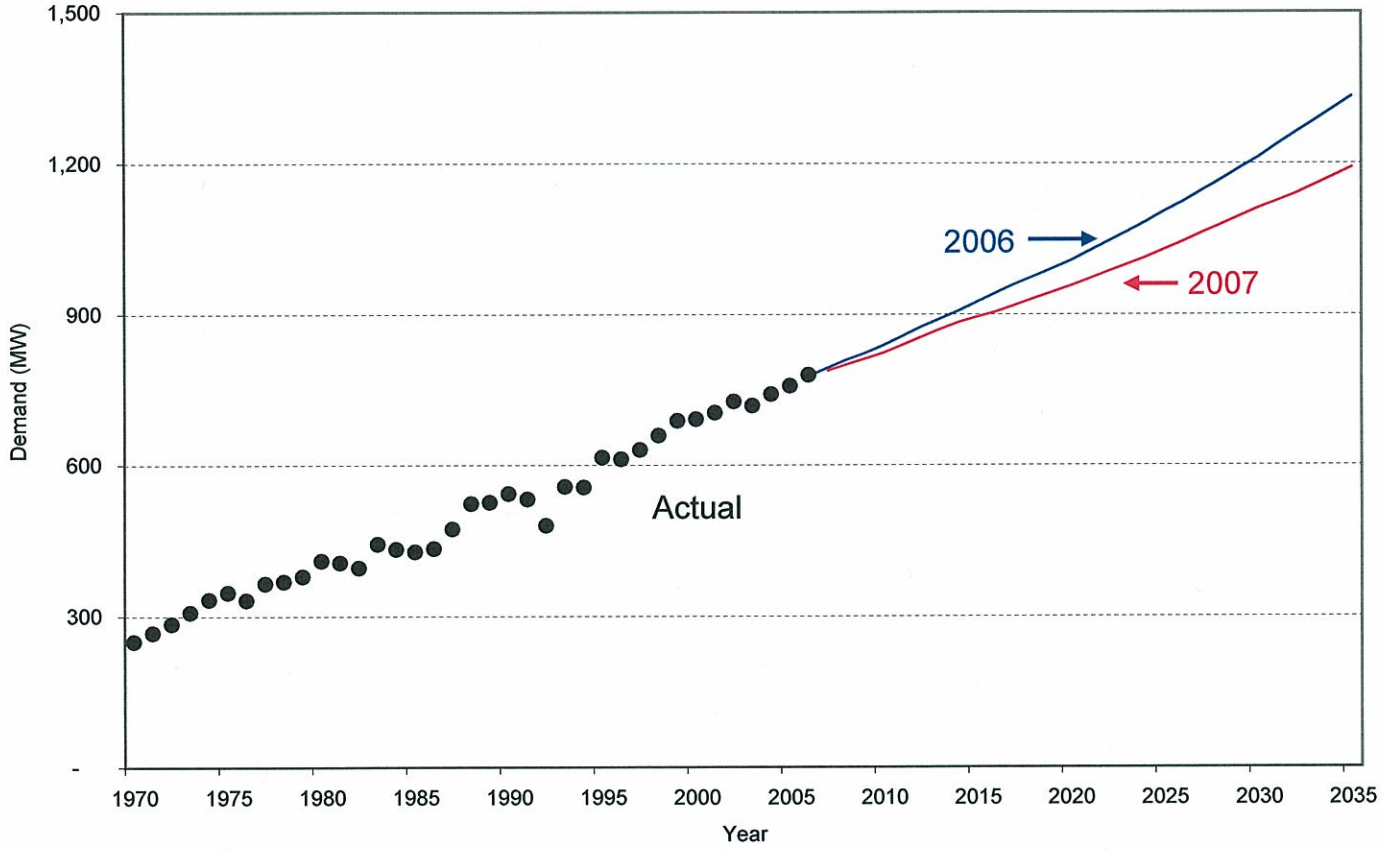


Figure 3-2
Lincoln Demand
Actual and Forecasted by Year of Forecast



The variables that were used in the projection of monthly energy usage include:

- adult population age 20 and older
- effective residential air conditioning saturation based on 1970 usage
- number of cooling degree days in the month base 55 degrees
- number of cooling degree days in the month base 65 degrees
- number of heating degree days base 55 degrees
- number of heating degree days base 65 degrees
- the effective residential electrical heating saturation developed from residential end use model
- earned real per capita income in 2000 dollars
- permanent real price of electricity and
- Lancaster County unemployment rate

The variables that are utilized in the projection of the demand forecast are:

- adult population age 20 and older
- effective residential air conditioning saturation rate based on 1969 usage
- average temperature for previous 24 hours minus 65 degrees
- temperature at time of peak minus 75 degrees
- dew point
- permanent real price of electricity
- earned real per capita income in 2000 dollars
- Lancaster County unemployment rate

Regression analysis is used to develop monthly models using appropriate variables. Statistics are developed for the regression models including but not limited to R^2 (Coefficient of Determination) and Durbin Watson statistics. These are used to verify the performance of the models and confidence interval of the forecast.

A copy of the "2007 Long-Range Forecast of Energy Sales, Demand and Number of Customers" report which further explains the LES forecast process is available on request.

3.1.2 Fuel Cost

The fuel cost projection includes a forecast of natural gas prices and coal prices for existing and future units. These forecasts were prepared in early 2007 and are shown in Table 3-1.

Table 3-1

Fuel Costs ($/MMBtu)

	Avg Coal Price	Avg Natural Gas Price
2007	1.03	6.69
2008	1.03	7.67
2009	1.04	7.39
2010	1.09	7.21
2011	1.15	6.79
2012	1.23	6.58
2013	1.31	6.63
2014	1.33	6.88
2015	1.38	6.98
2016	1.42	7.33
2017	1.42	7.60
2018	1.47	7.70
2019	1.39	8.10
2020	1.43	8.43
2021	1.49	8.51
2022	1.53	9.00
2023	1.57	9.28
2024	1.63	9.56
2025	1.69	9.98

3.1.3 Emissions Cost

Emissions cost projections for four different emissions were prepared: SO_2, NO_x, Mercury (Hg) and CO_2. A constant projection was utilized for SO_2, NO_x and Hg costs. For CO_2 three different costs were analyzed, a zero cost of CO_2, a base forecast of CO_2 costs and a high CO_2 cost projection. These projections are shown in Table 3-2. Since the costs of CO_2, or the emission targets for CO_2, are not yet established, all three cost scenarios were analyzed.

Table 3-2
Emission Costs

	SO2 ($/ton)	NOx ($/ton)	Hg ($/lb)	CO2 Cost ($/ton) Zero	Base	High
2007	$575	$0	$0	$0	$0	$0
2008	$604	$0	$0	$0	$0	$0
2009	$634	$0	$0	$0	$0	$0
2010	$666	$1,540	$36,456	$0	$0	$5.6
2011	$699	$1,681	$39,737	$0	$0	$8.0
2012	$734	$1,827	$42,916	$0	$0	$10.6
2013	$771	$1,978	$46,349	$0	$0	$13.2
2014	$809	$2,136	$50,057	$0	$0	$16.0
2015	$850	$2,310	$54,062	$0	$6.3	$18.9
2016	$892	$2,284	$57,846	$0	$7.8	$22.0
2017	$937	$2,253	$61,896	$0	$9.3	$25.3
2018	$983	$2,220	$66,228	$0	$10.9	$28.7
2019	$1,033	$2,184	$70,864	$0	$12.6	$32.2
2020	$1,084	$2,144	$75,470	$0	$14.4	$36.0
2021	$1,138	$2,210	$77,810	$0	$16.3	$38.6
2022	$1,195	$2,278	$80,222	$0	$18.4	$41.3
2023	$1,255	$2,349	$82,709	$0	$20.5	$44.2
2024	$1,318	$2,422	$85,273	$0	$22.8	$47.2
2025	$1,384	$2,497	$87,916	$0	$25.2	$50.3

3.2 Existing and Committed Resources

3.2.1 Supply Side

Laramie River Generation Station (LRS)

LES is one of six participants in the Missouri Basin Power Project. The generating facility of the project is the Laramie River Station (LRS) generating station. There are three generating units having a combined net rated capacity of 1,725 megawatts. The three units commenced commercial operation between July 1980 and November 1982. LES receives a net capacity of 179 megawatts from LRS.

Gerald Gentleman Station

LES purchases energy from NPPD's coal-fired Gerald Gentleman Station (Gentleman) pursuant to a Power Sales Agreement with NPPD. Gentleman Unit #1 has an accredited net capacity of 665 megawatts and Unit #2 has a net capability of 700 megawatts. LES is entitled to 8 percent, approximately 109 megawatts, of the power and energy of the two units.

Sheldon Generating Station

LES has a Participation Power Agreement with NPPD for 30 percent of the coal fired Sheldon Station or approximately 68 megawatts. Sheldon Station is located approximately 20 miles south of Lincoln and consists of two units, one rated at 105 megawatts and the other at 120 megawatts.

Walter Scott 4 Generating Station

LES is one of 15 joint owners in the Walter Scott Energy Center Unit 4 (WS4). This is the fourth unit at the Council Bluff's site, now called the Walter Scott site. WS4 became commercial in June of 2007. LES is the second largest participant with a 12.66% share, approximately 100 MW, of the project. The project consists of a nominal 800 megawatt generating unit and 124 miles of associated high voltage transmission. Mid-America Energy Corporation (MEC) is the operator of the Walter Scott Energy Center. Through December 31, 2008 LES is selling 50% of the capacity back to MEC. Also beginning in 2008 LES is swapping half of WS4 output for the equivalent capacity in Walter Scott Energy Center Unit 3. This arrangement gives LES approximately 50 megawatts from WS3 and 50 MW from WS4 for energy scheduling purposes.

Rokeby and J Street Combustion Turbines

The J Street Combustion Turbine is a 1972, 30 megawatt unit located in downtown Lincoln. The Rokeby site located in southwest Lincoln and includes three units: Rokeby #1, a 1974, 74 megawatt unit; Rokeby #2, a 1997, 88 megawatt unit; and Rokeby #3, a 2001, 100 megawatt unit. All three units utilize a thermal energy ice storage system capable of supplying cooled inlet air at 40°F on a 100°F day. This inlet cooling system significantly increases the amount of electricity the units produce on hot summer days. A 3 MW, black-start diesel unit is also located at the Rokeby site.

Salt Valley Generating Station (SVGS)

Salt Valley Generating Station site was completed in 2004. This is a simple cycle combustion turbine and a combined cycle site in northeast Lincoln. The SVGS site consists of three aero-derivative combustion turbines of approximately 50 megawatts in size. Two of these turbines are equipped with heat recovery boilers that provide steam to a steam turbine to provide additional generating capacity and improved efficiency. These two combustion turbines and the steam turbine are usually operated in combined cycle mode, but the combustion turbines are equipped to operate in simple cycle mode as well. The remaining combustion turbine operates only in simple cycle mode. An inlet cooling system is also utilized for the SVGS units. A 1.6 MW black-start diesel unit is also located at the Salt Valley site.

UNL and Other Nebraska State Agencies Existing Generation

These cooperative members have approximately 3.7 megawatts of backup or emergency generation.

Western Area Power Administration (WAPA)

LES has an allocation of firm power of approximately 32 megawatts, plus 72 megawatts of summer peaking firm power from WAPA. The majority of energy that LES receives under the summer/winter peaking contract is returned to WAPA during off peak periods.

Both UNL and State agencies in Lincoln have energy and capacity allocations from WAPA. UNL has 19 megawatts and other Nebraska State agencies receive 1.8 megawatts from WAPA. LES also delivers one megawatt of power from WAPA for the benefit of the Ponca Tribe in Lincoln.

3.2.2 Existing Demand Side Management Options

LES, UNL and other State agencies have all been active in DSM in order to optimize facilities used and minimize energy costs to customers.

Commercial Lighting

The LES commercial lighting program is currently an information only program that consists of educating consumers on the benefits associated with cost effective efficient lighting. This and all commercial customer initiated energy conservation alternatives have been enhanced by the LES Account Management Program. This program matches Large Commercial and Industrial customers directly to one LES account executive. The representative reviews programs that may be beneficial for that customer to optimize their energy usage.

NUCorp continues to replace lighting fixtures at UNL as part of the efficiency improvements. This includes installation of electronic ballast and replacing incandescent lights with T8 fluorescents.

LES Ground Coupled Heat Pumps (GCHP)

The results of a 1993 LES study indicated that the life cost of a ground source heat pump system is significantly lower due to the higher efficiency when compared to a conventional heating and cooling system. LES completed a follow up study using actual energy costs for eight Lincoln Public Schools (4 with GCHP and 4 with conventional HVAC systems). This analysis showed that the GCHP schools had heating and cooling costs that were 55% of the conventional system. All new public schools in the Lincoln area are utilizing these systems.

UNL Building Design Review

All new building designs were reviewed for energy conservation. The in-depth reviews by UNL engineers and architects over original or proposed designs have achieved an average of 5 percent reduction of energy consumption for each building over a standard building.

UNL HVAC Upgrades

In the last 2 years buildings on campus are upgrading HVAC systems for greater efficiency.

UNL Computerized Control Boiler and Chillers

The continued addition of computerized control will allow more accurate loading of chillers and the ability to control which energy source. Electric chillers or steam chillers (natural gas) are used to provide air conditioning to the campus.

LES Education and Assistance

At LES, educational assistance takes many forms including: residential and commercial energy audits, working with architects and engineers in trade ally education programs on heat pumps, energy efficient lighting and construction, and general education programs for the public on safe and wise use of electricity.

LES Audits

LES has provided residential energy audits since 1980. LES was the first utility to offer the federally mandated Residential Conservation Service (RCS) audit. LES continues to offer an RCS quality audit even though the Federal mandate has expired. LES is continually working with our commercial and industrial customers in order to evaluate their electric needs and find ways to satisfy those needs more efficiently and economically.

LES Account Executives

As previously mentioned, LES has established an Account Management Program where one Energy Services Account Executive is assigned to each large customer as a point of contact and analysis. The service provided by the LES Account Executive strives to increase the customers' load factor, energy efficiency and the customers economics.

LES Rate Development

Cost of Service rates at LES are developed to provide customers with proper price signals to encourage usage patterns that have an economic benefit to the LES System as a whole. The rates that apply to customers utilizing DSM options are key elements in the customers' evaluation of cost effectiveness. Some examples of these types of existing rates at LES are seasonal rates, lower priced heating rates, interruptible credits, load factor sensitive commercial and industrial rates, off-peak industrial rates, and residential conservation credits.

LES Net Metering

In 2007 LES initiated a trial period for net metering. LES will allow, on a trial basis, net metering for our customers in order to help facilitate renewable applications. This is being conducted as a test to ensure that there are no major economical detriments to the other customers and to determine customer interest in the program.

Nebraska State Penitentiary (NSP) and Lincoln Regional Center (LRC) Lighting Efficiency

When lighting is replaced at NSP or LRC facilities, the maintenance staff have been instructed to use the highest efficiency replacement lamps, ballast and fixtures available on an as-needed basis. Because of a lack of metering in individual buildings, an attempt to determine the savings from installation of high efficiency lighting equipment has not been made. However the lack of an increase in electrical demand or energy at the NSP in spite of steadily increasing prison population and a relatively flat trend for the LRC indicate benefit from the gradual improvement of lighting efficiency.

Nebraska State Office Building Energy Management System (EMS)

Since 1976 the EMS for the State Office Building has been updated when warranted. Each improvement allows greater ability to monitor and control space temperatures, humidity, etc. However the energy savings are difficult to assess because of the growth and number of employees and the addition of new electronic equipment.

LES Transmission and Distribution System Improvements

LES continues to improve its delivery system from resources to the customers. Energy losses on LES retail sales have dropped from 5.7 percent in 1978 to less than 4.5 percent today. While not strictly DSM activities, these activities improve the overall operating efficiencies of the system requiring less capacity and energy to serve our customers.

From 2007 through 2009 LES is making major improvements, with the assistance of our utility neighbors, in the bulk transmission system in the Lincoln area. LES will establish two new 345 kV interconnection points: one with Omaha Pubic Power District (OPPD) to Nebraska City and one with Nebraska Public Power District (NPPD) connecting to Columbus, NE. LES is building the substation requirements and being reimbursed by the line owners, OPPD and NPPD. In

addition to these interconnections, LES is constructing a North Tier 345 kV line to be completed in late 2008. When these facilities are completed the City of Lincoln will be completely encircled by a 345 kV loop and will have four 345 interconnection points on that loop, two with NPPD, and two with OPPD.

PURPA Generation

Another element affecting LES forecasting (along with DSM and transmission and distribution losses) is customer-owned generation. While this equipment is not operated by LES the equipment operation affects current and future generating needs. For PURPA qualified facilities, LES pays for energy at the LES avoided costs for energy delivered to the LES system. Customers currently with PURPA generation are Archer Daniel Midlands (ADM), the City of Lincoln Theresa Street Wastewater Plant, Hyde Observatory, and the Kaup residential wind turbine. All these units, except the wind turbine and Hyde Observatory, can not produce more than their load at any given time and thus can not sell excess energy production to LES at avoided costs.

County/City and State District Energy Corp (DEC)

In the fall of 1999 the District Energy Corp completed its second major energy project. This project included the construction of a new high efficiency heating facility for the Nebraska State Capitol, the State Office Building and Governor's Mansion to replace an aging steam line, which had provided steam from UNL. The project significantly reduced energy losses by reducing the distance and losses for the steam transported. It also eliminated a major capital expenditure by the state to replace the old steam lines.

Presently, the DEC provides services to over 1,700,000 square feet of various governmental facilities. Services are now being provided to the following customers;

- State Capitol Building
- State Office Building
- Governor's Mansion
- Hall of Justice Building
- City County Building
- Lancaster Correction Facility
- K Street Record Facility

Energy conservation technologies used in the DEC systems include: geothermal based heat pumps, ice storage, variable frequency drives, computer based control system as well as high efficiency chillers and boilers.

LES Renewable Energy Program

Wind

In 1998 LES initiated a renewable energy program. Customers that chose to contribute to the development of renewable resources paid $4.30 per 100 kilowatt hours for renewable energy supplied by the LES wind turbines. The $4.30 per customer contribution was considered sufficient to offset the additional cost of wind resources versus traditional supply resources. This program provided sufficient additional funding for LES to construct two 660 kilowatt Vestas wind turbines. Since 1999, however the customer participation in the program has steadily declined. The program is scheduled to be reconfigured to include future renewable resources and may be included as part of the Sustainable Energy Program options. The wind units do continue to operate and supply renewable energy to LES.

LES was also a 29.39 percent participant in a joint wind project in north central Nebraska (two 750 kilowatt units). This was a DOE sponsored project that operated since 1999. In 2007 this facility was retired and salvaged.

Ethanol/Bio Soy Diesel

In 2005 LES started using Unleaded W/Ethanol Gasoline (10% Ethanol) and Bio-Soy Diesel (2% Soy-Oil) in all fleet vehicles and equipment. The cost of the Soy-Diesel was slightly higher than that of regular Diesel (.03 cents a gallon) but this cost was offset by the reduced price of the Ethanol Gas compared to the regular unleaded. During a typical year, LES uses a total of 63,001 gallons of unleaded fuel and 55,405 gallons of diesel fuel.

LES Power Purchase Program (PPP)

In 2000 LES initiated a program to purchase load reduction from customers that can either reduce load or bring generation on line. The program now consists of 7.5 megawatts of contracted load reduction. These resources are utilized whenever the LES dispatchers find the PPP economically advantageous. LES received 3.2 megawatts of load reduction on the 2007 system peak day.

UNL – Exit Lighting

UNL is replacing inefficient incandescent fixtures with more efficient fixtures. While individual fixture load is very small there are sufficient numbers such that the total effect is significant.

Most of these existing programs at the cooperative member's facilities have been in place for many years. Due to this it is assumed that the current forecast incorporates the impacts from these DSM implementations and the system improvements discussed.

3.3 Load and Capability

Figure 2-1 in Section 2.3.1 shows the existing LES load and capability chart. LES currently does not expect a resource deficit until 2017 based on the current load growth forecast and the existing DSM and supply side resources. Since LES does not need any summer peak reduction until 2017 this creates a dilemma as to how to value the capacity benefit of options that reduce LES summer peak loads. It was decided, for the purposes of this IRP that LES would give a capacity credit beginning in 2015, two years before the actual system deficit. The rate applied is equivalent to $16 ($2006) a kilowatt-year spread over the four summer months of the LES summer season.

Due to the limited need of supply side resources of significant size before 2017, the primary focus of this IRP will be the DSM options that can further optimize the cooperative customer requirements.

3.4 Demand Side Management (DSM) Options

The original option list development had several different phases. LES first formed an internal, cross-divisional IRP Task Force (TF). The TF developed an initial list of DSM options. Next, the LES Managers reviewed and evaluated the option list. Finally that list was taken before a public meeting held in December 2007. Feedback from LES customers was obtained from that

meeting and the list was adjusted accordingly. Table 3-3 shows the final Demand Side Management Option List.

Three approaches were taken for the DSM options listed: 1) An option could have a detailed analysis prepared, 2) the options could be screened out by the IRP TF, or 3) the options may not be selected for detailed study but could become part of a program. A more detailed description of each of the options is included in Appendix B. Options that were added as a result of the public meeting are identified in green on Table 3-3. Options that were emphasized by the public at the December public meeting are shown in blue.

The initial 45 DSM options on the list cover all classes of customers and different types of demand side management activities. Some options only reduce peak summer demand, some reduce summer energy and demand. Some reduce energy consumption year around. From these original 45 options, 26 options, providing a wide range of DSM activities, were identified for detailed analysis. The IRP Task Force was then given the task of developing detailed assumptions for each of the 26 options.

Table 3-3
Demand Side Management Option List

New from Public
Emphasize by public

1/30/2008

	Option Name	Class	Detail Study	No Study but maybe program	Discussion
Residential Customer programs					
1	Energy Star Home Program	Res	X		
2	Energy Star Appliances(beyond AC, CFL,Refrig.)	Res	X		
3	Zero Energy Home	Res	X		
4	Prepayment Meters	Res			A good deal of revised equipment and procedures to implement,benefit hard to quantify.
5	Compact Fluorescent lights(CFL)	Res	X		
6	Ground Source Heat Pump	Res			generally too expensive
7	Refrigerator/Freezer- trade in	Res			manpower intensive, a lot of recycling issues
8	Refrigerator/Freezer efficient	Res	X		
9	Heat Pump Water Heater Systems	Res			too expensive
10	Solar Water heaters	Res	X		
11	Tankless Water heaters-		X		
12	Time of Use Rates	Res			In PURPA ruled out, maybe some test cases
13	Shade Trees	Res		X	Possibly combine with LES Right Tree program seems a good idea, very long term benefit however
14	Efficient Air Conditioning (AC/HP)	Res	X		
15	AC/Heat Pump(HP) Maintenance	Res			Trouble with getting into yards and working with customer Equip.
16	Electric Lawn Mower	Res			Small cutting beds, short battery life applicable for small areas only
17	Plug in Electric Hybrid Vehicle	Res	X		
18	AC LC-Radio	Res	X		
19	AC load control Thermostat	Res	X		
20	Water Heater LC	Res	X		
21	Horizontal Clothes Washer	Res			Long pay back, savings in water
22	Weatherization-caulking, window treatment, insulation, ducts	Res	X		
23	Residential Micro Wind	Res	X		
24	CRT replacement	Res			Not much price differential, happening with customer preference
25	Loans	Res			Has not been possible in past but others do, maybe revolving fund as source of money instead of LES credit?.
26	PV system rebate	Res	X		
Commercial and Industrial Customer programs					
27	Commercial Lighting-more eff, occupancy sensor, controls	GSD/LLP	X		
28	Eff Parking lot lights	GS			There is already a move to the more efficient lighting
29	LED Street lights				Still expensive and not too available
30	commercial Energy Star Program	GS	X		
31	Audits	GS			Doing
32	Maintenance of HVAC (recommissioning of equipment)	GS	X		
33	Variable drives/ Eff motors and Pumps	GS/GSD/LLP	X		
34	Cogeneration (Cogen)	GS/GSD/LLP	X		
35	District Systems	GS			Similar inpact to ground source HP since that is normally part of
36	Ground Source Heat Pump	GS	X		
37	Time of Use Rates	GS			In PURPA ruled out
38	Cool Storage	GS/GSD/LLP	X		
39	Exit lights(LED or Panel)	GS	X		
40	Vending miser	GS	X		
41	coffee Thermos	GS			PS is doing
42	Power Purchase Program	GSD/LLP	X		
43	PV for Signs	GS			
44	Commercial Micro wind	GS/GSD/LLP	X		
45	LES LEB			X	Temp set back, Replace Cooling tower, investigate -Building pressure and Central control system
			26		

3.5 Supply Side Options

With the LES Base Case capacity deficit not occurring until 2017 supply side options were not the focus of this IRP. But they were investigated to provide a preliminary indication for future supply study focus.

Table 3-4 provides the initial list of the 15 Supply Side options that were developed. These options contain a mix of base load unit options, peaking unit options and intermediate unit options. The renewable options are wind and landfill gas. Nuclear generation is included as a preliminary look. The base case plan was developed utilizing the following options:

Option 1 – Super Critical Pulverized Coal (PVC),
Option 5 – LM6000 Combustion Turbine (CT),
Option 8 - LM6000 two on one Combined Cycle unit (CC) and
Option 10 – Wind in five megawatt increments.

Other options were then compared to the economics of the base case.

The Supply Side review did include a detailed analysis of several of these options including: 1) wind units of 5 megawatts in 2009, 2) landfill gas of 5 megawatts (to keep the size the same as the wind), 3) PVC with CO_2 capture was modeled, and 4) a Renewal Portfolio Standard (RPS) that had a target of 15% by 2020 was also modeled. The renewable technologies used in meeting the RPS standard were two increments of two megawatt landfill gas generators (for a total of 4 MW) and then wind generation additions for the required remaining renewable portfolio requirements. Nuclear energy with an installed date of 2018 was also investigated as a supply side option.

In addition to the wind resource in Table 3-4, NPPD has recently completed an RFP process for a power purchase agreement for wind. Five and ten megawatt purchase increments were investigated beginning in 2009.

Table 3.4
SUPPLY SIDE OPTIONS

2006$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Supercritcal PVC	IGCC	PVC with CO2 Capture	IGCC with CO2 Capture	Lm6000 CT	LMS 100 CT	7EA CT	Lm6000 (2 on 1) CC	7EA (2 on 1) CC	WIND	Land Fill Gas	fuel Cell	Diesel on NG	CoGen	Nuclear	
SIZE (mw)	600	600	600	600	47.3	95.0	84.0	118	240	5	2	1	2	21	1100	
LES SHARE (mw)	100	100	100	100	47.3	95.0	84.0	118	100	5	2	1	2	21	100	
LES Acredited (mw)	100	100	100	100	47.3	95	84	118	100	1.3	2	1	2	21	100	
FUEL TYPE	COAL	COAL	COAL	COAL	NG	NG	NG	NG	NG	WIND	LF gas	NG	NG	NG	Ur	
OVERNIGHT CONSTRUCTION COSTS ($/kw)																
Unit	1850	2350	2488	2700	613	505	454	903	635	1800	2700	6100	383	840	3230	
Transmission	100	100	100	100						100					100	
FIXED COSTS ($/kw-yr)																
FOM	20.75	25.25	31.25	34.75	16.85	8	8.25	15.25	9.75	50	45.0	20	20	22.0	80	
Wheeling	23.06	23.06	23.06	23.06						5.99					23.06	
Fixed Fuel O&M					8.7	8.7	8.7	7.63	7.63			7.63	7.63			
TOTAL	43.81	48.31	54.31	57.81	25.55	16.7	16.95	22.88	17.38	55.99	45	20	20	22	103.06	
VOM ($/mwh)	3.25	4.60	7.00	7.20	6.9	7	6.6	4.50	5.00	0.00	1.5	2	2		0.00	
Fuel Cost ($/mmbtu)																
weighted annual	0.91	0.91	0.91	0.91	6.03	6.03	6.03	6.32	6.32	NA	0	6.32	6.03	10.11	0.70	
Heat Rate (btu/kwh)																
100%	8899	9500	12024	12800	9770	7965	10430	7727	7525	NA	10590	7491	10405	11400	10000	
Losses (%)	2	2	2	2						3.0					2	
Maintenance																
(days/year)	21	24.5	28	31	14	21	14	21	21	7	14	14	14	28	14	
															30	Refuel Every other year
F.O.R. (%)	5	11	7	12	8.0	9.0	8.0	10.0	9.0	15	7	13	6	5	5	
Emissions (lbs/mmbtu)																
SO2	0.060	0.019	0.0003	0.004	0.00056	0.00050	0.00060	0.00056	0.00060		0.001	0	0	0.001	0.000	
NOx	0.050	0.063	0.045	0.061	0.0091	0.0090	0.0010	0.0091	0.0010		0.100	0.00005	0.00005	0.030	0.000	
CO2	238	215	22	21	136.0	126.0	145.0	136.0	145.0		-878.0	135	135	116.6	0.000	
Particulates	0.015	0.007	0.015	0.007								0	0		0.000	
Mercury	0.0000014	0.0000007	0.0000014	0.0000007								0	0		0.000	

A screening analysis was performed for the other supply side options. That analysis indicated these were not as economical as the options investigated in detail. That screening analysis included IGCC, IGCC with CO_2 capture, fuel cell generation, and internal combustion engines operating on natural gas.

3.6 Models

In addition to the multiple models used in load forecasting, many other models are used to prepare the Lincoln Cooperative IRP. The LES IRP modeling process was utilized in preparing the combined IRP. Figure 3-3 shows a simplified flow chart for the modeling process.

Screening

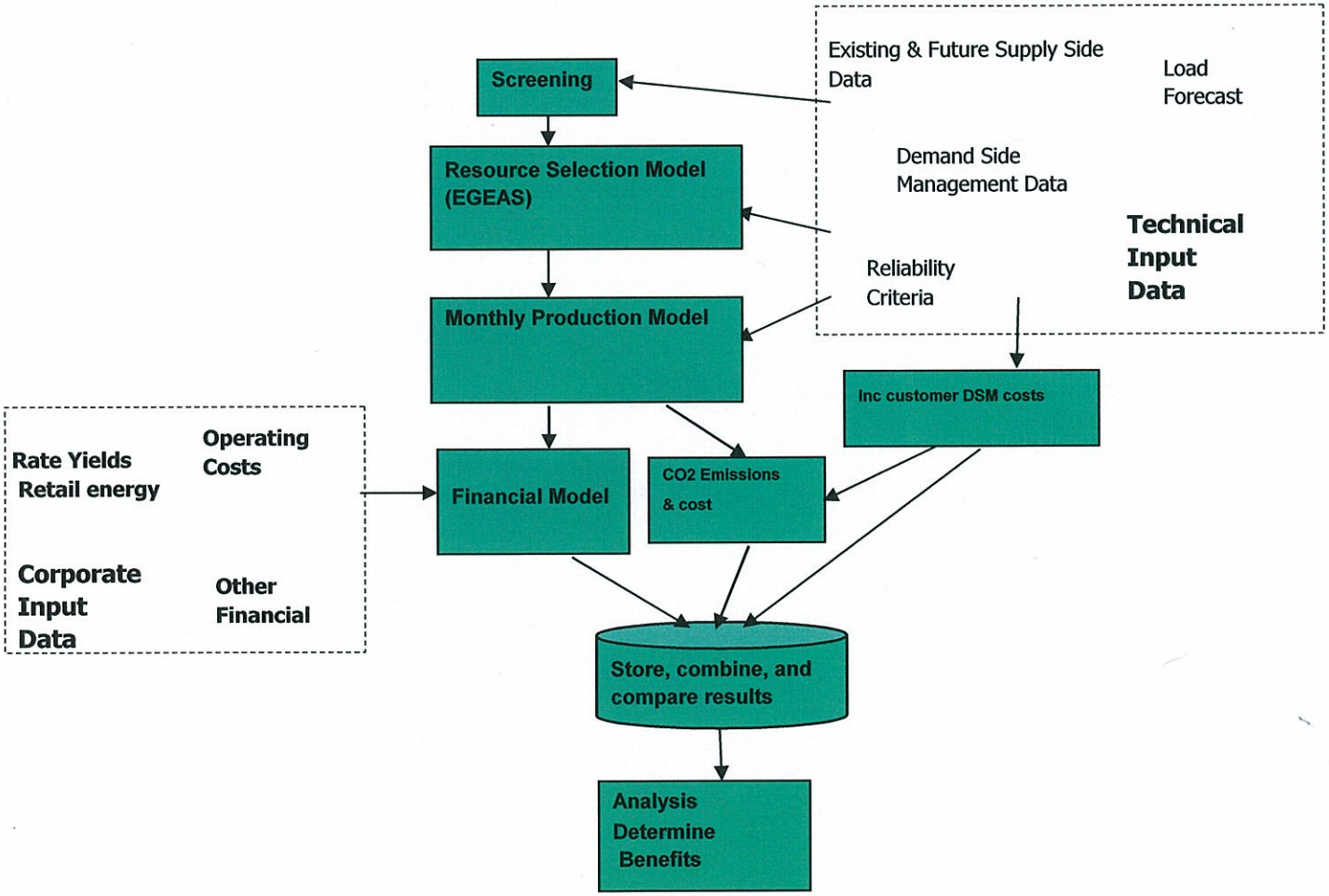
After detailed lists of Supply Side and Demand Side Management options are prepared, the options are screened to identify the most promising options to more fully evaluate. In the case of Supply Side options the screening process used a "screening curve analysis" where options can be compared against each other on a cost and capacity factor basis.

For DSM Options the screening process is more subjective but is based on LES experience and research and was further modified based on public input from the December public hearing.

Resource Selection Model

LES uses the EPRI Electric Generation Expansion Analysis System (EGEAS) computer model for our resource selection model. EGEAS can select Supply Side or Demand Side options from a shopping list of alternatives to meet LES load and reserve requirements. For this IRP, LES used the expansion model to select the options to be included in the base case and to select supply side options in a few other supply side cases. Otherwise, since the resource deficit does not occur until 2017, no generating resources would be identified in the expansion model until 2017. Separate modeling had to be established for reviewing options in the earlier time frame. Additional modeling was also necessary to get more detailed results that could be accurately compared.

Figure 3-3
IRP Modeling



Monthly Production Cost Model

A given resource plan from EGEAS is simulated in greater detail using the pre-specified pathway (production costing mode of EGEAS). Other input to the production cost model include all fixed costs for the resources and the load impact for a DSM option. These production cost results from the production cost model are an output to a file which is then used as input to the LES financial model.

Another output from the production model that is saved is the CO_2 emissions for the case for each year. This allows for relatively easy adjustment to CO_2 cost to analyze the impacts.

Financial Model

Once the power cost is determined for a case a financial model is then run to determine the resulting rate impacts from the required production costs for each DSM case. The financial model accounts for other operating costs, construction costs and retail energy changes that would happen with the DSM option. The results of the financial model are then stored so that the cases can be compared back to the base case modeled without DSM options.

Other Incremental Costs

In order to fully evaluate the DSM options from a customer view point there are other costs that have to be incorporated. For example, other fuel costs changes have to be accounted for (non electric system changes). Also the DSM equipment cost difference is also handled in this portion of the analysis. The other key component included in this analysis are changes in environmental costs from the customer (non-electric system changes). The only customer emission cost that is tracked is the CO_2 change caused by an option's fuel change. The electric system fuel and environmental changes are calculated within the production model, where all production units have emission rates for the four environmental factors being calculated.

This other incremental cost portion of the analysis also adds in the demand cost benefits or penalties for the DSM option.

Example Analysis

An example is useful in describing the process in more detail. Table 3-5 shows the sample DSM data for a plug-in hybrid vehicle option. This is one of the more complicated options

because there is a customer fuel use change other than electric. Many of the DSM options, for example a compact fluorescent, will only affect the electric system changes and will not have a reduction in other fuel types.

The data highlighted in yellow is the initial assumption data for the plug-in electric hybrid. This data is prepared by a member of the Task Force who was assigned to research and develop the data. It should be noted that the DSM options are assumed to be fully implemented in 2008. Then costs are determined that would keep them fully implemented through 2025.

The top box to the right of the yellow data develops the cost for the base technology, the cost of the new technology and calculates the difference for 2008 - 2025. The incremental present value costs, in green in cell Z22 of the bigger box, is then the incremental cost or benefit. (In this sample case it is a benefit.) Since the purpose of this spreadsheet is to calculate the non-electric system impacts, the electric system impacts calculated in the production modeling will be added to this. In this particular case an electric hybrid vehicle has much better gas mileage. The gas consumed is lower and there is a benefit. Offsetting that benefit will be an increase in electric system costs that will be handled on the production modeling of the electric system. There will be added costs since the charging of the vehicle increases the load for that customer.

Below the big box, developing the customer cost or benefit, is a calculation of emission benefits. These are emissions from the change in gasoline consumption between a hybrid and a conventional vehicle. The only emission that is tabulated is CO_2 and that is priced out at two different values, the base case, cell Z28 and a high cost of CO_2 case cell Z29. It is recognized that these costs would be zero if there is zero cost of CO_2.

With this spreadsheet for this option we have calculated the incremental costs or savings for the customers (except for the electric system benefit than is handled in the financial modeling process for the option). The very lower box on the spreadsheet, Table 3-5, indicates the demand cost savings, cell Z45. For this case, there is a demand cost increase as the electric system demand is increased due to charging the plug-in vehicles.

Table 3-5 Plug-in Electric Hybrid- Sample DSM data

DATA required for DSM options

	Technology Name	Test Plug in Hbrid
	Technology Availability	2008 [1]
	Customer Class	res
	Number of cust max	100,000
	Max devices per customer	1
	estimated customer penetration	10%
	estimated device penetration	100%
	Free Riders(%)	10%
	Failure rate(%)	0
	total Devices	10,000
	Current elec Rate ($/mwh)	$63.9
	Device Max Capacity(kw)	-0.548
	Summer on Peak	5.0%
	Summer Kw/device	-0.0274
	Summer Kwh/device	-667
	winter on peak	5%
	Winter Kw/device	-0.0274
	winter Kwh/device	-1333.3
Load Change		Retail
	Summer Dem Red(MW)	-0.247
	Energy Red(gWh)	-18.00
		System
	Summer Dem Red(MW)	-0.274
	Energy Red(gWh)	-18.888
	Losses Capacity	10.0%
	Losses Energy	4.7%
	electric mwh	1800
	Steam Lbs	n/a
	hot water lbs	n/a
	Gasoline gal	219
LES adders		
	Incentive/yr	$0
	Marketing/yr	$0
	Administration/ Monitoring/yr	$0
	Trade Ally contribution/yr	$0
	Escalation	2%
	T& D cost changes	0
Other		
	Borrowing rate	8%
	Discount rate	5%
	CC Escalation	3%
	OC Escalation	3%
	Other Fuel Cost($/gal)	$3
	OF Escalation	3%

Technology	Base	New
Installation cost/dev	$20,000	$25,000
Replacement cost/dev	$20,000	$25,000
Life	10	8
Finance life	5	5
Operating cost	$586	$481
comfort	0	0
Other Fuel Use (gal)	523	219
CO2(Tail Pipe and Upstream) tons/yr	6.08	2.55
		1.62 elect Emission estimate

Summer Jun-Sept
winter Oct -May

Financial model run year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Annual cost impacts($1000)			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total	
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025		
Base Tech CRF 25.05%																						
Replacement cost			206000										276847								482847	
Capital Cost			51594	51594	51594	51594	51594						69338	69338	69338	69338	69338				604660	
Operating cost			6036	6217	6403	6595	6793	6997	7207	7423	7646	7875	8112	8355	8606	8864	9130	9404	9686	9976	141325	
Other Fuel cost			16161	16646	17145	17659	18189	18735	19297	19876	20472	21086	21719	22370	23041	23733	24445	25178	25933	26711	378394	
Total cost			73791	74456	75142	75849	76576	25732	26504	27299	28118	28961	99168	100063	100985	101934	102912	34581	35619	36687	1124379	
PV total			70277	67534	64911	62401	60000	19201	18836	18477	18125	17780	57982	55719	53554	51484	49503	15842	15540	15244	732410	
New Tech CRF 25.05%																						
Installation cost			257500																		257500	
Replacement cost													346058									
Capital Cost			64493	64493	64493	64493	64493	0	0	0	0	0	86673	86673	86673	86673	86673	0	0	0	755826	151,165
Operating cost Plus LES adders			4954	5103	5256	5414	5576	5743	5916	6093	6276	6464	6658	6858	7064	7276	7494	7719	7950	8189	116002	
Other Fuel cost			6767	6970	7179	7395	7616	7845	8080	8323	8572	8830	9094	9367	9648	9938	10236	10543	10859	11185	158448	
Total cost			76214	76566	76928	77301	77685	13588	13996	14416	14848	15294	102425	102898	103384	103886	104402	18262	18809	19374	1030276	
PV total			72585	69447	66453	63596	60868	10140	9947	9757	9571	9389	59886	57297	54827	52469	50219	8366	8206	8050	681074	
Incremental PV cost			-2308	-1913	-1542	-1195	-869	9062	8889	8720	8554	8391	-1904	-1578	-1273	-986	-717	7476	7334	7194	51335	
Emission Benfit 1000 tons			35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	637	
Emission Cost savings base	$1000		0	0	0	0	0	0	0	223	275	329	386	446	509	578	650	726	806	890	5817	
Emission Cost savings High	$1000		0	0	198	284	373	467	564	669	778	893	1014	1141	1273	1365	1462	1563	1669	1780	15493	
PV Emission Cost savings base	$1000		0	0	0	0	0	0	0	151	177	202	226	249	270	292	313	332	352	370	2933	
PV Emission Cost savings High	$1000		0	0	171	233	292	348	401	453	502	548	593	635	675	690	703	716	728	740	8429	
co2 cost $/ton -Mid			0	0	0	0	0	0	0	6.3	7.77	9.3	10.92	12.62	14.4	16.33	18.37	20.51	22.78	25.16		
co2 cost $/ton -High			0	0	5.60	8.02	10.55	13.19	15.95	18.90	22.00	25.25	28.67	32.24	36.00	38.60	41.32	44.18	47.18	50.32		
Electric savings estimate [1]			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025		
Retail Energy Savings(gwh)		-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0		
Retail Energy rate($/mwh)		65.8	67.8	69.8	71.9	74.1	76.3	78.6	80.9	83.4	85.9	88.5	91.1	93.8	96.7	99.6	102.5	105.6	108.8	112.0		
Estimated Electric Savings ($1000)																						
Savings			-1220.25	-1256.85	-1294.56	-1333.40	-1373.40	-1414.60	-1457.04	-1500.75	-1545.77	-1592.15	-1639.91	-1689.11	-1739.78	-1791.97	-1845.73	-1901.11	-1958.14	-2016.88		
PV savings			-1162.1	-1140.0	-1118.3	-1097.0	-1076.1	-1055.6	-1035.5	-1015.8	-996.4	-977.4	-958.8	-940.6	-922.6	-905.1	-887.8	-870.9	-854.3	-838.1	(17,852)	
Electric emission estimate [1]																						
emission cost			0	0	0	0	0	0	0	-102	-126	-151	-177	-204	-233	-265	-298	-332	-369	-408		
PV cost			0.0	0.0	0.0	0.0	0.0	0.0	0.0	-69.1	-81.1	-92.5	-103.4	-113.8	-123.7	-133.6	-143.1	-152.2	-161.0	-169.4	(1,343)	
																					$ 3,896.91	/device
Demand Savings $/kw-yr		$16.48	$16.97	$17.48	$18.01	$18.55	$19.10	$19.68	$20.27	$20.88	$21.50	$22.15	$22.81	$23.50	$24.20	$24.93	$25.68	$26.45	$27.24	$28.06		
Demand Benefit										-$5.72	-$5.89	-$6.07	-$6.25	-$6.44	-$6.63	-$6.83	-$7.04	-$7.25	-$7.46	-$7.69		
PV savings			0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.9	-3.8	-3.7	-3.7	-3.6	-3.5	-3.4	-3.4	-3.3	-3.3	-3.2	(38.8)	

1) Will be calculated using LES long range financial model

Benefit $/kw 2006 $4

1) Availability- for analysis it will be assumed in 2008 in actuality PHEV will not be commercial for a year or two and may be longer than that before they are competitive.

This detailed analysis is prepared for each of the 26 detailed DSM options and it is added to the electric system impact.

Comparison of results – Base Case Example

Total benefit, or cost, is then calculated and that benefit is split to the customer and LES. A detailed comparison of each option can then be performed comparing the option to the base case and then comparing the options benefits to the benefits from other DSM options.

Table 3-6 is a comparison of the DSM cases and the supply side cases that were run using the base case assumptions of CO_2 costs. This table is primarily used as an example to highlight the various aspects of the calculations. The detailed tables for this case plus a zero CO_2 cost case and a high CO_2 cost case are in Appendix C. It should be noted that, in order to do the CO_2 cost sensitivities, the emissions of CO_2 from each case were tabulated. The cost of these emissions then can be established by multiplying the emissions times various cost of CO_2. That process is tabulated in Appendix D.

Again, if we look at plug-in electric hybrids as an example that is, DSM 17 on row 14 of the spreadsheet, Table 3-6. Column E in the "benefit components" section shows an approximate $10 million penalty on the financial model (electric system modeling) benefits. The customer impact is a $51 million benefit from Table 3-5. There is a demand penalty of $39,000 and there is a societal benefit of $2.9 million ($CO_2$ savings due to the fuel not consumed in the hybrid vehicle) both from Table 3-5. In total there is a $44 million present value benefit for this option. The next two sets of columns split this benefit to the customer benefit and electric system benefit.

The "customer (participant) benefit" on Table 3-6 includes the cost derived for each option as shown in Table 3-5 plus electric savings, or costs, due to a lower or higher, electrical usage. The non participant is also shown as the "electric system benefit" section and is the benefit derived by lower rates (if rates are higher there would be a penalty) and the demand benefit of the option. Generally no incentive costs or marketing costs are assumed. The final set of benefits, Column S - Other, is due to a CO_2 benefit that it can not be captured directly by the electric system or the customer.

Table 3-6 Benefit Analysis - (Base CO_2 Assumption)

					Benefit components ($1000 PV)					Customer (Particpant) Benefit ($1000 PV)				Electric System Benefit ($1000 PV)					Other
	Case	Name	Class	Fin Mod Rev Benefit	net other	Demand Benefit	Other Societal Benefit	Total Benefit	Elec System	Net other	incentive costs	Total	Non part Elec	Demand Benefit	incentive costs	Marketing costs	Total	Other Societal Benefit
1	DSM 1	Energy Star home	Res	$420	$348	$14	$20	$802	$354	$348	0	$702	$66	$14	0	0	$80	$20
2	DSM 2	Energy Star Appliances	Res	$856	-$1,765	$55	$12	-$841	$749	-$1,765	0	-$1,016	$107	$55	0	0	$162	$12
3	DSM 3	Zero Energy home	Res	$479	-$1,508	$15	$8	-$1,006	$388	-$1,508	0	-$1,120	$91	$15	0	0	$106	$8
4	DSM 5	Compact Fluorescent(CFL)	Res	$6,814	$148	$145	$0	$7,107	$13,373	$148	0	$13,521	-$6,559	$145	0	0	-$6,414	0
5	DSM 8	Refrigerator Eff	Res	$956	-$5,685	$27	$0	-$4,701	$1,698	-$5,685	0	-$3,986	-$743	$27	0	0	-$715	0
6	DSM 10	Solar Water Heaters (elec)	Res	$773	-$974	$9	$0	-$192	$1,371	-$974	0	$398	-$599	$9	0	0	-$590	0
7	DSM 11	Tankless Water Heaters (elec)	Res	$3,407	-$7,201	$80	$0	-$3,715	$3,790	-$7,201	0	-$3,412	-$383	$80	0	0	-$303	$0
8	DSM 14A	Eff AC	Res	$403	-$2,061	$49	$0	-$1,608	$293	-$2,061	0	-$1,768	$110	$49	0	0	$160	$0
8	DSM 14B	Eff HP	Res	$451	-$740	$16	$0	-$273	$341	-$740	0	-$399	$110	$16	0	0	$126	$0
9	DSM 17	Plug in Hybrid Electric Vehicle	Res	-$9,977	$51,335	-$39	$2,933	$44,252	-$20,970	$51,335	0	$30,365	$10,994	-$39	0	0	$10,955	$2,933
9	DSM 17A	PHEV compared to Hybird	Res	-$9,977	$29,510	-$39	$1,538	$21,033	-$20,970	$29,510	0	$8,540	$10,994	-$39	0	0	$10,955	$1,538
10	DSM 18	AC LC-Radio	Res	$849	-$7,529	$4,031	$0	-$2,649			0		-$6,680	$4,031	0	0	-$2,649	0
11	DSM 19	AC load control Thermostat	Res	$620	-$8,116	$4,927	$0	-$2,569			0		-$7,496	$4,927	0	0	-$2,569	0
12	DSM 20	Water Heater LC	Res	$0	-$2,273	$126	$0	-$2,148			0		-$2,273	$126	0	0	-$2,148	0
13	DSM 22	Weatherization	Res	$332	$22	$3	$13	$369	$27	$22	0	$48	$305	$3	0	0	$308	$13
14	DSM 23	Residential Wind	Res	$609	-$1,503	$6	$0	-$888	$389	-$1,503	0	-$1,113	$219	$6	0	0	$225	0
15	DSM 26	Photo Voltaic	Res	$338	-$934	$16	$0	-$580	$188	-$934	0	-$746	$150	$16	0	0	$166	0
16	DSM 27	Commercial Lighting	Com	$7,585	-$5,325	$612	$0	$2,872	$14,008	-$5,325	0	$8,683	-$6,423	$612	0	0	-$5,811	0
17	DSM 30	commercial Energy Star Program	Com	$2,624	-$2,814	$56	$42	-$92	$3,272	-$2,814	0	$458	-$648	$56	0	0	-$592	$42
18	DSM 32	Maintenance of HVAC	Com	$2,289	-$816	$330	$0	$1,803	$2,537	-$816	0	$1,721	-$248	$330	0	0	$82	$0
19	DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$595	-$704	$32	$0	-$77	$623	-$704	0	-$81	-$29	$32	0	0	$3	$0
20	DSM 34	Cogen	Ind	$37,556	-$44,161	$1,682	-$1,126	-$6,049	$77,207	-$44,161	0	$33,046	-$39,651	$1,682	0	0	-$37,969	-$1,126
21	DSM 36	Ground Coupled HP -Com	Com	$2,168	$5,070	$1,824	$818	$9,880	$293	$5,070	0	$5,363	$1,875	$1,824	0	0	$3,699	$818
22	DSM 38	Cool Storage	Com	$711	-$4,058	$471	$0	-$2,875	$0	-$4,058	0	-$4,058	$711	$471	0	0	$1,183	$0
23	DSM 39	Exit lights	Com/ind	$4,783	$9,191	$151	$0	$14,125	$9,368	$9,191	0	$18,559	-$4,585	$151	0	0	-$4,434	0
24	DSM 40	Vending miser	Com	$168	-$181	$0	$0	-$13	$902	-$181	0	$720	-$733	$0	0	0	-$733	0
25	DSM 42	Power Purchase Program	Ind	$315	-$361	$589	-$7	$536	$76	-$361	122	-$164	$239	$589	-122	0	$707	-$7
26	DSM 44	Commercial Micro Wind	Com/Ind	$822	-$7,572	$14	$0	-$6,736	$842	-$7,572	0	-$6,730	-$20	$14	0	0	-$8	$0
	Supply 1	Wind 5MW 2009	System	-$4,139		$184		-$3,955					-$4,139	$184			-$3,955	
	Supply 2A	LFG 5 MW -full em benefit	System	$18,049		$707		$18,756					$18,049	$707			$18,756	
	Supply 3	CO2 capture units	System	-$57,185		$0		-$57,185					-$57,185	$0			-$57,185	
	Supply 4	RPS 15% 2020	System	-$133,701		$6,448		-$127,252					-$133,701	$6,448			-$127,252	
	Supply 5	Nuclear 2018	System	-$20,787		$0		-$20,787					-$20,787	$0			-$20,787	
	Supply 6	NPPD Wind PPA 5Mw	System	-$4,366		$184		-$4,182					-$4,366	$184			-$4,182	
	Supply 7	NPPD Wind PPA 10Mw	System	-$7,883		$368		-$7,515					-$7,883	$368			-$7,515	

It should be noted that it is possible for there to be a customer benefit and an electric system penalty. For example, DSM 5, compact fluorescent, row 8 of this spreadsheet, had a total benefit of $7 million. In column L the customer benefit, due to electricity cost savings and lower costs of the light bulb over a 20-year life, is $13 million. In this case the electric system sees a penalty of $6 million due to higher rates caused by the timing of the lower consumption of the compact fluorescent.

An option that goes the other way is DSM option 26, photovoltaic. This option, in row 21 of the spreadsheet, has a $580,000 negative total benefit. The split on benefits for photovoltaic is that the customer has a $700,000 negative benefit and the electric system actually exhibits slightly lower rates and has a $166,000 positive benefit.

While there is significant data included in Table 3-6 and the equivalent spreadsheets for the other two CO_2 cost cases, it does not provide the benefit cost ratio of these options. The following summarizes the final comparison that is developed as part of the IRP.

Net Benefit to Cost

Table 3-7 shows net benefit to cost for the base case CO_2 cost assumptions. Again this table is used primarily as an example. The detailed tables are in Appendix C for all three CO_2 cases.

Looking again at plug-in electric hybrid vehicles, DSM option 17, even though there was a very large benefit shown in Table 3-6, there is also a very large cost. Therefore the net benefit to cost is fairly small. The final column on the table ranks the net benefit to cost of all 35 options evaluated in detail. These options are ranked on total benefit. For our example case the plug-in Hybrid Electric Vehicle is actually ranked 10th in terms of Net Benefit to cost ratio. However as discussed earlier, there are options that, while providing total benefit, do not provide both customer and/or LES benefit.

Table 3-7 Net Benefit to Cost
Base CO_2 Assumption

Net Benefit to Cost (B/C) review				total cost- B/C Ratio	
Case	Name	Class	total cost		Rank
DSM 1	Energy Star Home	Res	$404	1.98	3
DSM 2	Energy Star Appliances	Res	$6,355	-0.13	18
DSM 3	Zero Energy home	Res	$2,694	-0.37	27
DSM 5	Compact Fluorescent(CFL)	Res	$1,654	4.30	1
DSM 8	Refrigerator Eff	Res	$12,350	-0.38	28
DSM 10	Solar Water Heater (elec)	Res	$1,550	-0.12	17
DSM 11	Tankless Water heater (elec)	Res	$13,021	-0.29	26
DSM 14A	Eff AC	Res	$6,401	-0.25	22
DSM 14B	Eff HP	Res	$2,471	-0.11	16
DSM 17	Plug in Hybrid Electric Vehicle	Res	$755,826	0.06	10
DSM 17A	PHEV compared to Hybird	Res	$755,826	0.03	11
DSM 18	AC LC-Radio	Res	$10,473	-0.25	23
DSM 19	AC load control Thermostat	Res	$12,497	-0.21	20
DSM 20	Water Heater LC	Res	$1,047	-2.05	35
DSM 22	Weatherization	Res	$445	0.83	7
DSM 23	Residential Wind	Res	$1,542	-0.58	31
DSM 26	Photo Voltaic	Res	$1,322	-0.44	29
DSM 27	Commercial Lighting	Com	$7,367	0.39	8
DSM 30	commercial Energy Star Program	Com	$5,776	-0.02	12
DSM 32	Maintenance of HVAC	Com	$1,277	1.41	4
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$1,234	-0.06	15
DSM 34	Cogen	Ind	$10,321	-0.59	32
DSM 36	Ground Coupled HP -Com	Com	$105,029	0.09	9
DSM 38	Cool Storage	Com	$5,864	-0.49	30
DSM 39	Exit lights	Com/ind	$3,863	3.66	2
DSM 40	Vending miser	Com	$257	-0.05	14
DSM 42	Power Purchase Program	Ind	$578	0.93	5
DSM 44	Commercial Micro Wind	Com/Ind	$5,961	-1.13	34
Supply 1	Wind 5MW 2009	System	$14,975	-0.26	24
Supply 2A	LFG 5 MW -full em benefit	System	$21,719	0.86	6
Supply 3	CO2 capture units	System	$78,935	-0.72	33
Supply 4	RPS 15% 2020	System	$472,935	-0.27	25
Supply 5	Nuclear 2018	System	$434,542	-0.05	13
Supply 6	NPPD Wind PPA 5Mw	System	$18,579	-0.23	21
Supply 7	NPPD Wind PPA 10Mw	System	$37,158	-0.20	19
			cnt	35	

4.0 Results

This section discusses the least cost options over the 2008-2025 year evaluation window. This discussion will focus on the results in a graphical format and will emphasize the options that provide a net benefit to cost ratio that is greater than zero. For these results, a net benefit is defined as a case that has a benefit after accounting for all costs. It would be compared back to zero as to the break even period. Rather than a benefit cost ratio of "one" being the point at which net benefit would start, a net benefit cost ratio of zero is the breakeven point for this analysis.

4.1 Rank of the IRP Options by Net Benefit to Cost Ratio

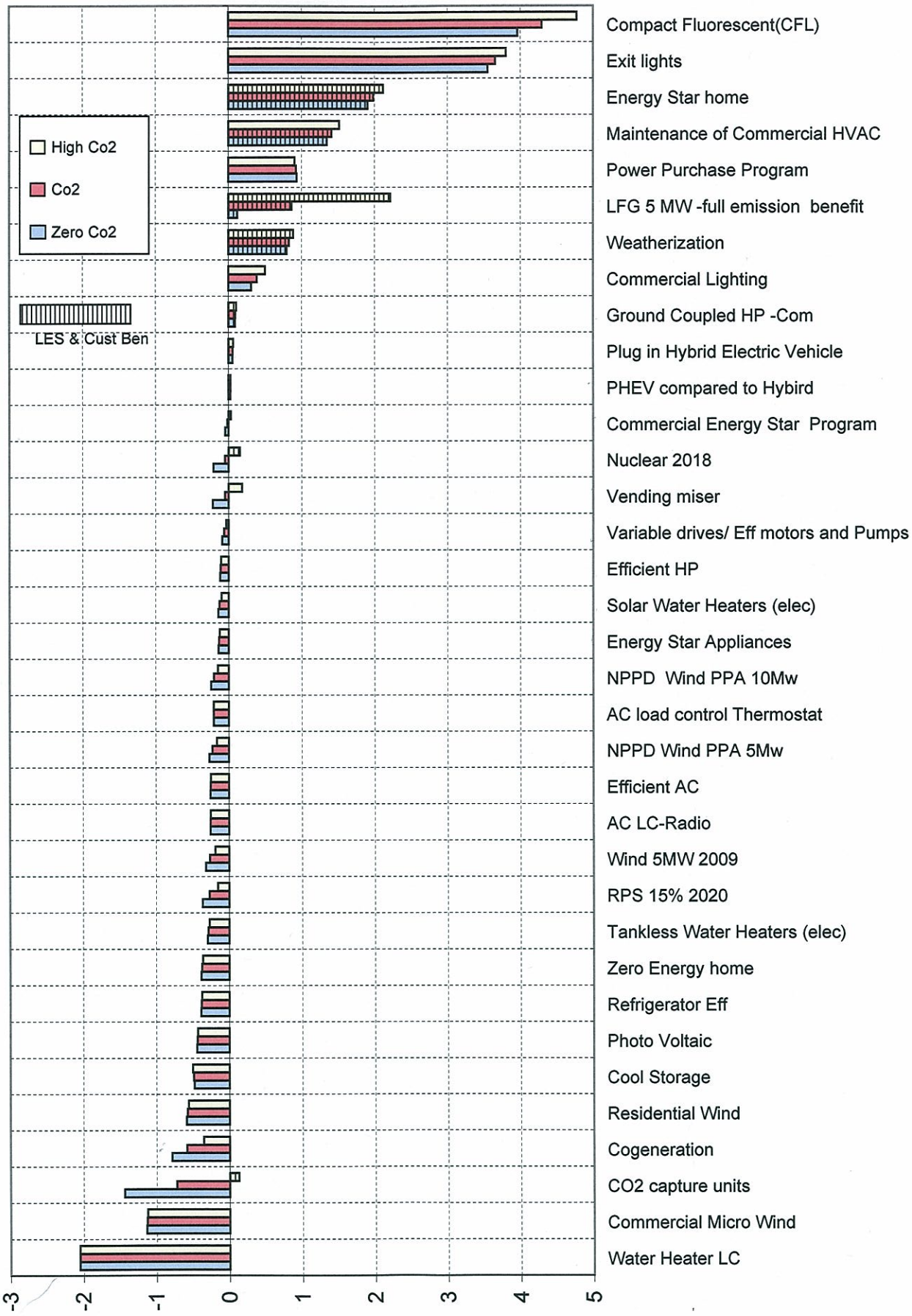
Figure 4-1 shows the rank of the options from the highest to lowest "net benefit to cost ratio". The options are ranked based on the base case cost CO_2 cost comparison. For each case, bars are also shown for the equivalent results for the three CO_2 cases; base CO_2, zero CO_2 and a high CO_2 cost case. Also on this chart, the bars are crossed hatched if an option creates benefits both the customer (participant) and the rest of LES (non participants).

In Figure 4-1 the option providing the highest benefit is the compact florescent (CFL) option. This is due to the very low cost of the option and the high benefit. It can be seen that, under a high cost CO_2 assumption, there is more benefit than under the expected CO_2 cost case or a zero CO_2 cost case. This is generally true for options that have a fairly significant system energy change or customer fuel use change. This is not the case for all options. For compact fluorescent the bars are not crossed hatched indicating that there is not a benefit for both the customer and LES. In this case the increased usage of compact fluorescents on the LES system would reduce consumption for those using them but increase rates slightly creating non participant or remaining LES penalty.

Discussion for several options in Figure 4-1:

- The second highest ranked option, Exit Lights, has a similar relationship as CFL.
- The Energy Star home option is the next most beneficial program and has benefit for both LES and the customer under all CO_2 assumptions.
- Maintenance of commercial HVAC equipment provides benefit for both the customer and LES with both zero CO_2 and Base CO_2 cost assumption. However at a high CO_2 cost assumption, there is no benefit for LES.

Figure 4-1
Net Benefit / Cost



- Power Purchase program is the next option, and has a total benefit, but very little energy is consumed or delivered so it's fairly insensitive to CO_2 cost assumptions. In this case LES benefits from the program, mostly due to the capacity benefit starting in 2015, but the customer themselves would not benefit.
- The landfill gas option is the most sensitive to CO_2 assumptions. Under a zero CO_2 cost assumption there is very little benefit for landfill gas on LES' system. Under a high CO_2 assumption it would actually rank third in the order of options evaluated.
- Weatherization is beneficial to both the customer and LES.
- Commercial lighting is a benefit to the customer but not LES.
- The Ground coupled heat pump option is beneficial to both LES and the Customer.
- Plug-in hybrid vehicles are beneficial to both when compared to a conventional vehicle. PHEV, when compared to a standard hybrid vehicle, is beneficial to both LES and the customer but the benefit is lower than when compared to the conventional vehicle.
- Commercial Energy Star Program shows a slight benefit at high CO_2 cost and slight penalty for other CO_2 cost assumptions.

Several options provide benefits only under the high CO_2 cost assumption. These are Commercial Energy Star Program, Nuclear option, Vending Miser and CO_2 capture for a coal resource. Otherwise the options below the Commercial Energy Star Program do not generally show a benefit.

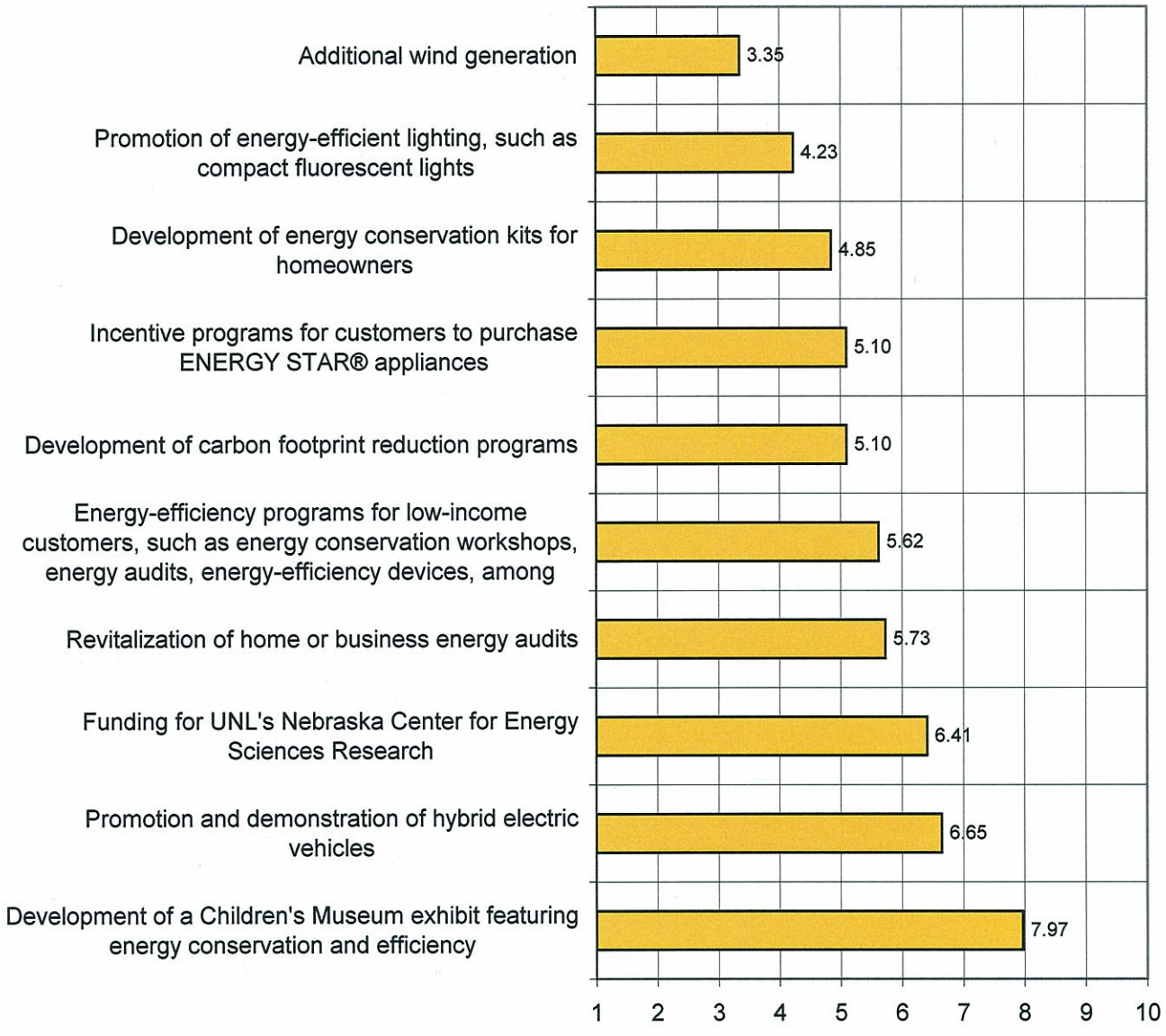
It should be noted that there are several wind cases in this chart. These cases are not calculated as beneficial over the twenty year window. The case closest to being beneficial was an NPPD wind Power Purchase Agreement (PPA) for 10 megawatts. It ranked 19th out of the 35 options.

Working up from the bottom of the chart the options that provide the least benefit are water heater load control, commercial micro wind and CO_2 capture coal fired units.

4.2 Sustainable Energy Program (SEP) Results

Figure 4-2 shows the results for the Sustainable Energy Program customer interest survey. Over 400 customers responded to this survey. The respondents were to rank the options 1 - 10, 1 being the best. The program with the lowest rank (lowest meaning best in this case) is additional wind generation at a 3.35 ranking. The highest ranking option at 7.97 is the Children's Museum exhibit. It can be seen that the customers favored the wind, compact fluorescents, energy kits, incentive to purchase Energy Star appliances, development of carbon footprint reduction, and energy efficiency for low income customers as the top six options. The bottom four options, going from the bottom of Figure 4-2, were the Children's Museum exhibit, promotion of hybrid electric vehicles, funding for UNL's Nebraska Center for energy research, and revitalization of business energy audits.

Figure 4-2
SEP Survey Ranking



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5.0 Conclusions and Recommendations

Table 5-1 shows the action plan to be followed for preparing and implementing new programs for the various options. The existing programs would be expected to continue unless specifically replaced or modified as a result of this IRP and the SEP process. This table groups common options, both beneficial IRP options and the SEP options. The column titled "Driver" shows whether it is an IRP beneficial option and/or a SEP option. All ten SEP options are shown with their ranking. For example SEP2 means this was an SEP option that was ranked #2 in the customer survey.

5.1 Supply Side

The only supply side option that is specifically recommended over the next five years is the installation of a landfill gas project. This project would be developed in conjunction with the Lincoln Public Works Department (PW) which manages the Lincoln City Landfill. The final arrangements between LES and PW will obviously affect the economics of the project. Based on the cost as assumed in this IRP, the landfill gas project showed a very small benefit without a CO_2 cost benefit being applied, but significantly larger benefit if high CO_2 costs are applied.

Additional wind generation was the highest ranking SEP option. The highest ranked wind option in the IRP analysis was a Purchase Power Agreement with NPPD for 10 MW. So while not currently economical, some wind could be pursued if there are SEP funds available.

Beyond the five year window LES does not require additional resource capability until 2017. This study does not make a recommendation as to that option. For the purpose of establishing a base case, the next option is assumed to be a pulverized coal fired unit. The comparisons of other supply alternatives did not show an economic benefit based on the range of assumptions used in this IRP analysis. Further work on future supply side options will be needed and will depend on the status of the existing resources, load forecasts, the implementation of a landfill gas project, and the impacts of any DSM or any SEP options initiated from this current IRP.

5.2 DSM Options

The DSM options indicating economic benefit are reviewed in the following individual discussions. These are options for which program review and development will continue in 2008. Implementation of funded programs would begin in 2009.

Lighting

Three lighting options were evaluated in the IRP; Compact Fluorescent (CFL), Exit lights, and commercial lighting (equipment change out-meaning lamps, ballasts, controls, sensors, etc.). These three options all showed total benefit. They also showed participating customer benefit but not non-participating customer (or LES) benefit.

Promotion of energy-efficient lighting such as compact fluorescent was the SEP option ranked second in the customer survey, thus it is important to the customers.

Compact Fluorescents

The increased use of compact fluorescents showed substantial benefit in total, and the highest of all options. Those benefits apply directly to the customer. LES actually sees some penalty from the load reduction caused by the compact fluorescents. This is due to the fact that the load reduction is coming at times when LES has available low cost existing resources.

Exit Lights

The implementation of more efficient Exit lights actually shows very similar benefit relationship to compact fluorescents. There are significant benefits to the customer with reduced consumption and the lower cost of the lamp. LES does not receive a benefit due to reduced consumptions effect on rates. However, that penalty is not as large as with the compact fluorescents. This option did rank 2nd in total cost benefit.

Commercial Lighting

The commercial lighting program option provides benefit to the customer, but not to LES. It ranked 8th in the IRP results.

Energy Star

Three Energy Star applications were evaluated in the IRP: Energy Star Homes, Energy Star appliances, and commercial or business Energy Star Program. "Incentive programs for customers to purchase Energy Star appliances" was also the 4th ranked SEP Option.

Table 5-1
Action Plan

	Class	Driver	2008	2009	2010	2011	2012
DSM							
Lighting							
Exit lights	Com/Ind	IRP/SEP2	DP	IP	CP	CP	CP
Equipment change outs	Com/Ind	IRP/SEP2	DP	IP	CP	CP	CP
Compact Fluorescent (CFL)	Res	IRP/SEP2	DP	IP	CP	CP	CP
Energy Star							
Homes	Res	IRP	DP	IP	CP	CP	CP
Appliances	Res	SEP4	SP	IPF			
Businesses	Com	IRP	DP	IP	CP	CP	CP
Heating and Cooling							
Weatherization	Res	IRP /SEP6	DP	IP	CP	CP	CP
Ground Coupled HP -Com	Com	IRP	DP	IP	CP	CP	CP
Maintenance and recommissioning of commercial HVAC	Com	IRP	DP	IP	CP	CP	CP
Community Base							
Energy-efficiency programs for low-income customers [1)]	Res	SEP6	SP	IPF			
Funding for UNL's Nebraska Center for Energy Sciences Research	NA	SEP8	SP	IPF			
Development of a Children's Museum exhibit featuring energy conservation and efficiency	NA	SEP10	SP	IPF			
Informational							
Development of energy conservation kits for homeowners	Res	SEP3	SP	IPF			
Revitalization of home or business energy audits	Res/Com	SEP7	SP	IPF			
Development of carbon footprint reduction programs	Res/Com	SEP5	SP	IPF			
Peak demand assistance							
Power Purchase program	Com/Ind	IRP	CP	CP	CP	CP	CP
Fuel Switching							
Plug in Hybrid Electric Vehicle	Res	IRP /SEP9	DP	IP	CP	CP	CP
Supply							
Landfill gas	System	IRP	WPW				
Wind	System	SEP1	PPA09/ SP	IPF	IPF		

1) Such as energy conservation workshops, energy audits, energy-efficiency devices, among others

IRP	Beneficial in IRP
SEPxx	SEP Option ranked "xx" in survey

CP	Continue Program
DP	Develop Program
IP	implement Program
IPF	implement Program if funded
SP	Scope program for potential funding from SEP
WPW	work with public works to implement
PPA09	Investigate Power Purchase for late 2009 or 2010

Energy Star Homes

The Energy Star Homes is the 3rd ranked option behind compact fluorescent and Exit lights. In this case, both LES and the customer benefit. In 2008 existing Energy Star Home programs will be reviewed and modified to enhance their benefit to Customers and LES. Implementation would begin 2009.

Energy Star Appliances

This option did not show a benefit in the IRP, but was ranked 4th in the SEP survey. Due to uncertainty on the funding for SEP options, this program would need to be more fully scoped for potential funding from SEP available funds.

Energy Star Business

This option showed a benefit in the IRP for the customers with a high CO_2 cost assumption. It did not show a benefit with other CO_2 cost assumptions. Any program for this option will be reviewed and modified or created to encourage this application.

Heating and Cooling

The three options in this section of Table 5-1 were all evaluated in the IRP and all showed benefits. As a result programs will be developed in 2008 for implementation in 2009.

Community Based and Informational

The options in these two sections of Table 5-1 are all SEP Options and the development of programs may be prioritized and funded based on the SEP ranking.

Peak Demand Assistance

Power Purchase Program

The Power Purchase Program did show total benefit. This program shows benefit for LES but not for the customer. So far the customers have been willing to assist LES in times of high energy costs even though it may not provide an economic benefit to them. Therefore it is recommended that Power Purchase Program be reviewed, modified if required, and continued for 2008 and beyond.

Fuel Switching

Plug-In Hybrid Electric Vehicles

The benefits for plug-in electric vehicles were not large, but there was some benefits accruing to both LES and the customer. Therefore a plug-in hybrid electric vehicles program would be investigated in 2008 for potential implementation in 2009.

Conclusions

The preferred focus and direction for programs has been developed through this IRP process. In addition it is LES' intent to continue to develop additional renewable and efficiency programs during 2008 based upon demonstrated customer interest and the availability of Sustainable Energy Program funding. Programs which provide economic benefit and are feasible based upon funding and customer interest will be pursued during 2009 and beyond.

APPENDIX A

LES Public Actions Summary

Index to LES Board and PRB Actions

Number	Date	Action
LES 2003-8	June 20, 2003	LES Board approves LES/Norris service boundary changes.
LES 2003-12	October 17, 2003	LES Board action to approve year 2004 Budget.
LES 2004-3	April 16, 2004	LES Board adopts "2004 Policy and Guidelines for Customer-Owned Generation.
LES 2004-8	August 20, 2004	LES Board approves "Rate Schedules, Service Regulations and 2004 Cost Analysis Summary." Proposed rate increase of 3% in October 2004 and 3% in 2005 went through public meeting August 12 and City Council Hearing. The second year of the rate increase was not approved by City Council as requested.
LES 2004-10	October 15, 2004	LES Board action to approve year 2005 Budget.
LES 2005-4	June 17, 2005	LES Board approves "Rate Schedules, Service Regulations and 2005 Cost Analysis Summary." Proposed rate increase of 9% effective August 1. Public hearing June 9, City Council hearing and approval.
LES 2005-11	October 21, 2005	LES Board approves route selection for North Tier-Phase II 345 kV transmission route selected after open house June 23 and August 4, Board Committee, review, a special Board meeting. Final approval of adjusted route at October 21 Board meeting.
LES 2005-12	October 21, 2005	LES Board approves additional funding for the LES Energy Assistance Program.
LES 2005-13	October 21, 2005	LES Board action to approve year 2006 Budget.
LES 2005-14	October 21, 2005	LES Board authorizes LES staff to commence process for development and approval of a Power Cost Adjustment.
LES 2005-19	November 18, 2005	LES Board approves an additional route segment for the North Tier 345 kV transmission system. Two open houses, Board committee and the final approval.
LES 2005-20	December 16, 2005	LES Board approves rate increase, PCA and Rate Stabilization Fund transfer. Public Meeting December 1, Board approval, City Council hearing. Rate increase approved. PCA was not.
LES 2006-1	January 20, 2006	LES Board approves another 345 transmission route segment for the North Tier System.
LES 2006-5	October 20, 2006	LES Board action to approve year 2007 Budget.

Number	Date	Action
LES 2007-4	February 16, 2007	LES Board approves 5.5% surcharge for increased costs due to transmission storm damage.
LES 2007-6	March 16, 2007	LES Board action to authorize issuances of revenue bonds was approved by City Council.
LES 2007-7	April 20, 2007	LES Board approves LES/Norris service boundary changes.
LES 2007-8	May 18, 2007	LES Board takes action on PURPA Standards public meeting held February 20.
LES 2007-9	May 18, 2007	LES Board approves modified version of the PURPA Standard on Net Metering. A trial net meeting procedure was adopted.
LES 2007-11	May 18, 2007	LES Board approves modifications to existing PURPA Standard on Information to Customers.
LES 2007-13	July 20, 2007	LES Board adopts the "2007 Policy and Guidelines for Customer-Owned Generation."
LES 2007-14	October 19, 2007	LES Board terminate 5.5% temporary surcharge.
LES 2007-14	October 19, 2007	LES Board action to approve year 2000 Budget.
IRP/SEP Public Meeting	December 13, 2007	Summary of Comments from the Meeting.

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2003-8

WHEREAS, Lincoln Electric System (LES) and the Norris Public Power District (Norris) executed the "Norris Public Power District and Lincoln Electric System Joint Planning and Service Area Adjustment Agreement" (Agreement) in October 2000; and

WHEREAS, such Agreement provides LES with a buffer between the Lincoln city limits and the LES service area boundary to allow for orderly planning and development of electrical infrastructure; and

WHEREAS, such Agreement also requires LES and Norris to jointly plan and coordinate installation of future facilities and future service area adjustments as Lincoln grows; and

WHEREAS, such joint planning efforts between LES and Norris indicate the need for an adjustment to the LES service area boundary; and

WHEREAS, such service area adjustment in the area of 120th and Van Dorn Streets includes approximately 0.25 square miles and would necessitate the transfer of eight customers and associated distribution facilities from Norris to LES at a cost of approximately $55,000.

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves the service area adjustment in the area of 120th and Van Dorn Streets as identified in Attachment A and authorizes the LES Administrator and CEO and LES staff to take all actions necessary to effectuate such service area adjustment with the Nebraska Power Review Board.

Ronald L. Ecklund
Chair

Adopted: June 20, 2003

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2003 - 12

WHEREAS, the Lincoln Electric System (LES) Administrative Board is charged with the responsibility for the control and management of the personnel, property, facilities, equipment, and finances of LES and annually approves the Budget to guide the financial and operational activities during the upcoming year; and

WHEREAS, the 2004 LES Budget in the amount of $254,959,200 was transmitted to the Budget and Rates Committee of the LES Administrative Board on September 22, 2003; and

WHEREAS, this Committee met and reviewed the Budget on October 1, 2003, and recommends it to the full Board for adoption; and

WHEREAS, LES has the obligation to make capital improvements necessary to maintain the electrical system in good working order and repair and expenditures for such purposes which are made from revenues may be reimbursed to the LES revenue or other funds from the issuance of the City's electric system revenue bonds; and

WHEREAS, obtaining right-of-way is an ongoing and necessary process for construction of transmission and distribution facilities that are identified in capital improvements budgets, the implementation of which on occasion requires the use of eminent domain requiring Lincoln City Council approval;

NOW, THEREFORE, BE IT RESOLVED, that pursuant to the recommendation of the Budget and Rates Committee, the LES Administrative Board hereby adopts the 2004 LES Budget in the amount of $254,959,200, and directs that it be properly transmitted to the Lincoln City Council for its full consideration and adoption; and

BE IT FURTHER RESOLVED, that to the extent capital improvements for transmission or distribution facilities of LES are made from LES revenues, it is intended that the amount of such expenditures, which is not reasonably expected to exceed $50,000,000, shall be reimbursable to the LES revenue and other funds through the issuance of future electric system revenue bonds, there being no funds of LES or the City reserved, allocated on a long-term basis or otherwise set aside (or reasonably expected to be reserved, allocated on a long-term basis or otherwise set aside) to provide permanent financing for the expenditures related to such expenditures, other than pursuant to the issuance of such electric system revenue bonds, this Resolution being determined to be consistent with the budgetary and financial circumstances of LES and the City as they exist or are reasonably

foreseeable on the date hereof the proper officers of LES shall keep and maintain records at least annually to determine the amount of such excess capital expenditures that may be reimbursed from electric system revenue bond proceeds; and

BE IT FURTHER RESOLVED, that the LES Administrative Board hereby requests that the City Council give LES ongoing eminent domain authority for those projects identified in the LES Budget.

Ronald L. Ecklund

Chair

Adopted: October 17, 2003

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION **2004-3**

WHEREAS, it is the intent of the Lincoln Electric System (LES) Administrative Board to encourage cost-effective cogeneration and small power production of electricity by customer-owned generation facilities; and

WHEREAS, this intent is in accordance with the goals set forth in the National Energy Act, which are the conservation of energy, the efficient use of resources and equitable rates; and

WHEREAS, the attached "2004 Policy and Guidelines for Customer-Owned Generation" remain in compliance with the requirements of the Public Utilities Regulatory Policies Act and Federal Energy Regulatory Commission's regulations;

NOW, THEREFORE, BE IT RESOLVED that in recognition of the above statements, the LES Administrative Board hereby adopts the "2004 Policy and Guidelines for Customer-Owned Generation" attached hereto and fully incorporated herein by reference.

Chair

Adopted: April 16, 2004

HISTORY:
Interim Policy, March 16, 1981
LES Resolution 83-3, March 18, 1983
LES Resolution 86-4, March 21, 1986
LES Resolution 88-1, March 18, 1988
LES Resolution 90-5, April 19, 1990
LES Resolution 92-3, March 19, 1992
LES Resolution 94-4, March 17, 1994
LES Resolution 96-6, April 19, 1996
LES Resolution 98-9, April 17, 1998
LES Resolution 2000-6, February 18, 2000
LES Resolution 2002-10, May 17, 2002

LES

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2004-8

WHEREAS, it is the responsibility of the Lincoln Electric System (LES) Administrative Board to develop and recommend to the City Council of the City of Lincoln rate schedules and service regulations for electric service to ratepayers in the LES service area; and

WHEREAS, the LES staff has prepared a document entitled, "Rate Schedules, Service Regulations, and 2004 Cost Analysis Summary," which demonstrates the need for a system average retail rate increase of 6 percent; and

WHEREAS, staff recommends a two-step implementation of the rate increase consisting of a system average 3 percent rate increase effective October 1, 2004, and a second system average 3 percent rate increase effective October 1, 2005; and

WHEREAS, the rate increase is necessary to pay increased costs of: producing power from owned resources; purchasing wholesale power; construction of new transmission and distribution facilities; and the construction of new and replacement generation resources; and

WHEREAS, a public hearing on the proposed rate increase was held on Thursday, August 12, at 7:00 p.m. at the Walter A. Canney Service Center to receive public input regarding the proposed increase; and

WHEREAS, notice of such public hearing was mailed in bill stuffers to all LES customers and published in the *Lincoln Journal Star*; and

WHEREAS, the LES Administrative Board has reviewed the cost analysis in detail with LES staff and has determined that there is sufficient justification for such change in rates and charges as has been recommended; and

WHEREAS, it has been determined that said rate recommendations are consistent with the LES financial plan and the requirements of the City of Lincoln's Bond Ordinance for LES;

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves and recommends to the Lincoln City Council the adoption of the "Rate Schedules, Service Regulations and 2004 Cost Analysis Summary," providing for a system average rate increase of 6 percent, to be implemented in two steps consisting of a system average 3 percent rate increase effective October 1, 2004, and a second system average 3 percent rate increase effective October 1, 2005; and

BE IT FURTHER RESOLVED, that the LES Administrative Board directs the LES Administrator and CEO to transmit said documents to the Lincoln City Council for its consideration and approval.

Mark Hesser
Chair

Adopted: August 20, 2004

LES

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2004 - 10

WHEREAS, the Lincoln Electric System (LES) Administrative Board is charged with the responsibility for the control and management of the personnel, property, facilities, equipment, and finances of LES and annually approves the Budget to guide the financial and operational activities during the upcoming year; and

WHEREAS, the 2005 LES Budget in the amount of $253,931,034 was transmitted to the Budget and Rates Committee of the LES Administrative Board on September 21, 2004; and

WHEREAS, this Committee met and reviewed the Budget on October 1, 2004, and recommends it to the full Board for adoption; and

WHEREAS, LES has the obligation to make capital improvements necessary to maintain the electrical system in good working order and repair and expenditures for such purposes which are made from revenues may be reimbursed to the LES revenue or other funds from the issuance of the City's electric system revenue bonds; and

WHEREAS, obtaining right-of-way is an ongoing and necessary process for construction of transmission and distribution facilities that are identified in capital improvements budgets, the implementation of which on occasion requires the use of eminent domain requiring Lincoln City Council approval;

NOW, THEREFORE, BE IT RESOLVED, that pursuant to the recommendation of the Budget and Rates Committee, the LES Administrative Board hereby adopts the 2005 LES Budget in the amount of $253,931,034, and directs that it be properly transmitted to the Lincoln City Council for its full consideration and adoption; and

BE IT FURTHER RESOLVED, that to the extent capital improvements for transmission or distribution facilities of LES are made from LES revenues, it is intended that the amount of such expenditures, which is not reasonably expected to exceed $50,000,000, shall be reimbursable to the LES revenue and other funds through the issuance of future electric system revenue bonds, there being no funds of LES or the City reserved, allocated on a long-term basis or otherwise set aside (or reasonably expected to be reserved, allocated on a long-term basis or otherwise set aside) to provide permanent financing for the expenditures related to such expenditures, other than pursuant to the issuance of such electric system revenue bonds, this Resolution being determined to be consistent with the budgetary and financial circumstances of LES and the City as they exist or are reasonably

foreseeable on the date hereof the proper officers of LES shall keep and maintain records at least annually to determine the amount of such excess capital expenditures that may be reimbursed from electric system revenue bond proceeds; and

BE IT FURTHER RESOLVED, that the LES Administrative Board hereby requests that the City Council give LES ongoing eminent domain authority for those projects identified in the LES Budget.

Chair

Adopted: October 15, 2004

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-4

WHEREAS, it is the responsibility of the Lincoln Electric System (LES) Administrative Board to develop and recommend to the City Council of the City of Lincoln rate schedules and service regulations for electric service to ratepayers in the LES service area; and

WHEREAS, the LES staff has prepared a document entitled, "Rate Schedules, Service Regulations, and 2005 Cost Analysis Summary," which demonstrates the need for a system average retail rate increase of 9 percent to be effective August 1, 2005; and

WHEREAS, the rate increase is necessary to pay increases in fuel costs, increased costs of purchasing wholesale power, increases in coal transportation rates, construction of new transmission and distribution facilities, and construction of generation resources.

WHEREAS, a public hearing on the proposed rate increase was held on Thursday, June 9, at 7:00 p.m. at the Walter A. Canney Service Center to receive public input regarding the proposed increase; and

WHEREAS, notice of such public hearing was mailed in bill stuffers to all LES customers and published in the *Lincoln Journal Star*; and

WHEREAS, the LES Administrative Board has reviewed the cost analysis in detail with LES staff and has determined that there is sufficient justification for such change in rates and charges as has been recommended; and

WHEREAS, it has been determined that said rate recommendations are consistent with the LES financial plan and the requirements of the City of Lincoln's Bond Ordinance for LES;

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves and recommends to the Lincoln City Council the adoption of the "Rate Schedules, Service Regulations and 2005 Cost Analysis Summary," providing for a system average rate increase of 9 percent, to be effective August 1, 2005; and

BE IT FURTHER RESOLVED, that the LES Administrative Board directs the LES Administrator and CEO to transmit said documents to the Lincoln City Council for its consideration and approval.

Chair

Adopted: June 17, 2005

LES

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-11

WHEREAS, the growth in north Lincoln together with long established reliability and service standards require Lincoln Electric System (LES) to construct new substations near NW 40th Street & Alvo Road and NW 70th & Fairfield Streets; and

WHEREAS, the integration of these new substations into LES' transmission and distribution system requires LES to construct new 345,000 volt and 115,000 volt transmission facilities between the existing substation at NW 12th & Arbor Road and the existing substation at NW 68th & Holdrege Street as part of the overall North Lincoln Transmission Line Project; and

WHEREAS, LES has studied and reviewed the possible transmission line route corridors using its transmission line routing corridor evaluation criteria; and

WHEREAS, LES staff has identified seven possible route corridors and exposed those route corridors to public scrutiny at an open house on June 23, 2005 to which 244 landowners located along these routes were invited; and

WHEREAS, in addition, LES conducted an additional open house on August 4, 2005, to receive public input; and

WHEREAS, in addition, LES staff has invited and encouraged further public input and participation in meetings with interested citizens, collecting correspondence, making synopses of telephone and direct contacts, and incorporated this input into the route selection process; and

WHEREAS, after reviewing all of the pertinent information including public input, and the feasibility of designing the project to be double circuit, the Operations & Power Supply Committee of the LES Administrative Board did, on August 19, 2005, recommend to the full Board a single route corridor, commonly referred to as the "yellow" route; and

WHEREAS, the Administrative Board, at its August 2005 meeting, requested its Operations and Power Supply Committee to review its original recommendation after receiving and considering comments from the public made at the August Board meeting; and

WHEREAS, the Operations and Power Supply Committee met twice (August 30 and August 31) to consider suggested alternate routes and comments made by the public at the August Board meeting and to discuss the merits of each of several alternate line locations; and

WHEREAS, at its meeting on August 31, 2005, the Operations and Power Supply Committee, after considerable discussion, voted to recommend again the single route corridor identified by it prior to the August meeting of the Administrative Board; and

WHEREAS, at a special board meeting on October 11, 2005, a vote of the LES Administrative Board to approve the "yellow" route failed on a vote of 4-5; and

WHEREAS, the LES Administrative Board deliberated and gave further consideration to the alternate routes that were reviewed, but not recommended, by the Operations and Power Supply Committee and voted to designate the alternate route commonly referred to as the "green" route as the board's preferred route, but also directed the Operations and Power Supply Committee to further review the green route to see if it could be further optimized.

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board does hereby select the route commonly referred to as the "green" route and designates the route of the transmission line and all appurtenances thereto for the project known as North Tier-Phase II, as follows:

> Commencing at the existing substation at NW 12th & Arbor Road the route shall go north along NW 12th Street to the half section line between McKelvie Road and Alvo Road, then west along the half section line between McKelvie Road and Alvo Road to NW 40th Street, then south along NW 40th Street to the proposed substation at NW 40th & Alvo Road, then generally southwest along the planned relocation of NW 40th Street to the intersection of NW 40th Street and NW 48th Street, then south along NW 48th Street to the half section line between Fletcher Avenue and Superior Street, then west along the half section line between Fletcher Avenue and Superior Street to the section line that would be NW 70th Street, then south along the section line that would be NW 70th Street to the proposed substation at NW 70th & Fairfield Street, then south along NW 70th Street to the existing substation at NW 68th & Holdrege Street; and

BE IT FURTHER RESOLVED, that in the process of implementing the selected routing, staff is authorized and directed to interact with affected property owners and other appropriate governmental agencies to consider existing and future adjacent land uses, man-made and natural barriers, and other similar conditions potentially affecting the transmission line and is given the authority to adjust the exact routing of the line to optimize its location consistent with the National Electrical Safety Code, the findings and conditions stated in this Resolution, and with the concurrence of the Operations and Power Supply Committee.

Chair

Adopted: Oct. 21, 2005

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-12

WHEREAS, many low-income and fixed income residents in Lincoln experience difficulties in keeping up with their monthly energy bills and other expenses due to extremes in weather conditions and other extraordinary hardships; and

WHEREAS, in 2001 the Lincoln Electric System (LES) Administrative Board adopted LES Resolution 2001-25, establishing the LES Energy Assistance Program that involves the distribution of LES vouchers to a designated human services agency to distribute to clients that meet the agency's requirements for assistance in paying their electric bill at LES; and

WHEREAS, the program as been funded since its establishment at a level equivalent to five cents per LES customer per month; and

WHEREAS, the LES Administrative Board Marketing and Communications Committee met with staff to review the performance of the program; and

WHEREAS, the performance data indicates a continuing need for energy assistance; and

WHEREAS, the Marketing and Communications Committee recommends increasing the funding for the program due to the fact that LES has increased electric rates since the program was established and there is a continuing need for such payment assistance; and

WHEREAS, the Marketing and Communications Committee also recommends that the funding level be reviewed by both the Marketing and Communications Committee and the Budget and Rates Committee following the approval of any future adjustments in LES retail electric rates.

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves increasing the funding for the LES Energy Assistance Program from a level of five cents per LES customer per month to six cents per LES customer per month.

BE IT FURTHER RESOLVED that staff is authorized and directed to review the funding level for the program with the LES Marketing and Communications Committee and Budget and Rates Committee following the approval of any future adjustments in LES retail electric rates.

Chair

Adopted: Oct. 21, 2005

LES

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-13

WHEREAS, the Lincoln Electric System (LES) Administrative Board is charged with the responsibility for the control and management of the personnel, property, facilities, equipment, and finances of LES and annually approves the Budget to guide the financial and operational activities during the upcoming year; and

WHEREAS, the 2006 LES Budget in the amount of $279,310,600 was transmitted to the Budget and Rates Committee of the LES Administrative Board on September 26, 2005; and

WHEREAS, this Committee met and reviewed the Budget on October 4, 2005, and recommends it to the full Board for adoption; and

WHEREAS, LES has the obligation to make capital improvements necessary to maintain the electrical system in good working order and repair and expenditures for such purposes which are made from revenues may be reimbursed to the LES revenue or other funds from the issuance of the City's electric system revenue bonds; and

WHEREAS, obtaining right-of-way is an ongoing and necessary process for construction of transmission and distribution facilities that are identified in capital improvements budgets, the implementation of which on occasion requires the use of eminent domain requiring Lincoln City Council approval;

NOW, THEREFORE, BE IT RESOLVED, that pursuant to the recommendation of the Budget and Rates Committee, the LES Administrative Board hereby adopts the 2006 LES Budget in the amount of $279,310,600, and directs that it be properly transmitted to the Lincoln City Council for its full consideration and adoption; and

BE IT FURTHER RESOLVED, that to the extent capital improvements for transmission or distribution facilities of LES are made from LES revenues, it is intended that the amount of such expenditures, which is not reasonably expected to exceed $50,000,000, shall be reimbursable to the LES revenue and other funds through the issuance of future electric system revenue bonds, there being no funds of LES or the City reserved, allocated on a long-term basis or otherwise set aside (or reasonably expected to be reserved, allocated on a long-term basis or otherwise set aside) to provide permanent financing for the expenditures related to such expenditures, other than pursuant to the issuance of such electric system revenue bonds, this Resolution being determined to be consistent with the budgetary and financial circumstances of LES and the City as they exist or are reasonably

foreseeable on the date hereof the proper officers of LES shall keep and maintain records at least annually to determine the amount of such excess capital expenditures that may be reimbursed from electric system revenue bond proceeds; and

BE IT FURTHER RESOLVED, that the LES Administrative Board hereby requests that the City Council give LES ongoing eminent domain authority for those projects identified in the LES Budget.

Chair

Adopted: Oct. 21, 2005

LES

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-14

WHEREAS, it is the responsibility of the Lincoln Electric System (LES) Administrative Board to develop and recommend to the City Council of the City of Lincoln rate schedules and service regulations for electric service to ratepayers in the LES service area; and

WHEREAS, LES is experiencing extreme volatility in fuel prices for its generating units as well as volatility in the price of wholesale power purchases which tend to follow the price of natural gas; and

WHEREAS, this price volatility is difficult to forecast and is beyond the direct control of LES staff; and

WHEREAS, LES staff projects that this price volatility will continue into the future; and

WHEREAS, many electric utilities in Nebraska and throughout the nation have implemented a mechanism known as a Power Cost Adjustment (PCA) that allows the utility to adjust the amount charged for retail electric service in order to generate the revenue necessary to cover fluctuating changes in power costs and avoid setting new base rates during a time of record high power costs; and

WHEREAS, in 1980 the LES Administrative Board considered certain standards as required by the federal Public Utility Regulatory Policies Act (PURPA) of 1978, including PURPA Sections 113(b)(2) and 115(e) regarding automatic adjustment clauses; and

WHEREAS, following public hearings in 1980 on the PURPA standards, the LES Administrative Board adopted a modified standard to be utilized if LES were to implement an automatic adjustment clause such as a power cost adjustment which is incorporated herein by reference; and

WHEREAS, such standard was also approved by the Lincoln City Council pursuant to Resolution No. A-67105 on September 2, 1980, and approved by the Mayor on September 9, 1980; and

WHEREAS, the LES Budget and Rates Committee met with staff to review in detail the staff recommendation to implement a PCA, consistent with the standard approved by the LES Administrative Board and Lincoln City Council, with a targeted effective date of February 1, 2006; and

WHEREAS, the LES PCA would be determined based on the amount by which the production fuel costs and purchased power costs deviate from the LES Administrative Board's approved base costs, will be adjusted upwards and downwards commensurately with cost fluctuations, and would be capped; and

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves the staff recommendation to commence the process for development and approval of a Power Cost Adjustment with a targeted effective date of February 1, 2006, utilizing the ordinary process used by LES for securing adjustments to retail electric rates.

Chair

Adopted: Oct. 21, 2005

LES

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-19

WHEREAS, the growth in north Lincoln together with long established reliability and service standards require Lincoln Electric System (LES) to construct new 345,000 volt transmission facilities between existing transmission facilities at North 14th Street & McKelive Road and existing transmission facilities at North 120th Street & Amberly Road as part of the overall North Lincoln Transmission Line Project; and

WHEREAS, LES has studied and reviewed the possible transmission line route corridors using its transmission line routing corridor evaluation criteria; and

WHEREAS, LES staff has identified seven possible route corridors and exposed those route corridors to public scrutiny at an open house on August 25, 2005 to which 309 landowners located along these routes were invited; and

WHEREAS, in addition, LES conducted an additional open house on October 27, 2005, to receive public input; and

WHEREAS, in addition, LES staff has invited and encouraged further input and participation in meetings with interested citizens and other local, state, and federal agencies, collecting correspondence, making synopses of telephone and direct contacts, and incorporated this input into the route selection process; and

WHEREAS, LES staff has reviewed the comments and information received during the line routing and public open house process and has recognized the sensitive environmental nature of the saline wetlands areas in the routing study corridor near North 27th Street; and

WHEREAS, after reviewing all of the pertinent information including public input, and the feasibility of designing portions of the project to be double circuit, the Operations & Power Supply Committee of the LES Administrative Board did, on November 18, 2005, recommend to the full Board a single route corridor for the portion of the overall North Lincoln Transmission Line Project between North 84th Street & Bluff Road and North 120th Street & Amberly Road;

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board does hereby select and designate the route of the transmission line and all appurtenances thereto for the portion of the project between North 84th Street & Bluff Road and North 120th Street & Amberly Road, as follows:

Commencing at the existing substation located at approximately the intersection of 84th Street and Bluff Road, the route shall go south along 84th Street to the half section line between Bluff Road and McKelvie Road, then east along the half section line between Bluff Road and McKelvie Road to 120th Street, then south to the existing transmission facilities located at approximately the intersection of 120th Street and Amberly Road;

BE IT FURTHER RESOLVED, that in the process of implementing the selected routing, staff is authorized and directed to: (a) Interact with affected property owners and other appropriate governmental agencies to consider existing and future adjacent land uses, man-made and natural barriers, and other similar conditions potentially affecting the transmission line; (b) Adjust the exact routing of the line to optimize its location consistent with the National Electrical Safety Code, and the findings and conditions stated in this Resolution; and (c) Provide a summary of such adjustments to the Operations and Power Supply Committee.

Chair

Adopted: November 18, 2005

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2005-20

WHEREAS, it is the responsibility of the Lincoln Electric System (LES) Administrative Board to develop and recommend to the City Council of the City of Lincoln rate schedules and service regulations for electric service to ratepayers in the LES service area; and

WHEREAS, LES is experiencing extreme volatility in fuel prices for its generating units as well as volatility in the price of wholesale power purchases which tend to follow the price of natural gas; and

WHEREAS, this price volatility is both difficult to forecast and beyond the direct control of LES staff; and

WHEREAS, many electric utilities throughout the nation have implemented a mechanism known as a Power Cost Adjustment (PCA) that allows the utility to adjust the amount charged for retail electric service in order to generate the amount of revenue necessary to cover fluctuating changes in power costs; and

WHEREAS, in 1980 the LES Administrative Board considered certain standards as required by the federal Public Utility Regulatory Policies Act of 1978 (PURPA), including PURPA Sections 113(b)(2) and 115(e) regarding automatic adjustment clauses; and

WHEREAS, following public hearings on the PURPA standards in 1980, the LES Administrative Board adopted a standard to be utilized if LES were to implement an automatic adjustment clause such as a PCA which is incorporated herein by reference; and

WHEREAS, such standard was also approved by the Lincoln City Council pursuant to Resolution No. A-67105 on September 2, 1980, and approved by the Mayor on September 9, 1980; and

WHEREAS, the LES Budget and Rates Committee met with staff to review in detail the recommendation to implement a PCA, consistent with the standard adopted by the LES Administrative Board and Lincoln City Council, with a targeted effective date of February 1, 2006; and

WHEREAS, the LES PCA would be determined based on the amount by which the production fuel costs and purchased power costs deviate from the LES Administrative Board's 2006 budget approved base costs, and would be adjusted upwards and downwards commensurately with cost fluctuations, as they are incurred; and

WHEREAS, a public hearing on the PCA was held on Thursday, December 1, 2005, for the purpose of receiving public input from customers, following notice given to all customers through a billing insert in customer billing statements; and

WHEREAS, the LES Administrative Board directed the Budget and Rates Committee to give further consideration to the public input received at the hearing; and

WHEREAS, the Budget and Rates Committee met to consider the public input and possible alternatives to the PCA proposal; and

WHEREAS, upon consideration of the public input, the Budget and Rates Committee advanced a modified recommendation that, among other things, implements a base rate increase, implements a PCA, and increases utilization of the LES Rate Stabilization Fund in 2006 as may be necessary from time to time to cover increased power costs and to meet LES' obligations to its bond holders and to maintain LES' financial integrity.

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves the full recommendation of the Budget and Rates Committee that includes the following components to generate the revenue necessary to cover the projected increases in future power costs:

1) Implementation of a nominal 4.5 percent rate increase applied equally across all customer rate classes to become effective with bills rendered on and after February 1, 2006, that will generate revenue sufficient to cover approximately half of the projected increase in power costs;

2) Implementation of a power cost adjustment (PCA) to become effective with bills rendered on and after February 1, 2006, to generate revenue to cover fluctuating power costs on a monthly basis that exceed the amount generated from base rates; and

3) Utilization during fiscal year 2006 of up to $8 million from the LES Rate Stabilization Fund as may be needed from time to time meet LES' obligations to its bond holders and to maintain LES' financial integrity.

BE IT FURTHER RESOLVED, that the LES Administrative Board authorizes staff to advance the base rate increase and PCA to the Lincoln City Council for consideration and recommends approval of the rate increase and PCA by the Lincoln City Council.

Chair

Adopted: December 16, 2005

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2006-1

WHEREAS, the growth in north Lincoln, together with long established reliability and service standards require Lincoln Electric System (LES) to construct new 345,000 volt transmission facilities between existing transmission facilities at North 14th Street & McKelvie Road and existing transmission facilities at North 120th Street & Amberly Road as part of the overall North Lincoln Transmission Line Project; and

WHEREAS, LES has studied and reviewed the possible transmission line route corridors using its transmission line routing corridor evaluation criteria; and

WHEREAS, LES staff has identified seven possible route corridors and exposed those route corridors to public scrutiny at an open house on August 25, 2005 to which 309 landowners located along these routes were invited; and

WHEREAS, in addition, LES conducted an additional open house on October 27, 2005, to receive public input; and

WHEREAS, in addition, LES staff has invited and encouraged further input and participation in meetings with interested citizens and other local, state, and federal agencies, collecting correspondence, making synopses of telephone and direct contacts, and incorporated this input into the route selection process; and

WHEREAS, LES staff has reviewed the comments and information received during the line routing and public open house process and has recognized the sensitive environmental nature of the saline wetlands areas in the routing study corridor near North 27th Street; and

WHEREAS, the LES Board has previously approved the route segment from North 120th Street & Amberly Road to North 84th Street & Bluff Road, and

WHEREAS, after reviewing all of the pertinent information including public input, and the feasibility of designing portions of the project to be double circuit, the Operations & Power Supply Committee of the LES Administrative Board did, on January 20, 2006, recommend to the full Board a single route corridor for the portion of the overall North Lincoln Transmission Line Project between North 84th Street & Bluff Road and North 14th Street & McKelvie Road;

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board does hereby select and designate the route of the transmission line and all appurtenances thereto for the portion of the project between North 84th Street & Bluff Road and North 14th Street & McKelive Road, as follows:

> Commencing at the existing substation located at approximately the intersection of North 84th Street and Bluff Road, the route shall go north along 84th Street to Bluff Road, then west along Bluff Road to 56th Street, then south along 56th Street to the half section line between Bluff Road and McKelvie Road, then west along the half section line between Bluff Road and McKelvie Road to approximately the first quarter section line to the east of 27th Street, then generally south and west along a route identified by property currently owned by the City of Lincoln to Arbor Road, then west along Arbor Road to the half section line between 14th Street and 27th Street, then north along the half section between 14th Street and 27th Street to the section line that would be McKelvie Road, then west along the section line that would be McKelvie Road to the existing transmission facilities located at North 14th Street & McKelvie Road;

BE IT FURTHER RESOLVED, that in the process of implementing the selected routing, staff is authorized and directed to: (a) Interact with affected property owners and other appropriate governmental agencies to consider existing and future adjacent land uses, man-made and natural barriers, and other similar conditions potentially affecting the transmission line; (b) Adjust the exact routing of the line to optimize its location consistent with the National Electrical Safety Code, and the findings and conditions stated in this Resolution; and (c) Provide a summary of such adjustments to the Operations & Power Supply Committee.

Chair

Adopted: January 20, 2006

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2006-5

WHEREAS, the Lincoln Electric System (LES) Administrative Board is charged with the responsibility for the control and management of the personnel, property, facilities, equipment, and finances of LES and annually approves the Budget Authorization to guide the financial and operational activities during the upcoming year; and

WHEREAS, the 2007 LES Operating Authorization in the amount of $199,337,000 and 2007 LES Capital Authorization in the amount of $113,925,200 was transmitted to the Budget and Rates Committee of the LES Administrative Board on September 26, 2006; and

WHEREAS, this Committee met and reviewed the Budget Authorization on October 4, 2006, and recommends it to the full Board for adoption; and

WHEREAS, LES has the obligation to make capital improvements necessary to maintain the electrical system in good working order and repair and expenditures for such purposes which are made from revenues may be reimbursed to the LES revenue or other funds from the issuance of the City's electric system revenue bonds; and

WHEREAS, obtaining right-of-way is an ongoing and necessary process for construction of transmission and distribution facilities that are identified in capital improvements budgets, the implementation of which on occasion requires the use of eminent domain requiring Lincoln City Council approval;

NOW, THEREFORE, BE IT RESOLVED, that pursuant to the recommendation of the Budget and Rates Committee, the LES Administrative Board hereby adopts the 2007 LES Operating and Capital Authorization in the total amount of $313,202,200, and directs that it be properly transmitted to the Lincoln City Council for its full consideration and adoption; and

BE IT FURTHER RESOLVED, that to the extent capital improvements for transmission or distribution facilities of LES are made from LES revenues, it is intended that the amount of such expenditures, which is not reasonably expected to exceed $50,000,000, shall be reimbursable to the LES revenue and other funds through the issuance of future electric system revenue bonds, there being no funds of LES or the City reserved, allocated on a long-term basis or otherwise set aside (or reasonably expected to be reserved, allocated on a long-term basis or otherwise set aside) to provide permanent financing for the expenditures related to such expenditures, other than pursuant to the issuance of such electric system revenue bonds, this Resolution being determined to be consistent

with the budgetary and financial circumstances of LES and the City as they exist or are reasonably foreseeable on the date hereof the proper officers of LES shall keep and maintain records at least annually to determine the amount of such excess capital expenditures that may be reimbursed from electric system revenue bond proceeds; and

BE IT FURTHER RESOLVED, that the LES Administrative Board hereby requests that the City Council give LES ongoing eminent domain authority for those projects identified in the LES Authorization.

Acting Chair

Adopted: October 20, 2006

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-4

WHEREAS, a severe ice storm in Central Nebraska over the period of December 29 - 31, 2006, caused substantial damage to Nebraska's high voltage transmission system resulting in 37 transmission lines out of service, essentially splitting the State's electrical system in half; and

WHEREAS, Nebraska Public Power District (NPPD) is taking all actions necessary to expedite the repair and reconstruction of the damaged transmission lines in order to return them to service as soon as possible; and

WHEREAS, NPPD is projecting that all the transmission lines will be repaired by June 1, 2007, assuming normal weather and timely materials delivery, and operations; and

WHEREAS, the transmission outages have impacted Lincoln Electric System's (LES) ability to receive its full allocation of power from the Laramie River Station (LRS) near Wheatland, Wyoming, and the Gerald Gentleman Station (GGS) near Sutherland, Nebraska, LES' two least cost resources; and

WHEREAS, LES is incurring significantly higher power costs because it must buy higher priced wholesale power or generate using its own higher cost generating units to replace the amount of power normally supplied by LRS and GGS; and

WHEREAS, LES incurred more than $3 million in storm related replacement power costs in January 2007 alone; and

WHEREAS, such increased costs are currently averaging $80,000 to $100,000 or more per day and are expected to total $9.4 million before the transmission system is fully repaired which is currently estimated at June 1, 2007; and

WHEREAS, the Budget and Rates Committee has reviewed LES' financial condition and has determined that an emergency exists because LES' current rates and reserve levels are insufficient to cover the increased power costs resulting from the ice storm damage to the high voltage transmission system; and

WHEREAS, the Budget and Rates Committee and staff has identified a temporary 5.5% surcharge as the most effective way to cover the storm-related costs without having to add the costs to the ongoing rate base; and

WHEREAS, the Budget and Rates Committee recommends that the LES Administrative Board request the Lincoln City Council to declare an emergency and approve the temporary surcharge.

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board finds that an emergency exists and approves a 5.5 percent surcharge on LES electric rates solely for the purpose of paying increased power costs stemming from the December 29 - 31, 2006 ice storm damage to the Nebraska transmission system and LES' inability to receive its full allocation of power from LRS and GGS. Details of the surcharge are provided in Attachment I to this resolution which is hereto fully incorporated by reference.

BE IT FURTHER RESOLVED, that the LES Administrative Board recommends that the surcharge on electric rates expire on December 31, 2007, or at the end of the billing cycle in the month when the surcharge has generated revenues sufficient to cover the storm-related power costs, whichever occurs first.

BE IT FURTHER RESOLVED, that the LES Administrative Board requests the Lincoln City Council to declare an emergency and approve the temporary surcharge so that it can be effective on electric bills rendered on and after March 1, 2007.

BE IT FURTHER RESOLVED, by the LES Administrative Board that if the surcharge is approved by the Lincoln City Council, while it is in effect LES will include in its monthly reporting to the LES Administrative Board a specific report that monitors the ice storm related power costs and the accumulated surcharge revenue.

S/Kathy Campbell
Vice Chair

Adopted: February 16, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-6

WHEREAS, the LES Administrative Board (the **"Board"**) has developed and adopted the Lincoln Electric System Financial Plan dated February 18, 2000 (as amended and supplemented from time to time, the **"Plan"**) to enable Lincoln Electric System (**"LES"**) to maintain a high level of financial integrity and to provide capital for projects using the most economical mix of financing instruments within federal, state and local laws and regulations; and

WHEREAS, at the request of the Board, to implement the Plan, Ordinance No. 17879 (**"General Ordinance"**) was adopted on July 23, 2001 by the City Council and approved by the Mayor on July 26, 2001, authorizing and providing for the issuance of all of the revenue bonds to be issued for and on behalf of LES after the adoption and approval of the General Ordinance; and

WHEREAS, it is necessary, desirable, advisable and in the best interest of the Board, LES and its customers that certain additions, extensions, improvements and betterments (collectively, the **"2007 Project"**) be made to the properties comprising Lincoln Electric System, including, without limitation, electric generation and transmission facilities; and

WHEREAS, the City has heretofore issued (a) $45,560,000 aggregate principal amount of its Electric System Revenue Bonds 1998 Series A, of which $31,075,000 aggregate principal amount are outstanding and unpaid, (the **"1998 Bonds"**) and (b) $141,150,000 aggregate principal amount of its Electric System Revenue Bonds, Series 2001, of which $140,150,000 aggregate principal amount are outstanding and unpaid, (the **"2001 Bonds"**) for the purpose of paying the costs of certain improvements to the Electric System; and

WHEREAS, since the date of issuance of the 1998 Bonds and the 2001 Bonds, interest rates have declined so that a significant overall savings in debt service to the City and LES may be achieved by refunding the 1998 Bonds and all or part of the 2001 Bonds; and

WHEREAS, it is necessary, desirable, advisable and in the best interest of the Board and the City to issue revenue bonds under the General Ordinance to provide funds (1) to pay the costs of the 2007 Project and (2) for the payment and redemption of the 1998 Bonds and all or part of the 2001 Bonds, (collectively, the "Refunded Bonds") in an amount not to exceed $300,000,000; and

WHEREAS, there has been presented to this Board an ordinance constituting the Fifth Series Ordinance adopted under the General Ordinance (the **"Fifth Series Ordinance"**) authorizing

the issuance of Lincoln Electric System Revenue and Refunding Bonds, Series 2007 (the **"2007 Bonds"**) of the City of such purposes; and

WHEREAS it is necessary, desirable and advisable that LES staff, Public Financial Management, LES legal counsel and bond counsel, and all other officers, employees and agents of LES proceed as expeditiously as possible with the issuance of the 2007 Bonds of the City for the purpose of paying the costs of the 2007 Project and refunding the Refunded Bonds;

NOW, THEREFORE, BE IT RESOLVED, that the Board recommends passage and adoption of the Fifth Series Ordinance by the City Council; and

BE IT FURTHER RESOLVED, that the LES Administrator and CEO and LES Staff are hereby authorized and directed to proceed with the preparation of all necessary documentation necessary to issue the 2007 Bonds for the purposes stated above; and

BE IT FURTHER RESOLVED, that the LES Administrator and CEO and LES Staff are hereby authorized and directed to take any and all action, including, but not limited to, the execution of all papers, certificates, receipts and documents as they, or any of them may deem necessary or desirable provide for the issuance, sale and delivery of the 2007 Bonds in accordance with the terms and conditions of this Resolution.

S/Kathy Campbell
Vice Chair

Adopted: March 16, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-7

WHEREAS, Lincoln Electric System (LES) and the Norris Public Power District (Norris) executed the "Norris Public Power District and Lincoln Electric System Joint Planning and Service Area Adjustment Agreement" (Agreement) in October 2000; and

WHEREAS, such Agreement provides LES with a buffer between the Lincoln city limits and the LES service area boundary to allow for orderly planning and development of electrical infrastructure; and

WHEREAS, such Agreement also requires LES and Norris to jointly plan and coordinate installation of future facilities and future service area adjustments as Lincoln grows; and

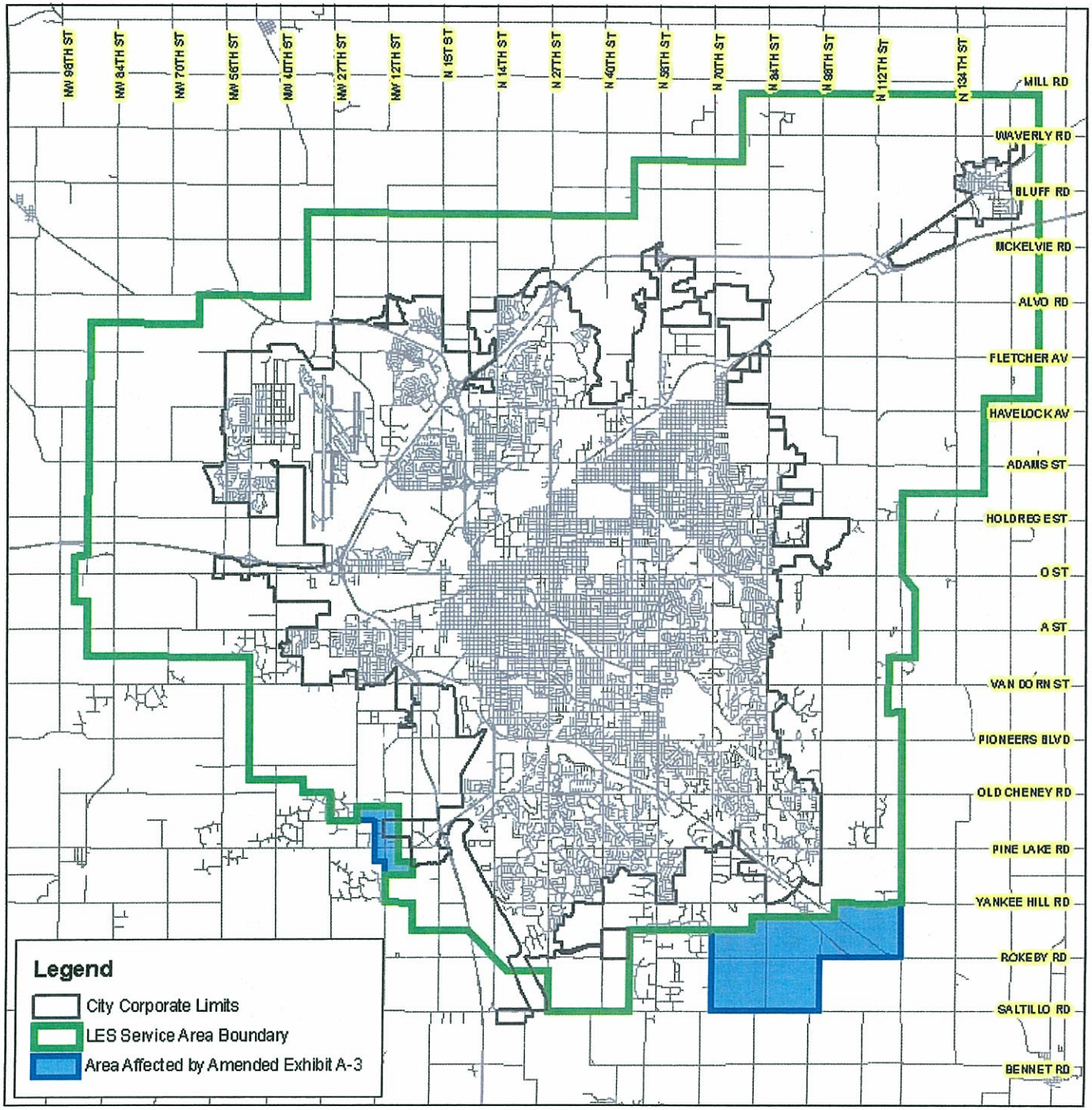
WHEREAS, such joint planning efforts between LES and Norris indicate the need for an adjustment to the LES service area boundary; and

WHEREAS, such service area adjustment in the areas located near 98th and Rokeby Road, Lincoln, and SW 12th and Denton Road, Lincoln includes approximately 5.5 square miles and would necessitate the transfer of 82 customers and associated distribution facilities from Norris to LES at a cost of approximately $515,000.

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board approves the service area adjustment in the areas located near 98th and Rokeby Road, Lincoln, and SW 12th and Denton Road, Lincoln as identified in Attachment A and authorizes the LES Administrator and CEO and LES staff to take all actions necessary to effectuate such service area adjustment with the Nebraska Power Review Board.

S/Ron Melbye
Chair

Adopted: April 20, 2007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MILL RD
WAVERLY RD
BLUFF RD
MCKELVIE RD
ALVO RD
FLETCHER AV
HAVELOCK AV
ADAMS ST
HOLDREGE ST
O ST
A ST
VAN DORN ST
PIONEERS BLVD
OLD CHENEY RD
PINE LAKE RD
YANKEE HILL RD
ROKEBY RD
SALTILLO RD
BENNET RD
Legend
City Corporate Limits
LES Service Area Boundary
Area Affected by Amended Exhibit A-3

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-8

WHEREAS, the Public Utility Regulatory Policies Act (PURPA) of 1978 required Lincoln Electric System (LES) to consider and determine the appropriateness of certain Standards set forth in PURPA as applied to certain LES operations; and

WHEREAS, the primary goal of PURPA is to encourage conservation of energy, equitable rates for electric consumers, and the efficient use of generation facilities and resources by electric utilities; and

WHEREAS, the Energy Policy Act (EPAct) of 2005 amended PURPA to provide for additional standards to be considered by certain utilities, including LES; and

WHEREAS, staff conducted an analysis of existing PURPA standards and new standards contained in EPAct 2005; and

WHEREAS, PURPA requires that one or more public hearings be held to receive input from ratepayers regarding the utility's consideration of the PURPA standards; and

WHEREAS, LES held a public hearing on February 20, 2007, at the Walter A. Canney Service Center, for the purpose of receiving public input on the following PURPA standards:

- Time-Based Metering and Communications, §111(d)(14);
- Interconnection, §111(d)(15);
- Net Metering, §111(d)(11);
- Fossil Fuel Generation Efficiency, §111(d)(13);
- Fuel Source Reliance, §111(d)(12); and
- Information to Customers, §113(b)(3) and 115(f); and

WHEREAS, the Budget & Rates Committee reviewed the staff recommendation and public input regarding the standard for Time-Based Metering and Communications and recommends that the standard not be adopted because it would result in greater costs for most electric consumers, as outlined in the attachment hereto; and

WHEREAS, the Budget & Rates Committee also reviewed the staff recommendation for a modified Interconnection standard and public input regarding such standard and recommends that a modified version of the federal standard be adopted as outlined in the attachment hereto.

NOW, THEREFORE, BE IT RESOLVED, that based on the information provided by staff and the public input obtained at the public hearing, the LES Administrative Board declines to adopt the PURPA standard on Time-Based Metering and Communications and adopts a modified version of the federal PURPA standard on Interconnection.

BE IT FURTHER RESOLVED that the LES Administrative Board recommends that the Lincoln City Council take similar action on these two PURPA standards.

S/Ron D. Melbye
Chair

Adopted: May 18, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-9

WHEREAS, the Public Utility Regulatory Policies Act (PURPA) of 1978 required Lincoln Electric System (LES) to consider and determine the appropriateness of certain Standards set forth in PURPA as applied to certain LES operations; and

WHEREAS, the primary goal of PURPA is to encourage conservation of energy, equitable rates for electric consumers, and the efficient use of generation facilities and resources by electric utilities; and

WHEREAS, the Energy Policy Act (EPAct) of 2005 amended PURPA to provide for additional standards to be considered by certain utilities, including LES; and

WHEREAS, staff conducted an analysis of existing PURPA standards and new standards contained in EPAct 2005; and

WHEREAS, PURPA requires a public hearing to be held to receive input from ratepayers regarding the utility's consideration of the PURPA standards; and

WHEREAS, LES held a public hearing on February 20, 2007, at the Walter A. Canney Service Center, for the purpose of receiving public input on the following PURPA standards:

- Time-Based Metering and Communications, §111(d)(14);
- Interconnection, §111(d)(15);
- Net Metering, §111(d)(11);
- Fossil Fuel Generation Efficiency, §111(d)(13);
- Fuel Source Reliance, §111(d)(12); and
- Information to Customers, §113(b)(3) and 115(f); and

WHEREAS, the Legislation & Governmental Affairs Committee reviewed the staff recommendation for a modified Net Metering standard and the public input regarding such standard and recommends that a modified version of the federal standard be adopted as outlined in the attachment hereto.

NOW, THEREFORE, BE IT RESOLVED, that based on the information provided by staff and the public input obtained at the public hearing, the LES Administrative Board approves a modified version of the federal PURPA standard on Net Metering and recommends that the Lincoln City Council also adopt the modified Net Metering standard.

S/Ron D. Melbye
Chair

Adopted: May 18, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-10

WHEREAS, the Public Utility Regulatory Policies Act (PURPA) of 1978 required Lincoln Electric System (LES) to consider and determine the appropriateness of certain Standards set forth in PURPA as applied to certain LES operations; and

WHEREAS, the primary goal of PURPA is to encourage conservation of energy, equitable rates for electric consumers, and the efficient use of generation facilities and resources by electric utilities; and

WHEREAS, the Energy Policy Act (EPAct) of 2005 amended PURPA to provide for additional standards to be considered by certain utilities, including LES; and

WHEREAS, staff conducted an analysis of existing PURPA standards and new standards contained in EPAct 2005; and

WHEREAS, PURPA requires a public hearing to be held to receive input from ratepayers regarding the utility's consideration of the PURPA standards; and

WHEREAS, LES held a public hearing on February 20, 2007, at the Walter A. Canney Service Center, for the purpose of receiving public input on the following PURPA standards:

- Time-Based Metering and Communications, §111(d)(14);
- Interconnection, §111(d)(15);
- Net Metering, §111(d)(11);
- Fossil Fuel Generation Efficiency, §111(d)(13);
- Fuel Source Reliance, §111(d)(12); and
- Information to Customers, §113(b)(3) and 115(f); and

WHEREAS, the Operations & Power Supply Committee reviewed the staff recommendation for a modified Fossil Fuel Generation Efficiency standard and the public input regarding such standard and recommends that a modified version of the federal standard be adopted as outlined in the attachment hereto.

WHEREAS, the Operations & Power Supply Committee also reviewed the staff recommendation for a modified Fuel Source Reliance standard and public input regarding such standard and recommends that the federal standard be adopted as reflected in the attachment hereto.

NOW, THEREFORE, BE IT RESOLVED, that based on the information provided by staff and the public input obtained at the public hearing, the LES Administrative Board approves a modified version of the federal PURPA standard on Fossil Fuel Generation and Efficiency and adopts the federal PURPA standard on Fuel Source Reliance.

BE IT FURTHER RESOLVED that the LES Administrative Board recommends that the Lincoln City Council take similar action on these two PURPA standards.

S/Ron D. Melbye
Chair

Adopted: May 18, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-11

WHEREAS, the Public Utility Regulatory Policies Act (PURPA) of 1978 required Lincoln Electric System (LES) to consider and determine the appropriateness of certain Standards set forth in PURPA as applied to certain LES operations; and

WHEREAS, the primary goal of PURPA is to encourage conservation of energy, equitable rates for electric consumers, and the efficient use of generation facilities and resources by electric utilities; and

WHEREAS, the Energy Policy Act (EPAct) of 2005 amended PURPA to provide for additional standards to be considered by certain utilities, including LES; and

WHEREAS, staff conducted an analysis of existing PURPA standards and new standards contained in EPAct 2005; and

WHEREAS, PURPA requires a public hearing to be held to receive input from ratepayers regarding the utility's consideration of the PURPA standards; and

WHEREAS, LES held a public hearing on February 20, 2007, at the Walter A. Canney Service Center, for the purpose of receiving public input on the following PURPA standards:

- Time-Based Metering and Communications, §111(d)(14);
- Interconnection, §111(d)(15);
- Net Metering, §111(d)(11);
- Fossil Fuel Generation Efficiency, §111(d)(13);
- Fuel Source Reliance, §111(d)(12); and
- Information to Customers, §113(b)(3) and 115(f); and

WHEREAS, the Communications & Marketing Committee reviewed the staff recommendation for modifying the existing PURPA standard on Information to Customers, as well as the public input regarding such standard, and recommends modifications to the existing standard be adopted as outlined in the attachment hereto.

NOW, THEREFORE, BE IT RESOLVED, that based on the information provided by staff and the public input obtained at the public hearing, the LES Administrative Board approves modifications to its existing PURPA standard on Information to Customers and recommends that the Lincoln City Council also adopt these modifications.

S/Ron D. Melbye
Chair

Adopted: May 18, 2007

LINCOLN ELECTRIC SYSTEM

***LES RESOLUTION* 2007-13**

WHEREAS, it is the intent of the Lincoln Electric System (LES) Administrative Board to encourage cost-effective cogeneration and small power production of electricity by customer-owned generation facilities; and

WHEREAS, this intent is in accordance with the goals set forth in the National Energy Act, which are the conservation of energy, the efficient use of resources and equitable rates; and

WHEREAS, the "2007 Policy and Guidelines for Customer-Owned Generation" remain in compliance with the requirements of the Public Utility Regulatory Policies Act and Federal Energy Regulatory Commission's regulations;

NOW, THEREFORE, BE IT RESOLVED that in recognition of the above statements, the LES Administrative Board hereby adopts the "2007 Policy and Guidelines for Customer-Owned Generation" fully incorporated herein by reference.

S/Ron D. Melbye
Chair

Adopted: July 20, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-14

WHEREAS, a severe ice storm in Central Nebraska over the period of December 29 - 31, 2006, caused substantial damage to Nebraska's high voltage transmission system resulting in 37 transmission lines out of service, essentially splitting the State's electrical system in half; and

WHEREAS, Nebraska Public Power District (NPPD) took immediate action to expedite the repair and reconstruction of the damaged transmission lines in order to return them to service by June 1, 2007; and

WHEREAS, the transmission outages impacted Lincoln Electric System's (LES) ability to receive its full allocation of power from the Laramie River Station (LRS) near Wheatland, Wyoming, and the Gerald Gentleman Station (GGS) near Sutherland, Nebraska, LES' two least cost resources; and

WHEREAS, LES incurred significantly higher power costs because it was required to buy higher priced wholesale power or generate using its own higher cost generating units to replace the amount of power normally supplied by LRS and GGS; and

WHEREAS, LES incurred approximately $9.8 million in storm related replacement power costs; and

WHEREAS, the LES Administrative Board recommended and the Lincoln City Council declared an emergency and approved a temporary 5.5% surcharge on electric bills to cover these storm-related costs and to expire on December 31, 2007, or at the end of the billing cycle in the month when the surcharge has generated revenues sufficient to cover the storm-related power costs, whichever occurs first; and

WHEREAS, the surcharge through September 2007 has generated $6.9 million in revenues; and

WHEREAS, the surcharge revenue has not yet covered all of the storm-related power costs, but LES has experienced other favorable factors, such as excellent operations at LES resources, on time completion of the Walter Scott, Jr. Energy Center Unit 4 in Council Bluffs, and reasonably priced wholesale power markets; and

WHEREAS, LES currently expects to end 2007 in a sound financial condition without the continuation of the temporary surcharge; and

WHEREAS, the LES Administrative Board Budget and Rates Committee has reviewed staff assessments of the surcharge and forecasts for the remainder of the year and recommends terminating the temporary surcharge at the end of the October 2007 billing cycle;

NOW, THEREFORE, BE IT RESOLVED, that the LES Administrative Board finds that the revenue collected from the temporary surcharge combined with LES' current financial position and projections for the remainder of 2007 are sufficient to cover the storm-related power costs and declares that the temporary 5.5% surcharge should terminate at the end of the October 2007 billing cycle; and

BE IT FURTHER RESOLVED, that a copy of this resolution be provided to the Lincoln City Council as notification of the termination of the temporary surcharge.

S/Ron D. Melbye
Chair

Adopted: October 19, 2007

LINCOLN ELECTRIC SYSTEM

LES RESOLUTION 2007-15

WHEREAS, the Lincoln Electric System (LES) Administrative Board is charged with the responsibility for the control and management of the personnel, property, facilities, equipment, and finances of LES and annually approves the Budget Authorization to guide the financial and operational activities during the upcoming year; and

WHEREAS, the 2008 LES Operating Authorization in the amount of $217,962,000 and 2008 LES Capital Authorization in the amount of $67,750,000 was transmitted to the Budget and Rates Committee of the LES Administrative Board for review; and

WHEREAS, this Committee met and reviewed the Budget Authorization on October 4, 2007, and recommends it to the full Board for adoption; and

WHEREAS, LES has the obligation to make capital improvements necessary to maintain the electrical system in good working order and repair and expenditures for such purposes which are made from revenues may be reimbursed to the LES revenue or other funds from the issuance of the City's electric system revenue bonds; and

WHEREAS, obtaining right-of-way is an ongoing and necessary process for construction of transmission and distribution facilities that are identified in capital improvements budgets, the implementation of which on occasion requires the use of eminent domain requiring Lincoln City Council approval;

NOW, THEREFORE, BE IT RESOLVED, that pursuant to the recommendation of the Budget and Rates Committee, the LES Administrative Board hereby adopts the 2008 LES Operating and Capital Authorization in the total amount of $285,712,000, and directs that it be properly transmitted to the Lincoln City Council for its full consideration and adoption; and

BE IT FURTHER RESOLVED, that to the extent capital improvements for transmission or distribution facilities of LES are made from LES revenues, it is intended that the amount of such expenditures, which is not reasonably expected to exceed $50,000,000, shall be reimbursable to the LES revenue and other funds through the issuance of future electric system revenue bonds, there being no funds of LES or the City reserved, allocated on a long-term basis or otherwise set aside (or reasonably expected to be reserved, allocated on a long-term basis or otherwise set aside) to provide permanent financing for the expenditures related to such expenditures, other than pursuant to the issuance of such electric system revenue bonds, this Resolution being determined to be consistent with the budgetary and financial circumstances of LES and the City as they exist or are reasonably

foreseeable on the date hereof the proper officers of LES shall keep and maintain records at least annually to determine the amount of such excess capital expenditures that may be reimbursed from electric system revenue bond proceeds; and

BE IT FURTHER RESOLVED, that the LES Administrative Board hereby requests that the City Council give LES ongoing eminent domain authority for those projects identified in the LES Authorization.

S/Ron D. Melbye
Chair

Adopted: October 19, 2007

Summary of 12/13/07
Public Meeting on LES' IRP and Sustainable Energy Program:

There were 6 members of the public in attendance and about a dozen or so LES staff. All 6 individuals provided comments.

A) Comments on the Integrated Resource Plan (IRP) Options:

1. Most commented that the list of options under review is pretty thorough.
2. One individual suggested that we distinguish between existing buildings and new construction and that we give extra credit for buildings that use LEED standards.
3. One suggestion to add micro wind unit to the list of options on the residential side.
4. Suggestions that inverted rates be looked at.
5. Incentives are important to get people to change practices.
6. Look at low-interest or zero-interest loans, maybe through Nebraska Energy Office or in partnership with a bank.
7. Suggestion to track emissions through IRP in addition to cost.
8. Fairly unanimous among those attending that efficiency is the most important consideration.

B) Comments on the Sustainable Energy Program:

1. Most attending indicated that carbon footprint reduction programs should have the highest priority and that efficiency is the key.
2. Financial incentives should be based on energy produced. Therefore, if equipment is not producing, the incentive/rebate is not paid.
3. Energy audits is a good idea, but there should be a follow up with the customer to see if any recommendations were implemented.
4. New construction using LEED standards is great, but the focus needs to be on changing the existing building base, not just the growth.
5. Focus on programs with the most rapid payback.
6. Support for our existing media messages---need to do more of it. Need to get community-wide involvement.
7. Commended LES for leadership on getting ground coupled heat pumps in all new schools.
8. Efficiency programs are good, but need to have a parallel focus on impact on low-income residents.
9. Several expressed interest in a Children's Museum exhibit. Cecil indicated this is consistent with the original plans for the building. There was a suggestion that an exhibit should somehow incorporate renewable energy in addition to energy conservation and efficiency.
10. One suggestion to use $250,000 of the funds for a residential subdivision pilot program to install a geothermal system at the low-income housing project proposed at 10th & Military.
11. Encourage customers to submit ideas and provide rewards for the best ideas offered.
12. Encourage us to find a way to incent landlords to make efficiency upgrades in their properties. High number of renters in Lincoln who can't control many of the energy efficiency decisions.
13. Reiterated need for a rate structure that rewards efficiency.
14. Programs developed under this program need to offer a good bang for the buck. Distribution of CFLs and efficiency kits sounds good, but there's no way to know if they lead to action. Programs need to have measurable results.
15. Avoid experimental ideas/technologies and focus on increasing implementation of things that have been proven.
16. Hybrid vehicles--LES doesn't need to demo them, but maybe LES could use this program in a couple of years to put in charging stations for plug-in electric hybrid vehicles.

APPENDIX B

Option Description

Residential Customer Demand Side Management (DSM) programs

1. Energy Star Homes - This option analyzes the benefit/cost of new homes that meet the 'Energy Star' criteria vs. the 'Standard' or 'typical' new home construction details. These homes are at least 15% more energy efficient than homes built to the 2004 International Residential Code (IRC), and include additional energy-saving features that typically make them 20–30% more efficient than standard homes.

2. Energy Star Appliances - This option considers the benefit/cost of replacing 3 major appliances, (refrigerator, clothes washer, & dish washer), with higher efficiency, 'Energy Star' rated appliances. This analysis assumes an energy star penetration of 20% of the annual replacements and new appliance purchases in the LES service area.

3. Zero Energy Home - The benefit/cost of building a 'zero energy' home vs. the typical new home being built in Lincoln. A Zero Energy Home (ZEH) combines state-of-the-art, energy-efficient construction and appliances with commercially available renewable energy systems such as solar water heating and solar electricity. This combination can result in very little energy consumption from the utility provider. Zero Energy Homes are connected to the utility grid but can be designed and constructed to produce nearly as much energy as they consume annually

4. Prepayment Meters - These provide pay-as-you-go metering that allows the customer to see how much energy they are using in kilowatt-hours and in dollars. An average customer on this rate would reduce their usage by conserving, but since the program would require more expensive equipment to meter and maintain the time-of-use feedback to the customer, this was not studied further

5. Compact Fluorescent Lights (CFL) - CFL bulbs are a very popular and an effective energy conservation device. A 20 W bulb produces the same light output (1200 lumens) as a 75 W incandescent bulb. They generally have a longer life (8000 hrs vs. 750 hrs) but they do cost 2 to 3 times the incandescent bulbs.

6. Ground Source Heat Pump - A ground coupled system consists of a geo-thermal well field acting as the thermal source/sink for water source heat pumps. Ground coupled heat pump systems utilize the earth's stable 50-55°F temperature for their high energy-efficiency.

7. Refrigerator/Freezer-Trade In - reduces the number of customers using an older, less efficient refrigerator as a second refrigerator. Some programs offer an incentive or a free pick up & disposal of these older units to reduce the number that remain in use. A previous volunteer program has been discontinued because of the logistics of the manual labor involved, the environmental issue of reclaiming the refrigerant by a licensed contractor, the landfill space, etc. This was not studied as it was viewed as not practical to implement because of recycling issues.

8. Refrigerator/Freezer Efficient - replace old refrigerators with newer, more efficient models that use less energy. The annual energy consumption for a new energy star refrigerator was compared to a new conventional model which uses 15 percent more energy. The energy star model was also compared to a conventional model sold in 2001 which uses 25 percent more energy.

9. Heat Pump Water Heater Systems - The benefit/cost of domestic water heaters that use electric heat pump technology to heat the water. Heat Pump Water Heaters use the refrigeration cycle of a heat pump to transfer heat from the surrounding air to domestic water, usually stored in a traditional tank. These systems are more efficient than traditional water heaters because they 'transfer' heat rather than 'generating' heat through a fossil fueled burner or an electric element. The incremental cost above other water heating systems however, at the present time, leads to a long payback calculated on LES rates. There is also concern among some consumers about the cooling of the surrounding air, which may be in a 'conditioned' space. For these reasons, the Energy Services staff believes the potential for significant sales of these units without a large 'buy down' investment from LES is unlikely at the present time.

10. Solar Water Heaters - Replace an existing water heating system with one that preheats the water with a solar heat collection system and then adds any additional heat required to get the hot water temperature required. Simple payback for a new solar water heater installation exceeds 20 years with existing electric rates. This option was evaluated in detail based on public input and the public meeting in December.

11. Tankless Water Heaters - Replace an existing water heater that stores hot water with one that heats the water as it is needed (on Demand). This saves on energy losses that occur from heating water and then storing it until needed. This can save about 30% on energy

consumption to heat and store water in the conventional system. The units do cost about 2.5 times the conventional system. This Option was added after the public meeting in December.

12. Time of Use Rates - Time-of-use (TOU) rates encourage customers to reduce load during peak periods and even move load to lower cost off-peak periods due to different pricing periods. This option was considered during the PURPA reviews for the Energy Policy Act of 2005. LES believes little load would be shifted due to time-of-use rates. TOU rates would attract the customers whose load characteristics allow them to reduce their bills without changing their load patterns. LES would lose revenue without appreciable load improvement. LES' billing system could not handle TOU rates without expensive upgrading. TOU rates were not considered further.

13. Shade Trees - How the proper placement of landscape trees would affect heating and cooling costs of a home. We did not pursue this option due to the long lead time for landscape trees to reach proper maturity to affect heating and cooling costs, sometimes over 20 years.

14. Efficient Air Conditioning (AC/HP) - The Department of Energy has recently upgraded the efficiency standards for residential air conditioners and heat pumps. As of January 23, 2006, all central air conditioners manufactured must achieve a Seasonal Energy Efficiency Ration (SEER) of 13 or higher and to 13SEER/7.7HSPF for new central heat pumps– 30 percent more efficient than the previous standard of 10SEER. The last time the government increased minimum efficiency standards for air conditioners was 10 years prior. The benefit/cost of 'super high efficiency' air conditioners, (SEER = 17) and 'super high efficiency' heat pumps, (SEER = 16), compared to 'high efficiency' equipment (SEER =13) was investigated.

15. AC/Heat Pump (HP) Maintenance - The benefit/cost of maintaining existing residential air conditioning units up to the level of energy performance that they were designed to operate at.

16. Electric Lawn Mowers - Compare traditional gas fired lawnmowers versus new electric rechargeable mowers taking into account the various emission and fuel cost differences between the two. We did not pursue this option due to the batteries not holding the charge long enough to mow anything but very small yards. Battery recharge time was also a concern along with narrow mowing width, bogging down in taller grass and most mowers are not self propelled.

17. Plug in Electric Hybrid Vehicle - currently not commercially available but provide environmentally cleaner operation and cost less to operate due to the reduced gasoline consumption.

18. AC Load Control-Radio - Air conditioner load control is a peak demand reduction technology which on hot days will cycle air conditioners off for short periods of time, in a predetermined manner. The system is centrally controlled, typically with radio signals sent to a switch mounted on the appliance.

19. AC Load Control Thermostat - The Air conditioner load control can also be done with "smart" thermostats that not only can cycle air conditioners off via a radio signal but can optimize control of over or under sized air conditioners and heat pumps.

20. Water Heater Load Control - Works on the same principal as air conditioner control and reduces peak electrical demand by shutting off the heating element of electric water heaters for brief periods of time. Currently only 16% of single family homes utilize electric water heaters in Lincoln. This option is not considered viable because the costs are much greater than the benefits. Due to this analysis, the water heater credit is being discontinued by LES.

21. Horizontal Clothes Washer - Appliance manufacturers have more recently developed new models of front-load washers which are smaller, more affordable and designed for noncommercial use. The average water consumption is reduced from 41.5 gallons/load to 25.8 gallons/load and total energy savings approaches 1 kWh/wash load (mainly from reduced water heating requirements). This technology has a long (20+ years) payback for the customer so was not evaluated in detail.

22. Weatherization- This option analyzes the benefit/cost of weatherizing existing houses, including air sealing measures, adding insulation, and programmable thermostats. Representative energy reductions/savings are in both electricity and natural gas. This option would be in addition to the other programs in the Lincoln area. The Lincoln Action Program and the Lincoln Housing authority offer low income weatherization, and the Nebraska Energy Office offers low interest financing for residential energy improvements on a State-wide basis.

23. Residential Wind - Investigate the benefit of small wind turbines on residential property. This option was added after public meeting in December.

24. Computer Monitor (CRT) Replacement - The two most common types of computer monitors are CRT (Cathode Ray Tube) monitors and LCD (Liquid Crystal Display) monitors. The biggest advantages of LCD monitors are that they are compact and lightweight and consume much less energy than a CRT.

25. Loans - Provide LES backed loans, low interest or zero interest, for qualified conservation measures.

26. Photo Voltaic (solar cell) (PV) System Rebate - Offer rebates for customers installing solar photovoltaic systems that would generate electricity during daytime hours and reduce LES' summer demand. The load curve for Hyde observatory was used to determine total energy generated for summer and winter, and the cost for a one kilowatt PV system was set at $7,000.

Commercial and Industrial Customer DSM programs

27. Commercial Lighting - The benefit/cost of replacing existing lighting systems in businesses with more energy efficient systems. The Energy Policy Act of 2005 requires these changes over the next few years. This option would implement them sooner.

28. Efficient Parking Lot Lights - The two primary types are mercury vapor (MV) and high pressure sodium vapor (HPSV) lights. The HPSV lights are more efficient. MV lamps are no longer being manufactured. Therefore, conversion to HPSV will occur as MV lamps fail and are replaced by HPSV.

29. LED Street Lights - There are new LED (light emitting diode) street light fixtures. These are more efficient than high pressure sodium vapor (HPSV) lights but cost considerably more. LED lamps are not available in large quantities and cost too much to be practical at this time.

30. Commercial Energy Star Program - This option analyzes the benefit/cost of participation in the U S EPA's Energy Star program for commercial buildings. (Only applies to some commercial sectors, excludes Restaurants, manufacturing, etc.) The building needs to be above the 75^{th} percentile for energy efficiency in its category.

31. Commercial Audits - The benefit/cost of conducting energy surveys or 'audits' in commercial buildings. These audits identify potential energy saving measures/ recommendations that could be implemented to reduce energy use. LES has been doing these audits for several years.

32. Maintenance of HVAC - This option analyzes the benefit/cost of maintaining existing small/medium commercial air conditioning units up to the level of energy performance that they were designed to operate at. Many of these units are located on the roof of a business and often regular, proper maintenance is neglected, which results in reduced operating efficiencies.

33. Variable Drives/ Efficient Motors and Pumps - This option analyzes the benefit/cost of variable frequency motor drives and/or more efficient motors in business and industry facilities.

34. Cogeneration (Cogen) - Cogeneration is the use of a heat engine to simultaneously generate both electricity and some other form of useful heat. Cogeneration captures the by product heat from producing electricity for domestic or industrial heating purposes. The analysis modeled a 10.7 MW combustion turbine and heat recovery boiler (HRSG) at the existing UNL central plant located 14th and Avery. The HRSG would generate 51 MMBtu/Hr of steam that would be used in the city campus steam distribution system for building heating and other year around needs.

35. District Systems - District Energy systems distribute thermal energy from a centralized location for heating and cooling requirements. The energy is often obtained from a cogeneration plant using absorption chillers, although standard boilers and chillers as well as geothermal sources can be used to produce the required energy. District energy plants can provide higher efficiencies and better pollution control.

36. Ground Source Heat Pump - A ground coupled system consists of a geo-thermal well field acting as the thermal source/sink for water source heat pumps. Ground coupled heat pump systems utilize the earth's stable 50-55°F temperature for their high energy-efficiency. Studies based on systems installed at Lincoln Public School facilities have demonstrated a 45%-50% energy reduction compared to conventional, non-ground coupled heating and cooling systems.

37. Time of Use Rates - Time-of-use (TOU) rates encourage customers to reduce load during peak periods and even move load to lower cost off-peak periods due to different pricing periods. This option was considered during the PURPA reviews for the Energy Policy Act of 2005. LES believes little load would be shifted due to time-of-use rates. TOU rates would attract the customers whose load characteristics allow them to reduce their bills without changing their load patterns. LES would lose revenue without appreciable load improvement. LES' billing system could not handle TOU rates without expensive upgrading. TOU rates were not considered further.

38. Cool Storage - Using chilled water system to supply building cooling during LES peak and chilling the water off of LES peak hours. The preliminary modeling used a thermal storage facility located on the existing UNL city campus district cooling loop and would include a 5 million gallon chilled water storage tank.

39. Exit Lights (LED) - LED exit lights reduces annual energy and peak demand by replacing inefficient incandescent and fluorescent exit lights that are always on. The older lights are being phased out by customers because of higher energy and maintenance costs, but the process could be accelerated by LES incentives and advertising.

40. Vending Miser - The benefit/cost of automated control equipment that shuts down the refrigerator and /or lights in vending machines when no one is around to use them.

41. Coffee Thermos - Investigate the tradeoff of replacing non-insulated coffee thermos' with insulated thermos' while turning off the burner to conserve energy in a business or commercial setting. We did not pursue this as we felt most office /commercial operations already use insulated coffee thermoses.

42. Power Purchase Program - LES currently reduces peak demand by paying larger commercial, industrial, and public authority customers to curtail their loads, either by running backup generators or reducing use. This is an ongoing voluntary program. LES continues to try to expand participation and the possible load reduction by recruiting eligible customers.

43. Photo Voltaic (PV) for Signs - Install solar photovoltaic cells on advertising billboards and other signs that require lighting at night. This was not studied further as it was not economical. It would only reduce energy consumption during off-peak hours, and it would not be beneficial for the customer based on the analysis done for option 26.

44. Commercial Micro Wind - Small wind turbines on commercial buildings to take advantage of wind turbulence caused by buildings. Special application wind turbines take advantage of this.

45. LES Downtown Office Efficiency Plan - A task force was set up to evaluate all of the buildings of the Lincoln Electric System for energy efficiency improvement possibilities. The first building to be evaluated was the Lincoln Electric Building (LEB). Four primary areas of energy use were investigated: building envelope, lighting, heating ventilation and air conditioning (HVAC), and ancillary equipment.

Supply Side

Supercritical Pulverized Coal - Conventional Pulverized coal unit share of 100MW that operates at ultra high steam pressure and temperature. Supercritical units have higher efficiencies and lower emissions compared with conventional coal units. The unit is assumed to have SO2 “scrubbers”, Selective catalytic converter for NOx control and activated carbon injection for Mercury control.

Integrated Gas Combined Cycle (IGCC) - Integrated Gas Combined Cycle unit share of 100MW. This unit converts coal to a gas for burning in Combustion Turbines which then has heat recovery units to increase efficiency. Based on LES estimates this option is more expensive than Supercritical Pulverized Coal and was screened out.

Pulverized Coal with CO2 Capture - Adds carbon capture to the pulverized coal unit cost and operating characteristics

IGCC with CO_2 Capture - Adds carbon capture to the IGCC coal unit cost and operating characteristics. Based on LES estimates this option is more expensive than Pulverized Coal with CO_2 Capture and was screened out.

LM6000 Combustion Turbine (CT) - A GE LM6000 aero-derivative natural gas fired combustion turbine, 47MW.

LMS 100 CT - A GE LMS100 natural gas fired combustion turbine, 100MW. This is currently the highest efficiency combustion turbine on the market. Potentially has promise but deemed to be too early in the commercial cycle for LES use, screened out.

7EA CT - A GE 7EA industrial natural gas fired combustion turbine, 84MW. Too big for LES preferred size and not as efficient as the LM6000, screened out.

LM6000 (2 on 1) Combined Cycle (CC) - a 118MW Combined Cycle unit utilizing two LM6000 Combustion Turbines with heat recovery boilers and a steam generator.

7EA (2 on 1) CC - a 100mw share of a 240MW combined cycle unit based on two GE 7EA with heat recovery and a steam generator. Would have to be Joint unit have not ventured into that type of operation for gas fired units. Usually are local units we own and operate. Screened out.

WIND - 5MW's of wind at site having 41% Capacity Factor-(equivalent to NPPD Ainsworth Site)

WIND Power Purchase Agreement - 5MW's and 10MW's investigated from NPPD under a Purchase Power Agreement (PPA) based on results of their RFP.

Landfill Gas - 5MW of generation capability which utilizes gas collected from the Bluff Road Landfill to drive specially designed Diesel generators. 5MW was used to compare directly to 5MW of wind. The actual generation available from the existing landfill would be less but would grow.

Fuel Cell - 1MW fuel cell utilizing natural Gas fuel. Screened out as too expensive.

Diesel on Natural Gas - 2MW unit using Natural Gas. Screened out as too expensive.

Nuclear - A 100MW share of a nuclear unit in 2018.

Renewable Portfolio Standard (15% by 2020) - Utilizing Wind and Landfill gas to meet a 15% renewable Portfolio Standard by 2020.

APPENDIX C

Benefit Calculations

Case comparison

Case comparison (Zero CO2)

Case	Name	Class	Benefit components ($1000 PV)					Customer (Particpant) Benefit ($1000 PV)				Electric System Benefit ($1000 PV)					Other
			Fin Mod Rev Benefit	net other	Demand Benefit	Other Societal Benefit	Total Benefit	Elec System	Net other	incentive costs	Total	Non part Elec	Demand Benefit	incentive costs	Marketing costs	Total	Other Societal Benefit
DSM 1	Energy Star Home	Res	$408	$348	$14	$0	$770	$326	$348	0	$674	$81	$14	0	0	$96	0
DSM 2	Energy Star Appliances	Res	$825	-$1,765	$55	$0	-$884	$691	-$1,765	0	-$1,074	$134	$55	0	0	$189	0
DSM 3	Zero Energy home	Res	$466	-$1,508	$15	$0	-$1,027	$358	-$1,508	0	-$1,150	$107	$15	0	0	$123	0
DSM 5	Compact Fluorescent(CFL)	Res	$6,259	$148	$145	$0	$6,552	$12,337	$148	0	$12,485	-$6,078	$145	0	0	-$5,934	0
DSM 8	Refrigerator Eff	Res	$884	-$5,685	$27	$0	-$4,774	$1,567	-$5,685	0	-$4,118	-$683	$27	0	0	-$656	0
DSM 10	Solar Water Heaters (elec)	Res	$743	-$974	$9	$0	-$222	$1,265	-$974	0	$291	-$522	$9	0	0	-$513	0
DSM 11	Tankless Water Heaters (elec)	Res	$3,277	-$7,201	$80	$0	-$3,844	$3,496	-$7,201	0	-$3,705	-$219	$80	0	0	-$139	0
DSM 14A	Eff AC	Res	$393	-$2,061	$49	$0	-$1,619	$270	-$2,061	0	-$1,791	$123	$49	0	0	$172	0
DSM 14B	Eff HP	Res	$436	-$740	$16	$0	-$288	$314	-$740	0	-$425	$122	$16	0	0	$138	0
DSM 17	Plug in Hybrid Electric Vehicle	Res	-$9,065	$51,335	-$39	$0	$42,232	-$19,346	$51,335	0	$31,990	$10,281	-$39	0	0	$10,242	0
DSM 17A	PHEV compared to Hybird	Res	-$9,065	$29,510	-$39	$0	$20,407	-$19,346	$29,510	0	$10,165	$10,281	-$39	0	0	$10,242	0
DSM 18	AC LC-Radio	Res	$848	-$7,529	$4,031	$0	-$2,650			0		-$6,682	$4,031	0	0	-$2,650	0
DSM 19	AC load control Thermostat	Res	$618	-$8,116	$4,927	$0	-$2,571			0		-$7,498	$4,927	0	0	-$2,571	0
DSM 20	Water Heater LC	Res	$0	-$2,273	$126	$0	-$2,147			0		-$2,273	$126	0	0	-$2,147	0
DSM 22	Weatherization	Res	$331	$22	$3	$0	$355	$25	$22	0	$46	$306	$3	0	0	$309	0
DSM 23	Residential Wind	Res	$591	-$1,503	$6	$0	-$905	$359	-$1,503	0	-$1,143	$232	$6	0	0	$238	0
DSM 26	Photo Voltaic	Res	$331	-$934	$16	$0	-$587	$174	-$934	0	-$760	$157	$16	0	0	$173	0
DSM 27	Commercial Lighting	Com	$7,013	-$5,325	$612	$0	$2,300	$12,923	-$5,325	0	$7,598	-$5,910	$612	0	0	-$5,298	0
DSM 30	commercial Energy Star Program	Com	$2,491	-$2,814	$56	$0	-$267	$3,019	-$2,814	0	$204	-$528	$56	0	0	-$471	0
DSM 32	Maintenance of HVAC	Com	$2,205	-$816	$330	$0	$1,718	$2,341	-$816	0	$1,525	-$136	$330	0	0	$194	0
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$566	-$704	$32	$0	-$106	$575	-$704	0	-$129	-$9	$32	0	0	$23	0
DSM 34	Cogen	Ind	$34,350	-$44,161	$1,682	$0	-$8,130	$71,233	-$44,161	0	$27,072	-$36,883	$1,682	0	0	-$35,202	0
DSM 36	Ground Coupled HP -Com	Com	$2,493	$5,070	$1,824	$0	$9,387	$270	$5,070	0	$5,340	$2,223	$1,824	0	0	$4,047	0
DSM 38	Cool Storage	Com	$775	-$4,058	$471	$0	-$2,811	$0	-$4,058	0	-$4,058	$775	$471	0	0	$1,247	0
DSM 39	Exit lights	Com/ind	$4,379	$9,191	$151	$0	$13,721	$8,643	$9,191	0	$17,834	-$4,264	$151	0	0	-$4,113	0
DSM 40	Vending miser	Com	$126	-$181	$0	$0	-$56	$832	-$181	0	$651	-$706	$0	0	0	-$706	0
DSM 42	Power Purchase Program	Ind	$314	-$361	$589	$0	$542	$70	-$361	122	-$170	$244	$589	-122	0	$711	0
DSM 44	Commercial Micro Wind	Com/Ind	$785	-$7,572	$14	$0	-$6,774	$777	-$7,572	0	-$6,795	$8	$14	0	0	$21	0
Supply 1	Wind 5MW 2009	System	-$4,955		$184	$0	-$4,771					-$4,955	$184			-$4,771	0
Supply 2A	LFG 5 MW -full em benefit	System	$1,931		$707	$0	$2,638					$1,931	$707			$2,638	0
Supply 3	CO2 capture units	System	-$113,433		$0	$0	-$113,433					-$113,433	$0			-$113,433	0
Supply 4	RPS 15% 2020	System	-$193,817		$6,448	$0	-$187,368					-$193,817	$6,448			-$187,368	0
Supply 5	Nuclear 2018	System	-$89,423		$0	$0	-$89,423					-$89,423	$0			-$89,423	0
Supply 6	NPPD Wind PPA 5Mw	System	-$5,172		$184	$0	-$4,988					-$5,172	$184			-$4,988	0
Supply 7	NPPD Wind PPA 10Mw	System	-$9,370		$368	$0	-$9,002					-$9,370	$368			-$9,002	

Case comparison (Base CO2)

Case	Name	Class	Benefit components ($1000 PV)					Customer (Particpant) Benefit ($1000 PV)				Electric System Benefit ($1000 PV)					Other
			Fin Mod Rev Benefit	net other	Demand Benefit	Other Societal Benefit	Total Benefit	Elec System	Net other	incentive costs	Total	Non part Elec	Demand Benefit	incentive costs	Marketing costs	Total	Other Societal Benefit
DSM 1	Energy Star home	Res	$420	$348	$14	$20	$802	$354	$348	0	$702	$66	$14	0	0	$80	$20
DSM 2	Energy Star Appliances	Res	$856	-$1,765	$55	$12	-$841	$749	-$1,765	0	-$1,016	$107	$55	0	0	$162	$12
DSM 3	Zero Energy home	Res	$479	-$1,508	$15	$8	-$1,006	$388	-$1,508	0	-$1,120	$91	$15	0	0	$106	$8
DSM 5	Compact Fluorescent(CFL)	Res	$6,814	$148	$145	$0	$7,107	$13,373	$148	0	$13,521	-$6,559	$145	0	0	-$6,414	0
DSM 8	Refrigerator Eff	Res	$956	-$5,685	$27	$0	-$4,701	$1,698	-$5,685	0	-$3,986	-$743	$27	0	0	-$715	0
DSM 10	Solar Water Heaters (elec)	Res	$773	-$974	$9	$0	-$192	$1,371	-$974	0	$398	-$599	$9	0	0	-$590	0
DSM 11	Tankless Water Heaters (elec)	Res	$3,407	-$7,201	$80	$0	-$3,715	$3,790	-$7,201	0	-$3,412	-$383	$80	0	0	-$303	$0
DSM 14A	Eff AC	Res	$403	-$2,061	$49	$0	-$1,608	$293	-$2,061	0	-$1,768	$110	$49	0	0	$160	$0
DSM 14B	Eff HP	Res	$451	-$740	$16	$0	-$273	$341	-$740	0	-$399	$110	$16	0	0	$126	$0
DSM 17	Plug in Hybrid Electric Vehicle	Res	-$9,977	$51,335	-$39	$2,933	$44,252	-$20,970	$51,335	0	$30,365	$10,994	-$39	0	0	$10,955	$2,933
DSM 17A	PHEV compared to Hybird	Res	-$9,977	$29,510	-$39	$1,538	$21,033	-$20,970	$29,510	0	$8,540	$10,994	-$39	0	0	$10,955	$1,538
DSM 18	AC LC-Radio	Res	$849	-$7,529	$4,031	$0	-$2,649			0		-$6,680	$4,031	0	0	-$2,649	0
DSM 19	AC load control Thermostat	Res	$620	-$8,116	$4,927	$0	-$2,569			0		-$7,496	$4,927	0	0	-$2,569	0
DSM 20	Water Heater LC	Res	$0	-$2,273	$126	$0	-$2,148			0		-$2,273	$126	0	0	-$2,148	0
DSM 22	Weatherization	Res	$332	$22	$3	$13	$369	$27	$22	0	$48	$305	$3	0	0	$308	$13
DSM 23	Residential Wind	Res	$609	-$1,503	$6	$0	-$888	$389	-$1,503	0	-$1,113	$219	$6	0	0	$225	0
DSM 26	Photo Voltaic	Res	$338	-$934	$16	$0	-$580	$188	-$934	0	-$746	$150	$16	0	0	$166	0
DSM 27	Commercial Lighting	Com	$7,585	-$5,325	$612	$0	$2,872	$14,008	-$5,325	0	$8,683	-$6,423	$612	0	0	-$5,811	0
DSM 30	commercial Energy Star Program	Com	$2,624	-$2,814	$56	$42	-$92	$3,272	-$2,814	0	$458	-$648	$56	0	0	-$592	$42
DSM 32	Maintenance of HVAC	Com	$2,289	-$816	$330	$0	$1,803	$2,537	-$816	0	$1,721	-$248	$330	0	0	$82	$0
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$595	-$704	$32	$0	-$77	$623	-$704	0	-$81	-$29	$32	0	0	$3	$0
DSM 34	Cogen	Ind	$37,556	-$44,161	$1,682	-$1,126	-$6,049	$77,207	-$44,161	0	$33,046	-$39,651	$1,682	0	0	-$37,969	-$1,126
DSM 36	Ground Coupled HP -Com	Com	$2,168	$5,070	$1,824	$818	$9,880	$293	$5,070	0	$5,363	$1,875	$1,824	0	0	$3,699	$818
DSM 38	Cool Storage	Com	$711	-$4,058	$471	$0	-$2,875	$0	-$4,058	0	-$4,058	$711	$471	0	0	$1,183	$0
DSM 39	Exit lights	Com/ind	$4,783	$9,191	$151	$0	$14,125	$9,368	$9,191	0	$18,559	-$4,585	$151	0	0	-$4,434	0
DSM 40	Vending miser	Com	$168	-$181	$0	$0	-$13	$902	-$181	0	$720	-$733	$0	0	0	-$733	0
DSM 42	Power Purchase Program	Ind	$315	-$361	$589	-$7	$536	$76	-$361	122	-$164	$239	$589	-122	0	$707	-$7
DSM 44	Commercial Micro Wind	Com/Ind	$822	-$7,572	$14	$0	-$6,736	$842	-$7,572	0	-$6,730	-$20	$14	0	0	-$6	$0
Supply 1	Wind 5MW 2009	System	-$4,139		$184		-$3,955					-$4,139	$184			-$3,955	
Supply 2A	LFG 5 MW -full em benefit	System	$18,049		$707		$18,756					$18,049	$707			$18,756	
Supply 3	CO2 capture units	System	-$57,185		$0		-$57,185					-$57,185	$0			-$57,185	
Supply 4	RPS 15% 2020	System	-$133,701		$6,448		-$127,252					-$133,701	$6,448			-$127,252	
Supply 5	Nuclear 2018	System	-$20,787		$0		-$20,787					-$20,787	$0			-$20,787	
Supply 6	NPPD Wind PPA 5Mw	System	-$4,366		$184		-$4,182					-$4,366	$184			-$4,182	
Supply 7	NPPD Wind PPA 10Mw	System	-$7,883		$368		-$7,515					-$7,883	$368			-$7,515	

Case comparison

Case comparison (High CO2)

Case	Name	Class	Benefit components ($1000 PV)					Customer (Particpant) Benefit ($1000 PV)				Electric System Benefit ($1000 PV)					Other
			Fin Mod Rev Benefit	net other	Demand Benefit	Other Societal Benefit	Total Benefit	Elec System	Net other	incentive costs	Total	Non part Elec	Demand Benefit	incentive costs	Marketing costs	Total	Other Societal Benefit
DSM 1	Energy Star Home	Res	$438	$348	$14	$56	$856	$402	$348	0	$750	$36	$14	0	0	$50	$56
DSM 2	Energy Star Appliances	Res	$900	-$1,765	$55	$35	-$775	$851	-$1,765	0	-$914	$49	$55	0	0	$104	$35
DSM 3	Zero Energy home	Res	$499	-$1,508	$15	$22	-$972	$441	-$1,508	0	-$1,067	$58	$15	0	0	$73	$22
DSM 5	Compact Fluorescent(CFL)	Res	$7,604	$148	$145	$0	$7,897	$15,191	$148	0	$15,339	-$7,587	$145	0	0	-$7,442	0
DSM 8	Refrigerator Eff	Res	$1,057	-$5,685	$27	$0	-$4,600	$1,929	-$5,685	0	-$3,755	-$872	$27	0	0	-$845	0
DSM 10	Solar Water Heaters (elec)	Res	$814	-$974	$9	$0	-$151	$1,558	-$974	0	$584	-$743	$9	0	0	-$735	$0
DSM 11	Tankless Water Heaters (elec)	Res	$3,597	-$7,201	$80	$0	-$3,524	$4,305	-$7,201	0	-$2,896	-$708	$80	0	0	-$628	$0
DSM 14A	Eff AC	Res	$419	-$2,061	$49	$0	-$1,593	$332	-$2,061	0	-$1,728	$87	$49	0	0	$136	$0
DSM 14B	Eff HP	Res	$470	-$740	$16	$0	-$253	$387	-$740	0	-$353	$84	$16	0	0	$99	$0
DSM 17	Plug in Hybrid Electric Vehicle	Res	-$11,251	$51,335	-$39	$8,429	$48,475	-$23,820	$51,335	0	$27,515	$12,570	-$39	0	0	$12,531	$8,429
DSM 17A	PHEV compared to Hybird	Res	-$11,251	$29,510	-$39	$1,538	$19,759	-$23,820	$29,510	0	$5,690	$12,570	-$39	0	0	$12,531	$1,538
DSM 18	AC LC-Radio	Res	$858	-$7,529	$4,031	$0	-$2,641			0		-$6,672	$4,031	0	0	-$2,641	0
DSM 19	AC load control Thermostat	Res	$630	-$8,116	$4,927	$0	-$2,559			0		-$7,486	$4,927	0	0	-$2,559	0
DSM 20	Water Heater LC	Res	$0	-$2,273	$126	$0	-$2,148			0		-$2,273	$126	0	0	-$2,148	0
DSM 22	Weatherization	Res	$333	$22	$3	$38	$395	$30	$22	0	$52	$303	$3	0	0	$306	$38
DSM 23	Residential Wind	Res	$633	-$1,503	$6	$0	-$864	$442	-$1,503	0	-$1,060	$190	$6	0	0	$196	$0
DSM 26	Photo Voltaic	Res	$348	-$934	$16	$0	-$570	$214	-$934	0	-$720	$135	$16	0	0	$150	0
DSM 27	Commercial Lighting	Com	$8,401	-$5,325	$612	$0	$3,688	$15,912	-$5,325	0	$10,588	-$7,512	$612	0	0	-$6,900	0
DSM 30	commercial Energy Star Program	Com	$2,813	-$2,814	$56	$122	$177	$3,717	-$2,814	0	$903	-$904	$56	0	0	-$848	$122
DSM 32	Maintenance of HVAC	Com	$2,424	-$816	$330	$0	$1,937	$2,882	-$816	0	$2,066	-$459	$330	0	0	-$129	0
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$634	-$704	$32	$0	-$38	$708	-$704	0	$4	-$74	$32	0	0	-$42	0
DSM 34	Cogen	Ind	$42,078	-$44,161	$1,682	-$3,237	-$3,638	$87,712	-$44,161	0	$43,551	-$45,634	$1,682	0	0	-$43,952	-$3,237
DSM 36	Ground Coupled HP -Com	Com	$1,892	$5,070	$1,824	$2,351	$11,137	$332	$5,070	0	$5,402	$1,560	$1,824	0	0	$3,384	$2,351
DSM 38	Cool Storage	Com	$638	-$4,058	$471	$0	-$2,948	$0	-$4,058	0	-$4,058	$638	$471	0	0	$1,110	
DSM 39	Exit lights	Com/ind	$5,353	$9,191	$151	$0	$14,695	$10,642	$9,191	0	$19,833	-$5,289	$151	0	0	-$5,138	0
DSM 40	Vending miser	Com	$228	-$181	$0	$0	$47	$1,024	-$181	0	$843	-$796	$0	0	0	-$796	
DSM 42	Power Purchase Program	Ind	$319	-$361	$589	-$21	$525	$86	-$361	122	-$153	$233	$589	-122	0	$700	-$21
DSM 44	Commercial Micro Wind	Com/Ind	$874	-$7,572	$14	$0	-$6,685	$957	-$7,572	0	-$6,616	-$83	$14	0	0	-$69	$0
Supply 1	Wind 5MW 2009	System	-$3,005		$184		-$2,821					-$3,005	$184			-$2,821	
Supply 2A	LFG 5 MW -full em benefit	System	$47,447		$707		$48,154					$47,447	$707			$48,154	
Supply 3	CO2 capture units	System	$10,004		$0		$10,004					$10,004	$0			$10,004	
Supply 4	RPS 15% 2020	System	-$49,455		$6,448		-$43,007					-$49,455	$6,448			-$43,007	
Supply 5	Nuclear 2018	System	$66,761		$0		$66,761					$66,761	$0			$66,761	
Supply 6	NPPD Wind PPA 5Mw	System	-$3,245		$184		-$3,061					-$3,245	$184			-$3,061	
Supply 7	NPPD Wind PPA 10Mw	System	-$5,829		$368		-$5,461					-$5,829	$368			-$5,461	

Case comparison

DSM Benefit to Cost (B/C) review

Case comparison (Zero CO2)

Case	Name	Class	total cost	total cost- B/C Ratio	Rank	total Benefit	Total B/C > .2	Total B/C > .5	LES Benefit	Cust & LES Benefit	
DSM 1	Energy Star home	Res	$404	1.91	3	x	x	x	x	1	Energy Star Home
DSM 2	Energy Star Appliances	Res	$6,355	-0.14	15				x	0	
DSM 3	Zero Energy home	Res	$2,694	-0.38	26				x	0	
DSM 5	Compact Fluorescent(CFL)	Res	$1,654	3.96	1	x	x	x		0	
DSM 8	Refrigerator Eff	Res	$12,350	-0.39	27					0	
DSM 10	Solar Water Heater (elec)	Res	$1,550	-0.14	16					0	
DSM 11	Tankless Water heater (elec)	Res	$13,021	-0.30	24					0	
DSM 14A	Eff AC	Res	$6,401	-0.25	21				x	0	
DSM 14B	Eff HP	Res	$2,471	-0.12	14				x	0	
DSM 17	Plug in Hybrid Electric Vehicle	Res	$755,826	0.06	10	x			x	1	Plug in Hybrid Electric Vehicle
DSM 17A	PHEV compared to Hybird	Res	$755,826	0.03	11	x			x	1	PHEV compared to Hybird
DSM 18	AC LC-Radio	Res	$10,473	-0.25	22					0	
DSM 19	AC load control Thermostat	Res	$12,497	-0.21	17					0	
DSM 20	Water Heater LC	Res	$1,047	-2.05	35					0	
DSM 22	Weatherization	Res	$445	0.80	6	x	x	x	x	1	Weatherization
DSM 23	Residential Wind	Res	$1,542	-0.59	31				x	0	
DSM 26	Photo Voltaic	Res	$1,322	-0.44	29				x	0	
DSM 27	Commercial Lighting	Com	$7,367	0.31	7	x	x			0	
DSM 30	commercial Energy Star Program	Com	$5,776	-0.05	12					0	
DSM 32	Maintenance of HVAC	Com	$1,277	1.35	4	x	x	x	x	1	Maintenance of HVAC
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$1,234	-0.09	13				x	0	
DSM 34	Cogen	Ind	$10,321	-0.79	32					0	
DSM 36	Ground Coupled HP -Com	Com	$105,029	0.09	9	x			x	1	Ground Coupled HP -Com
DSM 38	Cool Storage	Com	$5,864	-0.48	30				x	0	
DSM 39	Exit lights	Com/ind	$3,863	3.55	2	x	x	x		0	
DSM 40	Vending miser	Com	$257	-0.22	19					0	
DSM 42	Power Purchase Program	Ind	$578	0.94	5	x	x	x	x	0	
DSM 44	Commercial Micro Wind	Com/Ind	$5,961	-1.14	33				x	0	
Supply 1	Wind 5MW 2009	System	$14,975	-0.32	25					0	
Supply 2A	LFG 5 MW -full em benefit	System	$21,719	0.12	8	x			x	1	LFG 5 MW -full em benefit
Supply 3	CO2 capture units	System	$78,935	-1.44	34					0	
Supply 4	RPS 15% 2020	System	$472,935	-0.40	28					0	
Supply 5	Nuclear 2018	System	$434,542	-0.21	18					0	
Supply 6	NPPD Wind PPA 5Mw	System	$18,579	-0.27	23					0	
Supply 7	NPPD Wind PPA 10Mw	System	$37,158	-0.24	20					0	
		cnt		35		11	7	6	17		

Case comparison (Base CO2)

DSM Benefit to Cost (B/C) review

Case	Name	Class	total cost	total cost- B/C Ratio	Rank	total Benefit	Total B/C > .2	Total B/C > .5	LES Benefit	Cust & LES Benefit	CO2 Savings tons Elect	Gas	other	total	tons/$			
DSM 1	Energy Star Home	Res	$404	1.98	3	x	x	x	x	1	1894	4268		6162	15.25	9	9	
DSM 2	Energy Star Appliances	Res	$6,355	-0.13	18				x	0	4613			4613	0.73	27		
DSM 3	Zero Energy home	Res	$2,694	-0.37	27				x	0	2105	1686		3791	1.41	22		
DSM 5	Compact Fluorescent(CFL)	Res	$1,654	4.30	1	x	x	x		0	83805			83805	50.67	3	3	
DSM 8	Refrigerator Eff	Res	$12,350	-0.38	28					0	10711			10711	0.87	24		
DSM 10	Solar Water Heater (elec)	Res	$1,550	-0.12	17					0	4364			4364	2.82	18		
DSM 11	Tankless Water heater (elec)	Res	$13,021	-0.29	26					0	20150			20150	1.55	20		
DSM 14A	Eff AC	Res	$6,401	-0.25	22				x	0	1679			1679	0.26	30		
DSM 14B	Eff HP	Res	$2,471	-0.11	16				x	0	2096			2096	0.85	25		
DSM 17	Plug in Hybrid Electric Vehicle	Res	$755,826	0.06	10	x			x	1	-133734		636715	502982	0.67	28		
DSM 17A	PHEV compared to Hybird	Res	$755,826	0.03	11	x			x	1	-133734		333856	200122	0.26	29		
DSM 18	AC LC-Radio	Res	$10,473	-0.25	23					0	1052			1052	0.10	32		
DSM 19	AC load control Thermostat	Res	$12,497	-0.21	20					0	1283			1283	0.10	31		
DSM 20	Water Heater LC	Res	$1,047	-2.05	35					0	4			4	0.00	33		
DSM 22	Weatherization	Res	$445	0.83	7	x	x	x	x	1	155	2845		3000	6.74	13		
DSM 23	Residential Wind	Res	$1,542	-0.58	31				x	0	2509			2509	1.63	19		
DSM 26	Photo Voltaic	Res	$1,322	-0.44	29				x	0	1083			1083	0.82	26		
DSM 27	Commercial Lighting	Com	$7,367	0.39	8	x	x			0	86454			86454	11.73	10	10	
DSM 30	commercial Energy Star Program	Com	$5,776	-0.02	12					0	19982	9188		29171	5.05	16		
DSM 32	Maintenance of HVAC	Com	$1,277	1.41	4	x	x	x	x	1	13964			13964	10.94	11		
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$1,234	-0.06	15				x	0	4147			4147	3.36	17		
DSM 34	Cogen	Ind	$10,321	-0.59	32					0	477864	-244514		233350	22.61	5	5	
DSM 36	Ground Coupled HP -Com	Com	$105,029	0.09	9	x			x	1	-26950	177594		150644	1.43	21		
DSM 38	Cool Storage	Com	$5,864	-0.49	30				x	0	-7066			-7066	-1.21	34		
DSM 39	Exit lights	Com/ind	$3,863	3.66	2	x	x	x		0	60217			60217	15.59	8	8	
DSM 40	Vending miser	Com	$257	-0.05	14					0	6256			6256	24.33	4	4	
DSM 42	Power Purchase Program	Ind	$578	0.93	5	x	x	x	x	0	390	-1621		-1230	-2.13	35		
DSM 44	Commercial Micro Wind	Com/Ind	$5,961	-1.13	34					0	5419			5419	0.91	23		
Supply 1	Wind 5MW 2009	System	$14,975	-0.26	24					0	118629			118629	7.92	12		
Supply 2A	LFG 5 MW -full em benefit	System	$21,719	0.86	6	x	x	x	x	1	3353301			3353301	154.39	1	1	
Supply 3	CO2 capture units	System	$78,935	-0.72	33					0	6493192			6493192	82.26	2	2	
Supply 4	RPS 15% 2020	System	$472,935	-0.27	25					0	8751623			8751623	18.50	7	7	
Supply 5	Nuclear 2018	System	$434,542	-0.05	13					0	8514515			8514515	19.59	6	6	
Supply 6	NPPD Wind PPA 5Mw	System	$18,579	-0.23	21					0	117260			117260	6.31	14		
Supply 7	NPPD Wind PPA 10Mw	System	$37,158	-0.20	19					0	218059			218059	5.87	15		
		cnt		35		11	8	7	16									

Case comparison

DSM Benefit to Cost (B/C) review

Case comparison (High CO2)

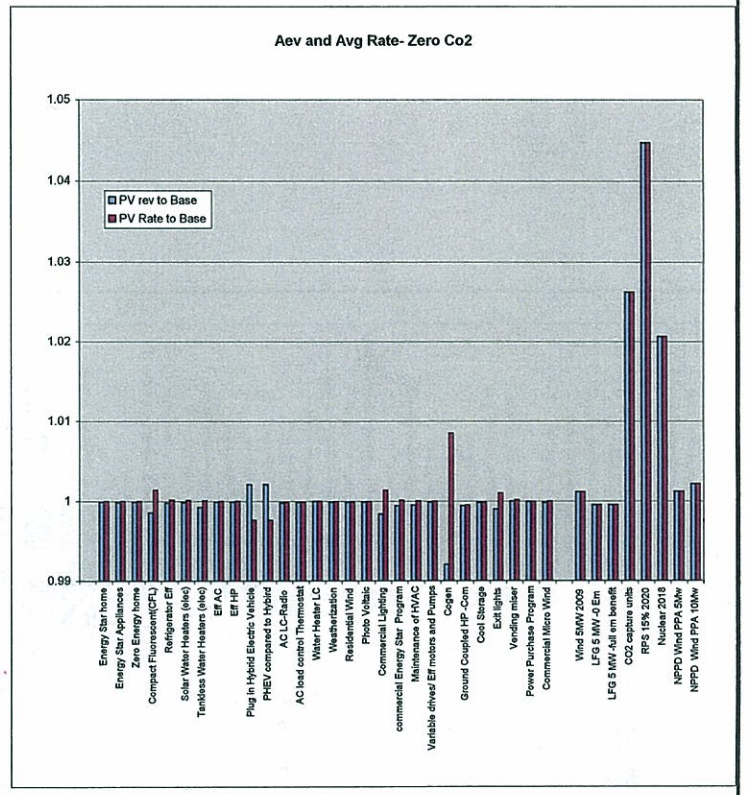
Case	Name	Class	total cost	total cost- B/C Ratio	Rank	total Benefit	Total B/C > .2	Total B/C > .5	LES Benefit	Cust & LES Benefit	
DSM 1	Energy Star Home	Res	$404	2.12	4	x	x	x	x	1	Energy Star Home
DSM 2	Energy Star Appliances	Res	$6,355	-0.12	20				x	0	
DSM 3	Zero Energy home	Res	$2,694	-0.36	29				x	0	
DSM 5	Compact Fluorescent(CFL)	Res	$1,654	4.77	1	x	x	x		0	
DSM 8	Refrigerator Eff	Res	$12,350	-0.37	30					0	
DSM 10	Solar Water Heater (elec)	Res	$1,550	-0.10	18					0	
DSM 11	Tankless Water heater (elec)	Res	$13,021	-0.27	27					0	
DSM 14A	Eff AC	Res	$6,401	-0.25	25				x	0	
DSM 14B	Eff HP	Res	$2,471	-0.10	19				x	0	
DSM 17	Plug in Hybrid Electric Vehicle	Res	$755,826	0.06	13	x			x	1	Plug in Hybrid Electric Vehicle
DSM 17A	PHEV compared to Hybird	Res	$755,826	0.03	15	x			x	1	PHEV compared to Hybird
DSM 18	AC LC-Radio	Res	$10,473	-0.25	26					0	
DSM 19	AC load control Thermostat	Res	$12,497	-0.20	24					0	
DSM 20	Water Heater LC	Res	$1,047	-2.05	35					0	
DSM 22	Weatherization	Res	$445	0.89	7	x	x	x	x	1	Weatherization
DSM 23	Residential Wind	Res	$1,542	-0.56	33				x	0	
DSM 26	Photo Voltaic	Res	$1,322	-0.43	31				x	0	
DSM 27	Commercial Lighting	Com	$7,367	0.50	8	x	x	x		0	
DSM 30	commercial Energy Star Program	Com	$5,776	0.03	14	x				0	
DSM 32	Maintenance of HVAC	Com	$1,277	1.52	5	x	x	x		0	
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$1,234	-0.03	16					0	
DSM 34	Cogen	Ind	$10,321	-0.35	28					0	
DSM 36	Ground Coupled HP -Com	Com	$105,029	0.11	12	x			x	1	Ground Coupled HP -Com
DSM 38	Cool Storage	Com	$5,864	-0.50	32				x	0	
DSM 39	Exit lights	Com/ind	$3,863	3.80	2	x	x	x		0	
DSM 40	Vending miser	Com	$257	0.18	9	x				0	
DSM 42	Power Purchase Program	Ind	$578	0.91	6	x	x	x	x	0	
DSM 44	Commercial Micro Wind	Com/Ind	$5,961	-1.12	34					0	
Supply 1	Wind 5MW 2009	System	$14,975	-0.19	23					0	
Supply 2A	LFG 5 MW -full em benefit	System	$21,719	2.22	3	x	x	x	x	1	LFG 5 MW -full em benefit
Supply 3	CO2 capture units	System	$78,935	0.13	11	x			x	1	CO2 capture units
Supply 4	RPS 15% 2020	System	$472,935	-0.09	17					0	
Supply 5	Nuclear 2018	System	$434,542	0.15	10	x			x	1	Nuclear 2018
Supply 6	NPPD Wind PPA 5Mw	System	$18,579	-0.16	22					0	
Supply 7	NPPD Wind PPA 10Mw	System	$37,158	-0.15	21					0	
		cnt		35		15	8	8	16		

Case comparison

Case comparison (Zero CO2)

Financial Model Case results

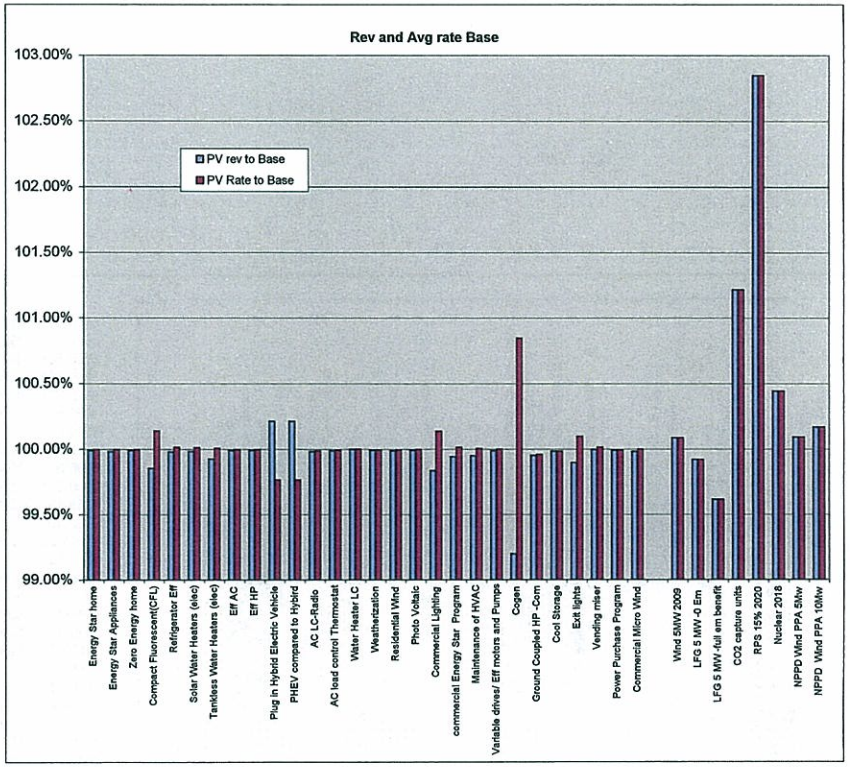
Case	Name	Class	PV Rev Req ($M)	Bas case CO2 costs	Net Zero	Capacity (Sum of Annual MW's)	Energy (Sum of Annual GWh's)	Average PV Rate ($/MWh)	PV rev to Base	PV Rate to Base
Base			$4,693.0	$363	$4,329.6	17,977.0	75,908.4	$57.037		
DSM 1	Energy Star home	Res	$4,692.6	$363	$4,329.2	17,975.2	75,902.6	$57.036	99.99%	100.00%
DSM 2	Energy Star Appliances	Res	$4,692.2	$363	$4,328.8	17,970.0	75,896.2	$57.035	99.98%	100.00%
DSM 3	Zero Energy home	Res	$4,692.5	$363	$4,329.1	17,975.1	75,902.1	$57.036	99.99%	100.00%
DSM 5	Compact Fluorescent(CFL)	Res	$4,686.2	$363	$4,323.3	17,958.6	75,692.4	$57.117	99.86%	100.14%
DSM 8	Refrigerator Eff	Res	$4,692.1	$363	$4,328.7	17,973.5	75,880.9	$57.046	99.98%	100.02%
DSM 10	Solar Water Heaters (elec)	Res	$4,692.2	$363	$4,328.8	17,975.9	75,886.2	$57.044	99.98%	100.01%
DSM 11	Tankless Water Heaters (elec)	Res	$4,689.6	$363	$4,326.3	17,966.8	75,847.1	$57.040	99.92%	100.01%
DSM 14A	Eff AC	Res	$4,692.6	$363	$4,329.2	17,970.7	75,903.6	$57.035	99.99%	100.00%
DSM 14B	Eff HP	Res	$4,692.6	$363	$4,329.2	17,975.0	75,902.8	$57.035	99.99%	100.00%
DSM 17	Plug in Hybrid Electric Vehicle	Res	$4,703.0	$364	$4,338.7	17,981.9	76,248.3	$56.902	100.21%	99.76%
DSM 17A	PHEV compared to Hybird	Res	$4,703.0	$364	$4,338.7	$17,982	$76,248	$56.902	100.21%	99.76%
DSM 18	AC LC-Radio	Res	$4,692.2	$363	$4,328.7	17,464.0	75,904.1	$57.029	99.98%	99.99%
DSM 19	AC load control Thermostat	Res	$4,692.4	$363	$4,329.0	17,350.1	75,903.2	$57.033	99.99%	99.99%
DSM 20	Water Heater LC	Res	$4,693.0	$363	$4,329.6	17,961.0	75,908.4	$57.037	100.00%	100.00%
DSM 22	Weatherization	Res	$4,692.7	$363	$4,329.3	17,976.6	75,907.9	$57.033	99.99%	99.99%
DSM 23	Residential Wind	Res	$4,692.4	$363	$4,329.0	17,976.2	75,902.1	$57.034	99.99%	99.99%
DSM 26	Photo Voltaic	Res	$4,692.7	$363	$4,329.3	17,975.0	75,905.3	$57.035	99.99%	100.00%
DSM 27	Commercial Lighting	Com	$4,685.4	$363	$4,322.6	17,906.9	75,682.1	$57.115	99.84%	100.14%
DSM 30	commercial Energy Star Program	Com	$4,690.4	$363	$4,327.1	17,969.8	75,855.4	$57.044	99.94%	100.01%
DSM 32	Maintenance of HVAC	Com	$4,690.7	$363	$4,327.4	17,935.1	75,867.3	$57.039	99.95%	100.00%
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$4,692.4	$363	$4,329.0	17,973.0	75,898.3	$57.037	99.99%	100.00%
DSM 34	Cogen	Ind	$4,655.5	$360	$4,295.2	17,763.0	74,670.0	$57.523	99.21%	100.85%
DSM 36	Ground Coupled HP -Com	Com	$4,690.9	$364	$4,327.1	17,744.9	75,903.6	$57.008	99.94%	99.95%
DSM 38	Cool Storage	Com	$4,692.3	$363	$4,328.8	17,917.0	75,908.4	$57.027	99.98%	99.98%
DSM 39	Exit lights	Com/Ind	$4,688.2	$363	$4,325.2	17,957.8	75,757.0	$57.093	99.90%	100.10%
DSM 40	Vending miser	Com	$4,692.9	$363	$4,329.5	17,977.0	75,893.8	$57.046	100.00%	100.02%
DSM 42	Power Purchase Program	Ind	$4,692.7	$363	$4,329.3	17,902.0	75,907.1	$57.034	99.99%	99.99%
DSM 44	Commercial Micro Wind	Com/Ind	$4,692.2	$363	$4,328.8	17,975.3	75,894.7	$57.037	99.98%	100.00%
					$0.0				0.00%	0.00%
Supply 1	Wind 5MW 2009	System	$4,697.2	$363	$4,334.5	17,954.9	75,908.4	$57.102	100.11%	100.11%
Supply 2	LFG 5 MW -0 Em	System	$4,689.3	$362	$4,327.7	17,892.0	75,908.4	$57.012	99.96%	99.96%
Supply 2A	LFG 5 MW -full em benefit	System	$4,675.0	$347	$4,327.7	17,892.0	75,908.4	$57.012	99.96%	99.96%
Supply 3	CO2 capture units	System	$4,750.2	$307	$4,443.0	17,977.0	75,908.4	$58.531	102.62%	102.62%
Supply 4	RPS 15% 2020	System	$4,826.7	$303	$4,523.4	17,977.0	75,908.4	$59.590	104.48%	104.48%
Supply 5	Nuclear 2018	System	$4,713.8	$295	$4,419.0	17,977.0	75,908.4	$58.215	102.07%	102.07%
Supply 6	NPPD Wind PPA 5Mw	System	$4,697.4	$363	$4,334.8	17,977.0	75,908.4	$57.105	100.12%	100.12%
Supply 7	NPPD Wind PPA 10Mw	System	$4,700.9	$362	$4,339.0	17,977.0	75,908.4	$57.161	100.22%	100.22%



Case comparison (Base CO2)

Financial Model Case results

Case	Name	Class	PV Rev Req ($M)	Capacity (Sum of Annual MW's)	Energy (Sum of Annual GWh's)	Average PV Rate ($/MWh)	PV rev to Base	PV Rate to Base
Base			$4,693.0	17,977.0	75,908.4	$61.825		
DSM 1	Energy Star home	Res	$4,692.6	17,975.2	75,902.6	$61.824	99.99%	100.00%
DSM 2	Energy Star Appliances	Res	$4,692.2	17,970.0	75,896.2	$61.823	99.98%	100.00%
DSM 3	Zero Energy home	Res	$4,692.5	17,975.1	75,902.1	$61.824	99.99%	100.00%
DSM 5	Compact Fluorescent(CFL)	Res	$4,686.2	17,958.6	75,692.4	$61.911	99.85%	100.14%
DSM 8	Refrigerator Eff	Res	$4,692.1	17,973.5	75,880.9	$61.835	99.98%	100.02%
DSM 10	Solar Water Heaters (elec)	Res	$4,692.2	17,975.9	75,886.2	$61.833	99.98%	100.01%
DSM 11	Tankless Water Heaters (elec)	Res	$4,689.6	17,966.8	75,847.1	$61.830	99.93%	100.01%
DSM 14A	Eff AC	Res	$4,692.6	17,970.7	75,903.6	$61.823	99.99%	100.00%
DSM 14B	Eff HP	Res	$4,692.6	17,975.0	75,902.8	$61.823	99.99%	100.00%
DSM 17	Plug in Hybrid Electric Vehicle	Res	$4,703.0	17,981.9	76,248.3	$61.680	100.21%	99.77%
DSM 17A	PHEV compared to Hybird	Res	$4,703.0	17,981.9	76,248.3	$61.680	100.21%	99.77%
DSM 18	AC LC-Radio	Res	$4,692.2	17,464.0	75,904.1	$61.817	99.98%	99.99%
DSM 19	AC load control Thermostat	Res	$4,692.4	17,350.1	75,903.2	$61.821	99.99%	99.99%
DSM 20	Water Heater LC	Res	$4,693.0	17,961.0	75,908.4	$61.825	100.00%	100.00%
DSM 22	Weatherization	Res	$4,692.7	17,976.6	75,907.9	$61.821	99.99%	99.99%
DSM 23	Residential Wind	Res	$4,692.4	17,976.2	75,902.1	$61.822	99.99%	100.00%
DSM 26	Photo Voltaic	Res	$4,692.7	17,975.0	75,905.3	$61.823	99.99%	100.00%
DSM 27	Commercial Lighting	Com	$4,685.4	17,906.9	75,682.1	$61.909	99.84%	100.14%
DSM 30	commercial Energy Star Program	Com	$4,690.4	17,969.8	75,855.4	$61.833	99.94%	100.01%
DSM 32	Maintenance of HVAC	Com	$4,690.7	17,935.1	75,867.3	$61.828	99.95%	100.01%
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$4,692.4	17,973.0	75,898.3	$61.825	99.99%	100.00%
DSM 34	Cogen	Ind	$4,655.5	17,763.0	74,670.0	$62.347	99.20%	100.84%
DSM 36	Ground Coupled HP -Com	Com	$4,690.9	17,744.9	75,903.6	$61.800	99.95%	99.96%
DSM 38	Cool Storage	Com	$4,692.3	17,917.0	75,908.4	$61.815	99.98%	99.98%
DSM 39	Exit lights	Com/Ind	$4,688.2	17,957.8	75,757.0	$61.885	99.90%	100.10%
DSM 40	Vending miser	Com	$4,692.9	17,977.0	75,893.8	$61.834	100.00%	100.02%
DSM 42	Power Purchase Program	Ind	$4,692.7	17,902.0	75,907.1	$61.822	99.99%	99.99%
DSM 44	Commercial Micro Wind	Com/Ind	$4,692.2	17,975.3	75,894.7	$61.825	99.98%	100.00%
Supply 1	Wind 5MW 2009	System	$4,697.2	17,954.9	75,908.4	$61.879	100.09%	100.09%
Supply 2	LFG 5 MW -0 Em	System	$4,689.3	17,892.0	75,908.4	$61.776	99.92%	99.92%
Supply 2A	LFG 5 MW -full em benefit	System	$4,675.0	17,892.0	75,908.4	$61.587	99.62%	99.62%
Supply 3	CO2 capture units	System	$4,750.2	17,977.0	75,908.4	$62.578	101.22%	101.22%
Supply 4	RPS 15% 2020	System	$4,826.7	17,977.0	75,908.4	$63.586	102.85%	102.85%
Supply 5	Nuclear 2018	System	$4,713.8	17,977.0	75,908.4	$62.099	100.44%	100.44%
Supply 6	NPPD Wind PPA 5Mw	System	$4,697.4	17,977.0	75,908.4	$61.882	100.09%	100.09%
Supply 7	NPPD Wind PPA 10Mw	System	$4,700.9	17,977.0	75,908.4	$61.929	100.17%	100.17%

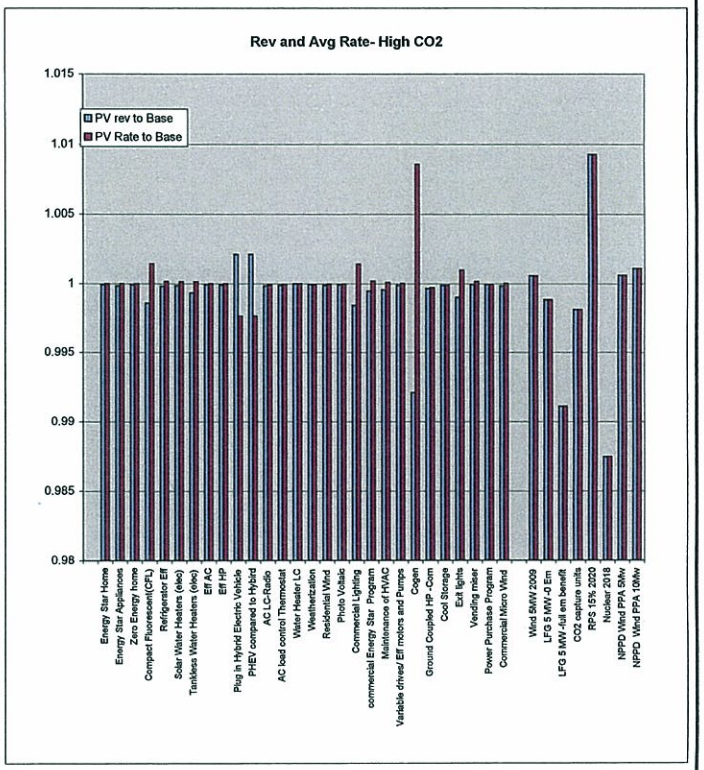


Case comparison

Case comparison (High CO2)

Financial Model Case results

Case	Name	Class	PV Rev Req ($M)	Bas case CO2 costs	High CO2 costs	Net High	Capacity (Sum of Annual MW's)	Energy (Sum of Annual GWh's)	Average Rate ($/MWh)	PV rev to Base	PV Rate to Base
Base			$4,693.0	$363	$1,001	$5,331.0	17,977.0	75,908.4	$70.229		
DSM 1	Energy Star Home	Res	$4,692.6	$363	$1,001	$5,330.5	17,975.2	75,902.6	$70.229	99.99%	100.00%
DSM 2	Energy Star Appliances	Res	$4,692.2	$363	$1,001	$5,330.1	17,970.0	75,896.2	$70.228	99.98%	100.00%
DSM 3	Zero Energy home	Res	$4,692.5	$363	$1,001	$5,330.5	17,975.1	75,902.1	$70.228	99.99%	100.00%
DSM 5	Compact Fluorescent(CFL)	Res	$4,686.2	$363	$1,000	$5,323.4	17,958.6	75,692.4	$70.329	99.86%	100.14%
DSM 8	Refrigerator Eff	Res	$4,692.1	$363	$1,001	$5,329.9	17,973.5	75,880.9	$70.240	99.98%	100.02%
DSM 10	Solar Water Heaters (elec)	Res	$4,692.2	$363	$1,001	$5,330.2	17,975.9	75,886.2	$70.239	99.98%	100.01%
DSM 11	Tankless Water Heaters (elec)	Res	$4,689.6	$363	$1,001	$5,327.4	17,966.8	75,847.1	$70.238	99.93%	100.01%
DSM 14A	Eff AC	Res	$4,692.6	$363	$1,001	$5,330.5	17,970.7	75,903.6	$70.228	99.99%	100.00%
DSM 14B	Eff HP	Res	$4,692.6	$363	$1,001	$5,330.5	17,975.0	75,902.8	$70.228	99.99%	100.00%
DSM 17	Plug in Hybrid Electric Vehicle	Res	$4,703.0	$364	$1,004	$5,342.2	17,981.9	76,248.3	$70.063	100.21%	99.76%
DSM 17A	PHEV compared to Hybird	Res	$4,703.0	$364	$1,004	$5,342.2	17,981.9	76,248.3	$70.063	100.21%	99.76%
DSM 18	AC LC-Radio	Res	$4,692.2	$363	$1,001	$5,330.1	17,464.0	75,904.1	$70.222	99.98%	99.99%
DSM 19	AC load control Thermostat	Res	$4,692.4	$363	$1,001	$5,330.3	17,350.1	75,903.2	$70.225	99.99%	99.99%
DSM 20	Water Heater LC	Res	$4,693.0	$363	$1,001	$5,331.0	17,961.0	75,908.4	$70.229	100.00%	100.00%
DSM 22	Weatherization	Res	$4,692.7	$363	$1,001	$5,330.6	17,976.6	75,907.9	$70.225	99.99%	99.99%
DSM 23	Residential Wind	Res	$4,692.4	$363	$1,001	$5,330.3	17,976.2	75,902.1	$70.227	99.99%	100.00%
DSM 26	Photo Voltaic	Res	$4,692.7	$363	$1,001	$5,330.6	17,975.0	75,905.3	$70.227	99.99%	100.00%
DSM 27	Commercial Lighting	Com	$4,685.4	$363	$1,000	$5,322.6	17,906.9	75,682.1	$70.328	99.84%	100.14%
DSM 30	commercial Energy Star Program	Com	$4,690.4	$363	$1,001	$5,328.2	17,969.8	75,855.4	$70.241	99.95%	100.02%
DSM 32	Maintenance of HVAC	Com	$4,690.7	$363	$1,001	$5,328.5	17,935.1	75,867.3	$70.235	99.95%	100.01%
DSM 33	Variable drives/ Eff motors and Pumps	Com/Ind	$4,692.4	$363	$1,001	$5,330.3	17,973.0	75,898.3	$70.230	99.99%	100.00%
DSM 34	Cogen	Ind	$4,655.5	$360	$994	$5,288.9	17,763.0	74,670.0	$70.830	99.21%	100.86%
DSM 36	Ground Coupled HP -Com	Com	$4,690.9	$364	$1,002	$5,329.1	17,744.9	75,903.6	$70.208	99.96%	99.97%
DSM 38	Cool Storage	Com	$4,692.3	$363	$1,002	$5,330.3	17,917.0	75,908.4	$70.221	99.99%	99.99%
DSM 39	Exit lights	Com/Ind	$4,688.2	$363	$1,000	$5,325.6	17,957.8	75,757.0	$70.299	99.90%	100.10%
DSM 40	Vending miser	Com	$4,692.9	$363	$1,001	$5,330.7	17,977.0	75,893.8	$70.239	100.00%	100.01%
DSM 42	Power Purchase Program	Ind	$4,692.7	$363	$1,001	$5,330.7	17,902.0	75,907.1	$70.226	99.99%	100.00%
DSM 44	Commercial Micro Wind	Com/Ind	$4,692.2	$363	$1,001	$5,330.1	17,975.3	75,894.7	$70.230	99.98%	100.00%
Supply 1	Wind 5MW 2009	System	$4,697.2	$363	$999	$5,334.0	17,954.9	75,908.4	$70.269	100.06%	100.06%
Supply 2	LFG 5 MW -0 Em	System	$4,689.3	$362	$997	$5,324.7	17,892.0	75,908.4	$70.147	99.88%	99.88%
Supply 2A	LFG 5 MW -full em benefit	System	$4,675.0	$347	$956	$5,283.5	17,892.0	75,908.4	$69.604	99.11%	99.11%
Supply 3	CO2 capture units	System	$4,750.2	$307	$878	$5,321.0	17,977.0	75,908.4	$70.097	99.81%	99.81%
Supply 4	RPS 15% 2020	System	$4,826.7	$303	$857	$5,380.4	17,977.0	75,908.4	$70.881	100.93%	100.93%
Supply 5	Nuclear 2018	System	$4,713.8	$295	$845	$5,264.2	17,977.0	75,908.4	$69.350	98.75%	98.75%
Supply 6	NPPD Wind PPA 5Mw	System	$4,697.4	$363	$999	$5,334.2	17,977.0	75,908.4	$70.272	100.06%	100.06%
Supply 7	NPPD Wind PPA 10Mw	System	$4,700.9	$362	$998	$5,336.8	17,977.0	75,908.4	$70.306	100.11%	100.11%



APPENDIX D

CO_2 Cost Calculation

CO2 COST ($/Ton)

Base Case High

Emissions tons

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	0.0	0.0	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676
2007	0.0	0.0	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3063696.4	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696
2008	0.0	0.0	3,515,189	3,515,170	3,515,156	3,515,169	3,514,605	3,515,116	3,515,163	3,514,999	3,515,174	3,515,175	3,515,967	3515139	3,515,128	3,515,186	3,515,188	3,515,173	3,515,181	3,514,563	3,515,042	3,515,039	3,515,167	3,510,537	3,514,963	3,515,179	3,514,794	3,515,154	3,515,180	3,515,154
2009	0.0	0.0	3,678,007	3,677,958	3,677,855	3,677,950	3,675,079	3,677,650	3,677,881	3,677,412	3,677,967	3,677,932	3,682,443	3677944	3,677,930	3,678,003	3,678,004	3,677,930	3,677,975	3,675,092	3,677,349	3,677,896	3,677,824	3,660,865	3,680,584	3,678,113	3,676,024	3,677,798	3,677,998	3,677,840
2010	0.0	5.6	3,799,523	3,799,488	3,799,446	3,799,482	3,797,516	3,799,359	3,799,467	3,799,235	3,799,513	3,799,488	3,801,312	3,799,463	3,799,451	3,799,520	3,799,522	3,799,487	3,799,510	3,797,597	3,799,174	3,799,434	3,799,443	3,788,213	3,800,526	3,799,467	3,798,146	3,799,425	3,799,515	3,799,444
2011	0.0	8.0	3,729,986	3,729,951	3,729,905	3,729,950	3,728,546	3,729,804	3,729,913	3,729,614	3,729,945	3,729,952	3,732,473	3,729,861	3,729,836	3,729,980	3,729,983	3,729,951	3,729,966	3,728,511	3,729,646	3,729,671	3,729,924	3,726,632	3,729,732	3,730,109	3,728,983	3,729,880	3,729,955	3,729,910
2012	0.0	10.6	3,679,228	3,679,171	3,679,125	3,679,170	3,677,376	3,678,994	3,679,125	3,678,622	3,679,162	3,679,186	3,681,858	3,679,097	3,679,072	3,679,221	3,679,222	3,679,182	3,679,196	3,677,230	3,678,762	3,678,621	3,679,171	3,671,820	3,676,658	3,679,056	3,677,956	3,679,112	3,679,185	3,679,129
2013	0.0	13.2	3,780,558	3,780,506	3,780,481	3,780,507	3,779,327	3,780,398	3,780,480	3,780,090	3,780,505	3,780,534	3,782,293	3,780,438	3,780,414	3,780,553	3,780,553	3,780,527	3,780,535	3,779,190	3,780,235	3,779,937	3,780,544	3,772,009	3,776,180	3,780,401	3,779,704	3,780,480	3,780,517	3,780,492
2014	0.0	16.0	3,749,309	3,749,232	3,749,185	3,749,232	3,746,907	3,749,014	3,749,169	3,748,514	3,749,232	3,749,255	3,752,593	3,749,215	3,749,196	3,749,307	3,749,301	3,749,249	3,749,270	3,746,737	3,748,718	3,748,397	3,749,258	3,733,771	3,743,069	3,749,093	3,747,716	3,749,164	3,749,270	3,749,178
2015	6.3	18.9	3,689,115	3,689,042	3,688,978	3,689,039	3,686,496	3,688,781	3,688,973	3,688,344	3,689,033	3,689,055	3,692,978	3,689,021	3,689,002	3,689,113	3,689,108	3,689,047	3,689,072	3,686,334	3,688,468	3,688,437	3,689,014	3,676,284	3,685,148	3,688,955	3,687,302	3,688,941	3,689,076	3,688,967
2016	7.8	22.0	3,668,621	3,668,513	3,668,456	3,668,511	3,665,246	3,668,201	3,668,430	3,667,533	3,668,522	3,668,540	3,673,338	3,668,531	3,668,510	3,668,621	3,668,611	3,668,532	3,668,567	3,665,065	3,667,788	3,667,483	3,668,528	3,649,412	3,661,102	3,668,386	3,666,348	3,668,412	3,668,584	3,668,427
2017	9.3	25.3	4,259,841	4,259,722	4,259,504	4,259,702	4,253,805	4,259,065	4,259,557	4,258,535	4,259,740	4,259,683	4,269,670	4,259,762	4,259,746	4,259,836	4,259,834	4,259,653	4,259,766	4,253,685	4,258,406	4,259,419	4,259,468	4,230,896	4,267,265	4,260,172	4,255,518	4,259,376	4,259,829	4,259,436
2018	10.9	28.7	4,163,214	4,163,085	4,162,895	4,163,071	4,157,737	4,162,496	4,162,932	4,161,883	4,163,096	4,163,077	4,172,411	4,163,101	4,163,080	4,163,208	4,163,203	4,163,049	4,163,141	4,157,535	4,161,889	4,162,276	4,162,932	4,131,729	4,163,537	4,163,547	4,159,211	4,162,775	4,163,172	4,162,857
2019	12.6	32.2	4,565,394	4,565,267	4,565,042	4,565,247	4,559,264	4,564,599	4,565,078	4,564,033	4,565,299	4,565,231	4,575,563	4,565,343	4,565,332	4,565,391	4,565,385	4,565,194	4,565,321	4,559,117	4,563,932	4,564,640	4,565,052	4,520,694	4,572,233	4,566,166	4,560,929	4,564,915	4,565,387	4,564,963
2020	14.4	36.0	4,622,256	4,622,141	4,621,942	4,622,123	4,616,282	4,621,507	4,621,956	4,620,998	4,622,152	4,622,107	4,632,019	4,622,185	4,622,170	4,622,253	4,622,248	4,622,070	4,622,188	4,616,175	4,620,895	4,621,472	4,621,945	4,590,457	4,627,054	4,623,295	4,617,864	4,621,791	4,622,248	4,621,853
2021	16.3	38.6	4,494,567	4,494,421	4,494,188	4,494,405	4,487,845	4,493,692	4,494,211	4,492,884	4,494,416	4,494,394	4,505,344	4,494,381	4,494,344	4,494,555	4,494,554	4,494,359	4,494,474	4,487,566	4,492,933	4,493,401	4,494,233	4,458,511	4,507,988	4,495,043	4,489,730	4,494,066	4,494,522	4,494,118
2022	18.4	41.3	4,682,548	4,682,417	4,682,226	4,682,404	4,677,067	4,681,822	4,682,244	4,681,182	4,682,421	4,682,409	4,691,840	4,682,375	4,682,341	4,682,537	4,682,535	4,682,372	4,682,474	4,676,840	4,681,216	4,681,351	4,682,296	4,651,068	4,682,902	4,683,241	4,678,504	4,682,109	4,682,503	4,682,169
2023	20.5	44.2	5,026,822	5,026,600	5,026,243	5,026,569	5,016,367	5,025,462	5,026,256	5,024,445	5,026,647	5,026,556	5,044,054	5,027,071	5,027,113	5,026,855	5,026,804	5,026,497	5,026,694	5,016,106	5,024,320	5,025,342	5,026,266	4,963,888	5,031,650	5,028,405	5,019,204	5,026,015	5,026,836	5,026,121
2024	22.8	47.2	5,001,966	5,001,760	5,001,425	5,001,731	4,992,300	5,000,703	5,001,440	4,999,754	5,001,798	5,001,721	5,017,947	5,002,187	5,002,225	5,001,997	5,001,950	5,001,664	5,001,845	4,991,982	4,999,634	5,000,528	5,001,458	4,945,184	5,005,756	5,003,226	4,994,896	5,001,220	5,001,980	5,001,314
2025	25.2	50.3	5,148,035	5,147,842	5,147,514	5,147,812	5,138,610	5,146,805	5,147,541	5,145,953	5,147,879	5,147,789	5,163,811	5,148,014	5,148,007	5,148,039	5,148,020	5,147,735	5,147,921	5,138,401	5,145,790	5,146,871	5,147,508	5,094,346	5,154,782	5,149,393	5,141,134	5,147,291	5,148,033	5,147,389
	M tons		81.199	81.197	81.194	81.196	81.115	81.188	81.194	81.178	81.197	81.196	81.332	81.198	81.197	81.199	81.198	81.196	81.197	81.112	81.179	81.185	81.194	80.721	81.226	81.206	81.138	81.192	81.198	81.193
	M tons Benefit elect			0.002	0.005	0.002	0.084	0.011	0.004	0.020	0.002	0.002	-0.134	0.001	0.001	0.000	0.000	0.003	0.001	0.086	0.020	0.014	0.004	0.478	-0.027	-0.007	0.060	0.006	0.0004	0.0054
	M tons Benefit Other			0.004		0.002						conv	0.637				0.003				0.009			-0.245	0.178					-0.0016
												HVO	0.334																

Cost (K$)

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2014	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2015	$23,241	$23,241	$23,241	$23,241	$23,225	$23,239	$23,241	$23,237	$23,241	$23,241	$23,266	$23,241	$23,241	$23,241	$23,241	$23,241	$23,241	$23,224	$23,237	$23,237	$23,241	$23,161	$23,216	$23,240	$23,230	$23,240	$23,241	$23,240
2016	$28,505	$28,504	$28,504	$28,504	$28,479	$28,502	$28,504	$28,497	$28,504	$28,505	$28,542	$28,504	$28,504	$28,505	$28,505	$28,504	$28,505	$28,478	$28,499	$28,496	$28,504	$28,356	$28,447	$28,503	$28,488	$28,504	$28,505	$28,504
2017	$39,617	$39,615	$39,613	$39,615	$39,560	$39,609	$39,614	$39,604	$39,616	$39,615	$39,708	$39,616	$39,616	$39,616	$39,616	$39,615	$39,616	$39,559	$39,603	$39,613	$39,613	$39,347	$39,686	$39,620	$39,576	$39,612	$39,616	$39,613
2018	$45,462	$45,461	$45,459	$45,461	$45,402	$45,454	$45,459	$45,448	$45,461	$45,461	$45,563	$45,461	$45,461	$45,462	$45,462	$45,460	$45,462	$45,400	$45,448	$45,452	$45,459	$45,118	$45,466	$45,466	$45,419	$45,458	$45,462	$45,458
2019	$57,615	$57,614	$57,611	$57,613	$57,538	$57,605	$57,611	$57,598	$57,614	$57,613	$57,744	$57,615	$57,614	$57,615	$57,615	$57,613	$57,614	$57,536	$57,597	$57,606	$57,611	$57,051	$57,702	$57,625	$57,559	$57,609	$57,615	$57,610
2020	$66,560	$66,559	$66,556	$66,559	$66,474	$66,550	$66,556	$66,542	$66,559	$66,558	$66,701	$66,559	$66,559	$66,560	$66,560	$66,558	$66,560	$66,473	$66,541	$66,549	$66,556	$66,103	$66,630	$66,575	$66,497	$66,554	$66,560	$66,555
2021	$73,396	$73,394	$73,390	$73,394	$73,287	$73,382	$73,390	$73,369	$73,394	$73,393	$73,572	$73,393	$73,393	$73,396	$73,396	$73,393	$73,395	$73,282	$73,370	$73,377	$73,391	$72,807	$73,615	$73,404	$73,317	$73,388	$73,396	$73,389
2022	$86,018	$86,016	$86,012	$86,016	$85,918	$86,005	$86,013	$85,993	$86,016	$86,016	$86,189	$86,015	$86,015	$86,018	$86,018	$86,015	$86,017	$85,914	$85,994	$85,996	$86,014	$85,440	$86,025	$86,031	$85,944	$86,010	$86,018	$86,011
2023	$103,100	$103,096	$103,088	$103,095	$102,886	$103,072	$103,089	$103,051	$103,097	$103,095	$103,454	$103,105	$103,106	$103,101	$103,100	$103,093	$103,097	$102,880	$103,049	$103,070	$103,089	$101,809	$103,195	$103,133	$102,944	$103,084	$103,100	$103,096
2024	$113,945	$113,940	$113,932	$113,939	$113,725	$113,916	$113,933	$113,894	$113,941	$113,939	$114,309	$113,950	$113,951	$113,946	$113,944	$113,938	$113,942	$113,717	$113,892	$113,912	$113,935	$112,651	$114,031	$113,973	$113,784	$113,928	$113,945	$113,930
2025	$129,525	$129,520	$129,511	$129,519	$129,287	$129,494	$129,512	$129,472	$129,521	$129,518	$129,921	$129,524	$129,524	$129,525	$129,524	$129,517	$129,522	$129,282	$129,468	$129,495	$129,511	$128,174	$129,694	$129,559	$129,351	$129,506	$129,525	$129,508
	$766,985	$766,959	$766,918	$766,956	$765,781	$766,829	$766,922	$766,706	$766,963	$766,955	$768,968	$766,984	$766,983	$766,986	$766,983	$766,948	$766,970	$765,745	$766,697	$766,804	$766,922	$760,018	$767,711	$767,130	$766,109	$766,892	$766,983	$766,904
	Benefit	$26	$67	$29	$1,204	$156	$64	$279	$22	$31	-$1,983	$2	$2	-$1	$2	$38	$15	$1,240	$288	$182	$63	$6,967	-$725	-$144	$877	$93	$2	$81

PV Cost (K$)

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2014	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2015	$14,982	$14,981	$14,981	$14,981	$14,971	$14,980	$14,981	$14,979	$14,981	$14,981	$14,997	$14,981	$14,981	$14,982	$14,982	$14,981	$14,981	$14,970	$14,979	$14,979	$14,981	$14,930	$14,966	$14,981	$14,974	$14,981	$14,981	$14,981
2016	$17,500	$17,499	$17,499	$17,499	$17,484	$17,498	$17,499	$17,495	$17,499	$17,499	$17,522	$17,499	$17,499	$17,500	$17,500	$17,499	$17,499	$17,483	$17,496	$17,494	$17,499	$17,408	$17,464	$17,499	$17,489	$17,499	$17,500	$17,499
2017	$23,163	$23,162	$23,161	$23,162	$23,130	$23,159	$23,161	$23,156	$23,162	$23,162	$23,216	$23,163	$23,162	$23,163	$23,163	$23,162	$23,163	$23,129	$23,155	$23,161	$23,161	$23,006	$23,203	$23,165	$23,139	$23,160	$23,163	$23,161
2018	$25,315	$25,314	$25,313	$25,314	$25,282	$25,311	$25,313	$25,307	$25,314	$25,314	$25,371	$25,314	$25,314	$25,315	$25,315	$25,314	$25,315	$25,281	$25,307	$25,309	$25,313	$25,124	$25,317	$25,317	$25,291	$25,312	$25,315	$25,313
2019	$30,555	$30,554	$30,552	$30,554	$30,514	$30,549	$30,552	$30,546	$30,554	$30,554	$30,623	$30,554	$30,554	$30,555	$30,555	$30,553	$30,554	$30,513	$30,545	$30,550	$30,552	$30,255	$30,600	$30,560	$30,525	$30,551	$30,555	$30,552
2020	$33,618	$33,617	$33,615	$33,617	$33,574	$33,612	$33,615	$33,608	$33,617	$33,616	$33,689	$33,617	$33,617	$33,618	$33,618	$33,616	$33,617	$33,573	$33,608	$33,612	$33,615	$33,386	$33,652	$33,625	$33,586	$33,614	$33,618	$33,615
2021	$35,305	$35,304	$35,302	$35,304	$35,252	$35,298	$35,302	$35,292	$35,304	$35,304	$35,390	$35,303	$35,303	$35,305	$35,305	$35,303	$35,304	$35,250	$35,292	$35,296	$35,302	$35,022	$35,410	$35,309	$35,267	$35,301	$35,305	$35,301
2022	$39,406	$39,405	$39,403	$39,405	$39,360	$39,400	$39,403	$39,395	$39,405	$39,405	$39,484	$39,405	$39,404	$39,406	$39,406	$39,405	$39,405	$39,358	$39,395	$39,396	$39,404	$39,141	$39,409	$39,412	$39,372	$39,402	$39,406	$39,403
2023	$44,982	$44,980	$44,977	$44,980	$44,889	$44,970	$44,977	$44,961	$44,981	$44,980	$45,136	$44,984	$44,985	$44,983	$44,982	$44,979	$44,981	$44,886	$44,960	$44,969	$44,977	$44,419	$45,025	$44,996	$44,914	$44,975	$44,982	$44,976
2024	$47,346	$47,344	$47,341	$47,344	$47,255	$47,334	$47,341	$47,325	$47,345	$47,344	$47,498	$47,349	$47,349	$47,347	$47,346	$47,344	$47,345	$47,252	$47,324	$47,333	$47,342	$46,809	$47,382	$47,358	$47,279	$47,339	$47,347	$47,340
2025	$51,257	$51,255	$51,252	$51,255	$51,163	$51,245	$51,252	$51,237	$51,256	$51,255	$51,414	$51,257	$51,257	$51,257	$51,257	$51,254	$51,256	$51,161	$51,235	$51,246	$51,252	$50,723	$51,324	$51,271	$51,189	$51,250	$51,257	$51,251
	$363,428	$363,416	$363,397	$363,415	$362,873	$363,356	$363,399	$363,299	$363,418	$363,414	$364,340	$363,427	$363,426	$363,429	$363,427	$363,411	$363,421	$362,857	$363,295	$363,344	$363,399	$360,222	$363,754	$363,492	$363,025	$363,386	$363,427	$363,391
	PV Benefit	$12	$31	$14	$555	$72	$29	$129	$10	$14	-$912	$2	$2	$0	$1	$17	$7	$572	$133	$85	$29	$3,206	-$326	-$64	$404	$43	$1	$37

PV Benefit (K$)

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2014	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

2015	$0	$0	$1	$0	$11	$1	$1	$3	$0	$0	-$16	$0	$0	$0	$0	$0	$0	$11	$3	$3	$0	$52	$16	$1	$7	$1	$0	$1
2016	$0	$1	$1	$1	$16	$2	$1	$5	$0	$0	-$23	$0	$1	$0	$0	$0	$0	$17	$4	$5	$0	$92	$36	$1	$11	$1	$0	$1
2017	$0	$1	$2	$1	$33	$4	$2	$7	$1	$1	-$53	$0	$1	$0	$0	$1	$0	$33	$8	$2	$2	$157	-$40	-$2	$24	$3	$0	$2
2018	$0	$1	$2	$1	$33	$4	$2	$8	$1	$1	-$56	$1	$1	$0	$0	$1	$0	$35	$8	$6	$2	$191	-$2	-$2	$24	$3	$0	$2
2019	$0	$1	$2	$1	$41	$5	$2	$9	$1	$1	-$68	$0	$0	$0	$0	$1	$0	$42	$10	$5	$2	$299	-$46	-$5	$30	$3	$0	$3
2020	$0	$1	$2	$1	$43	$5	$2	$9	$1	$1	-$71	$1	$1	$0	$0	$1	$0	$44	$10	$6	$2	$231	-$35	-$8	$32	$3	$0	$3
2021	$0	$1	$3	$1	$53	$7	$3	$13	$1	$1	-$85	$1	$2	$0	$0	$2	$1	$55	$13	$9	$3	$283	-$105	-$4	$38	$4	$0	$4
2022	$0	$1	$3	$1	$46	$6	$3	$11	$1	$1	-$78	$1	$2	$0	$0	$1	$1	$48	$11	$10	$2	$265	-$3	-$6	$34	$4	$0	$3
2023	$0	$2	$5	$2	$94	$12	$5	$21	$2	$2	-$154	-$2	-$3	$0	$0	$3	$1	$96	$22	$13	$5	$563	-$43	-$14	$68	$7	$0	$6
2024	$0	$2	$5	$2	$91	$12	$5	$21	$2	$2	-$151	-$2	-$2	$0	$0	$3	$1	$95	$22	$14	$5	$537	-$36	-$12	$67	$7	$0	$6
2025	$0	$2	$5	$2	$94	$12	$5	$21	$2	$2	-$157	$0	$0	$0	$0	$3	$1	$96	$22	$12	$5	$535	-$67	-$14	$69	$7	$0	$6
	$0	$12	$31	$14	$555	$72	$29	$129	$10	$14	-$912	$2	$2	$0	$1	$17	$7	$572	$133	$85	$29	$3,206	-$326	-$64	$404	$43	$1	$37

Cost (K$)

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2010	$21,285	$21,285	$21,285	$21,285	$21,274	$21,284	$21,285	$21,284	$21,285	$21,285	$21,295	$21,285	$21,285	$21,285	$21,285	$21,285	$21,285	$21,274	$21,283	$21,285	$21,285	$21,222	$21,291	$21,285	$21,277	$21,285	$21,285	$21,285
2011	$29,927	$29,926	$29,926	$29,926	$29,915	$29,925	$29,926	$29,924	$29,926	$29,926	$29,947	$29,926	$29,926	$29,927	$29,927	$29,926	$29,927	$29,915	$29,924	$29,924	$29,926	$29,900	$29,925	$29,928	$29,919	$29,926	$29,926	$29,926
2012	$38,827	$38,826	$38,825	$38,826	$38,807	$38,824	$38,825	$38,820	$38,826	$38,826	$38,854	$38,825	$38,825	$38,826	$38,826	$38,826	$38,826	$38,805	$38,822	$38,820	$38,826	$38,748	$38,799	$38,825	$38,813	$38,825	$38,826	$38,825
2013	$49,883	$49,882	$49,882	$49,882	$49,867	$49,881	$49,882	$49,877	$49,882	$49,883	$49,906	$49,882	$49,881	$49,883	$49,883	$49,883	$49,883	$49,865	$49,879	$49,875	$49,883	$49,770	$49,825	$49,881	$49,872	$49,882	$49,883	$49,882
2014	$59,810	$59,809	$59,808	$59,809	$59,772	$59,805	$59,808	$59,798	$59,809	$59,809	$59,863	$59,809	$59,808	$59,810	$59,810	$59,809	$59,810	$59,769	$59,801	$59,796	$59,809	$59,562	$59,711	$59,807	$59,785	$59,808	$59,810	$59,808
2015	$69,737	$69,736	$69,735	$69,736	$69,688	$69,731	$69,735	$69,723	$69,736	$69,736	$69,810	$69,735	$69,735	$69,737	$69,737	$69,736	$69,736	$69,685	$69,725	$69,724	$69,735	$69,495	$69,662	$69,734	$69,703	$69,734	$69,736	$69,734
2016	$80,719	$80,716	$80,715	$80,716	$80,644	$80,709	$80,714	$80,695	$80,716	$80,717	$80,822	$80,717	$80,716	$80,719	$80,718	$80,717	$80,717	$80,640	$80,700	$80,694	$80,717	$80,296	$80,553	$80,713	$80,669	$80,714	$80,718	$80,714
2017	$107,582	$107,579	$107,573	$107,578	$107,429	$107,562	$107,575	$107,549	$107,579	$107,578	$107,830	$107,580	$107,579	$107,582	$107,582	$107,577	$107,580	$107,426	$107,546	$107,571	$107,572	$106,851	$107,769	$107,590	$107,473	$107,570	$107,582	$107,572
2018	$119,347	$119,343	$119,338	$119,343	$119,190	$119,326	$119,339	$119,309	$119,343	$119,343	$119,610	$119,343	$119,343	$119,347	$119,346	$119,342	$119,345	$119,184	$119,309	$119,320	$119,339	$118,444	$119,356	$119,356	$119,232	$119,334	$119,346	$119,336
2019	$147,211	$147,206	$147,199	$147,206	$147,013	$147,185	$147,200	$147,167	$147,208	$147,205	$147,538	$147,209	$147,209	$147,210	$147,210	$147,204	$147,208	$147,008	$147,163	$147,186	$147,200	$145,769	$147,431	$147,235	$147,067	$147,195	$147,210	$147,197
2020	$166,379	$166,374	$166,367	$166,374	$166,164	$166,352	$166,368	$166,333	$166,375	$166,373	$166,730	$166,376	$166,375	$166,378	$166,378	$166,372	$166,376	$166,160	$166,330	$166,350	$166,367	$165,234	$166,551	$166,416	$166,220	$166,362	$166,378	$166,364
2021	$173,470	$173,464	$173,455	$173,463	$173,210	$173,436	$173,456	$173,405	$173,463	$173,463	$173,885	$173,462	$173,461	$173,469	$173,469	$173,462	$173,466	$173,199	$173,406	$173,425	$173,457	$172,078	$173,988	$173,488	$173,283	$173,450	$173,468	$173,452
2022	$193,494	$193,488	$193,480	$193,488	$193,267	$193,464	$193,481	$193,437	$193,488	$193,488	$193,878	$193,486	$193,485	$193,493	$193,493	$193,486	$193,491	$193,258	$193,439	$193,444	$193,463	$192,193	$193,508	$193,522	$193,327	$193,476	$193,492	$193,478
2023	$222,091	$222,081	$222,065	$222,080	$221,629	$222,031	$222,066	$221,966	$222,083	$222,079	$222,852	$222,102	$222,104	$222,092	$222,090	$222,077	$222,085	$221,618	$221,980	$222,026	$222,066	$219,310	$222,304	$222,161	$221,754	$222,055	$222,092	$222,060
2024	$235,981	$235,971	$235,955	$235,970	$235,525	$235,921	$235,956	$235,876	$235,973	$235,969	$236,735	$235,991	$235,993	$235,982	$235,980	$235,967	$235,975	$235,510	$235,871	$235,913	$235,957	$233,302	$236,160	$236,040	$235,647	$235,946	$235,982	$235,950
2025	$259,036	$259,026	$259,009	$259,024	$258,561	$258,974	$259,011	$258,931	$259,028	$259,023	$259,829	$259,035	$259,034	$259,036	$259,035	$259,021	$259,030	$258,551	$258,923	$258,977	$259,009	$256,334	$259,375	$259,104	$258,688	$258,998	$259,035	$259,003
	$1,974,776	$1,974,714	$1,974,619	$1,974,706	$1,971,955	$1,974,411	$1,974,627	$1,974,112	$1,974,722	$1,974,704	$1,979,386	$1,974,763	$1,974,759	$1,974,777	$1,974,771	$1,974,689	$1,974,740	$1,971,867	$1,974,100	$1,974,330	$1,974,631	$1,958,509	$1,976,209	$1,975,086	$1,972,729	$1,974,560	$1,974,768	$1,974,588
	Benefit	$62	$157	$70	$2,821	$365	$149	$664	$54	$72	-$4,610	$13	$16	-$1	$5	$87	$36	$2,908	$676	$446	$145	$16,267	-$1,433	-$310	$2,047	$216	$8	$188

PV Cost (K$)

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2010	$17,511	$17,511	$17,511	$17,511	$17,502	$17,511	$17,511	$17,510	$17,511	$17,511	$17,520	$17,511	$17,511	$17,511	$17,511	$17,511	$17,511	$17,502	$17,510	$17,511	$17,511	$17,459	$17,516	$17,511	$17,505	$17,511	$17,511	$17,511
2011	$23,448	$23,448	$23,448	$23,448	$23,439	$23,447	$23,448	$23,446	$23,448	$23,448	$23,464	$23,448	$23,447	$23,448	$23,448	$23,448	$23,448	$23,438	$23,446	$23,446	$23,448	$23,427	$23,447	$23,449	$23,442	$23,448	$23,448	$23,448
2012	$28,973	$28,973	$28,972	$28,973	$28,958	$28,971	$28,972	$28,968	$28,972	$28,973	$28,994	$28,972	$28,972	$28,973	$28,973	$28,973	$28,973	$28,957	$28,969	$28,968	$28,973	$28,915	$28,953	$28,972	$28,963	$28,972	$28,973	$28,972
2013	$35,451	$35,451	$35,450	$35,451	$35,439	$35,450	$35,450	$35,447	$35,451	$35,451	$35,467	$35,450	$35,450	$35,451	$35,451	$35,451	$35,451	$35,438	$35,448	$35,445	$35,451	$35,371	$35,410	$35,450	$35,443	$35,450	$35,451	$35,450
2014	$40,482	$40,481	$40,481	$40,481	$40,456	$40,479	$40,480	$40,473	$40,481	$40,481	$40,517	$40,481	$40,481	$40,482	$40,482	$40,481	$40,481	$40,454	$40,476	$40,472	$40,481	$40,314	$40,415	$40,480	$40,465	$40,480	$40,481	$40,480
2015	$44,953	$44,952	$44,952	$44,952	$44,921	$44,949	$44,952	$44,944	$44,952	$44,952	$45,000	$44,952	$44,952	$44,953	$44,953	$44,952	$44,953	$44,919	$44,945	$44,945	$44,952	$44,797	$44,905	$44,951	$44,931	$44,951	$44,953	$44,951
2016	$49,554	$49,553	$49,552	$49,553	$49,509	$49,549	$49,552	$49,539	$49,553	$49,553	$49,618	$49,553	$49,553	$49,554	$49,554	$49,553	$49,553	$49,506	$49,543	$49,539	$49,553	$49,295	$49,453	$49,551	$49,523	$49,551	$49,554	$49,552
2017	$62,901	$62,899	$62,896	$62,899	$62,812	$62,889	$62,897	$62,882	$62,899	$62,899	$63,046	$62,900	$62,899	$62,901	$62,901	$62,898	$62,900	$62,810	$62,880	$62,895	$62,895	$62,473	$63,011	$62,906	$62,837	$62,894	$62,901	$62,895
2018	$66,457	$66,455	$66,452	$66,454	$66,369	$66,445	$66,452	$66,435	$66,455	$66,455	$66,604	$66,455	$66,455	$66,457	$66,457	$66,454	$66,456	$66,366	$66,436	$66,442	$66,452	$65,954	$66,462	$66,462	$66,393	$66,450	$66,456	$66,451
2019	$78,069	$78,067	$78,063	$78,066	$77,964	$78,055	$78,064	$78,046	$78,067	$78,066	$78,243	$78,068	$78,068	$78,069	$78,069	$78,065	$78,068	$77,962	$78,044	$78,056	$78,063	$77,305	$78,186	$78,082	$77,993	$78,051	$78,069	$78,062
2020	$84,032	$84,030	$84,027	$84,030	$83,924	$84,019	$84,027	$84,010	$84,031	$84,030	$84,210	$84,031	$84,031	$84,032	$84,032	$84,029	$84,031	$83,922	$84,008	$84,018	$84,027	$83,454	$84,120	$84,051	$83,953	$84,024	$84,032	$84,025
2021	$83,442	$83,439	$83,435	$83,439	$83,317	$83,426	$83,435	$83,411	$83,439	$83,439	$83,642	$83,438	$83,438	$83,442	$83,442	$83,438	$83,440	$83,312	$83,411	$83,420	$83,436	$82,772	$83,691	$83,451	$83,352	$83,433	$83,441	$83,433
2022	$88,642	$88,639	$88,636	$88,639	$88,538	$88,628	$88,636	$88,616	$88,639	$88,639	$88,818	$88,638	$88,638	$88,641	$88,641	$88,638	$88,640	$88,534	$88,616	$88,619	$88,637	$88,046	$88,648	$88,655	$88,565	$88,633	$88,641	$88,634
2023	$96,898	$96,893	$96,886	$96,893	$96,696	$96,871	$96,887	$96,852	$96,894	$96,892	$97,230	$96,902	$96,903	$96,898	$96,897	$96,891	$96,895	$96,691	$96,849	$96,869	$96,887	$95,684	$96,991	$96,928	$96,751	$96,882	$96,898	$96,884
2024	$98,055	$98,051	$98,044	$98,050	$97,865	$98,030	$98,045	$98,012	$98,052	$98,050	$98,368	$98,059	$98,060	$98,056	$98,055	$98,049	$98,053	$97,859	$98,009	$98,027	$98,045	$96,942	$98,129	$98,080	$97,916	$98,040	$98,055	$98,042
2025	$102,509	$102,505	$102,499	$102,505	$102,322	$102,485	$102,499	$102,468	$102,506	$102,504	$102,823	$102,509	$102,509	$102,509	$102,509	$102,503	$102,507	$102,317	$102,464	$102,486	$102,499	$101,440	$102,644	$102,536	$102,372	$102,494	$102,509	$102,496
	$1,001,377	$1,001,347	$1,001,302	$1,001,344	$1,000,032	$1,001,203	$1,001,306	$1,001,057	$1,001,351	$1,001,343	$1,003,563	$1,001,367	$1,001,365	$1,001,378	$1,001,375	$1,001,336	$1,001,360	$999,989	$1,001,055	$1,001,156	$1,001,309	$993,649	$1,001,978	$1,001,514	$1,000,403	$1,001,275	$1,001,373	$1,001,288
	PV Benefit	$30	$75	$34	$1,345	$174	$71	$320	$26	$34	-$2,186	$10	$12	$0	$2	$41	$17	$1,388	$322	$219	$68	$7,726	-$601	-$137	$974	$102	$5	$89

PV Benefit (K$)

Year	Base	DSM 1 Energy Star home	DSM 2 Energy Star Appliances	DSM 3 Zero Energy Home	DSM 5 Compact Fluorescent(CFL)	DSM 8 Refrigerator Eff	DSM 10 Solar Water Heater (elec)	DSM 11 Tankless Water heater(elec)	DSM 14A Eff AC	DSM 14B Eff HP	DSM 17 PHEV	DSM 18 AC LC-Radio	DSM 19 AC load control Thermostat	DSM 20 Water Heater LC	DSM 22 Weatherizatio n	DSM 23 Residential Wind	DSM 26 Photo Voltaic	DSM 27 Commercial Lighting	DSM 30 commercial Energy Star Program	DSM 32 Maintenance of HVAC	DSM 33 Variable drives/ Eff motors and Pumps	DSM 34 Cogen	DSM 36 GCHP - Com	DSM 38 Cool Storage	DSM 39 Exit lights	DSM 40 Vending miser	DSM 42 Power Purchase Program	DSM 44 Commercial Micro Wind
2006	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$9	$1	$0	$1	$0	$0	-$8	$0	$0	$0	$0	$0	$0	$9	$2	$0	$0	$52	-$5	$0	$6	$0	$0	$0
2011	$0	$0	$0	$0	$9	$1	$0	$2	$0	$0	-$16	$1	$1	$0	$0	$0	$0	$9	$2	$2	$0	$21	$2	-$1	$6	$1	$0	$0
2012	$0	$0	$1	$0	$15	$2	$1	$5	$1	$0	-$21	$1	$1	$0	$0	$0	$0	$16	$4	$5	$0	$58	$20	$1	$10	$1	$0	$1
2013	$0	$0	$1	$0	$12	$1	$1	$4	$0	$0	-$16	$1	$1	$0	$0	$0	$0	$13	$3	$6	$0	$80	$41	$1	$8	$1	$0	$1
2014	$0	$1	$1	$1	$26	$3	$2	$9	$1	$1	-$35	$1	$1	$0	$0	$1	$0	$28	$6	$10	$1	$168	$67	$2	$17	$2	$0	$1
2015	$0	$1	$2	$1	$32	$4	$2	$9	$1	$1	-$47	$1	$1	$0	$0	$1	$1	$34	$8	$8	$1	$156	$48	$2	$22	$2	$0	$2
2016	$0	$1	$2	$1	$46	$6	$3	$15	$1	$1	-$64	$1	$2	$0	$0	$1	$1	$48	$11	$15	$1	$259	$102	$3	$31	$3	$1	$3
2017	$0	$2	$5	$2	$89	$11	$4	$19	$1	$2	-$145	$1	$1	$0	$0	$3	$1	$91	$21	$6	$6	$427	-$110	-$5	$64	$7	$0	$6
2018	$0	$2	$5	$2	$87	$11	$5	$21	$2	$2	-$147	$2	$2	$0	$0	$3	$1	$91	$21	$15	$4	$503	-$5	-$5	$64	$7	$1	$6
2019	$0	$2	$6	$3	$105	$14	$5	$23	$2	$3	-$174	$1	$1	$0	$0	$3	$1	$107	$25	$13	$6	$764	-$117	-$13	$76	$8	$0	$7
2020	$0	$2	$6	$2	$109	$14	$5	$23	$2	$3	-$177	$1	$2	$0	$0	$3	$1	$111	$25	$14	$6	$578	-$87	-$19	$80	$8	$0	$7
2021	$0	$3	$7	$3	$125	$16	$7	$31	$3	$3	-$200	$3	$4	$0	$0	$4	$2	$130	$30	$22	$6	$669	-$249	-$9	$90	$9	$1	$8
2022	$0	$2	$6	$3	$104	$14	$6	$26	$2	$3	-$176	$3	$4	$0	$0	$3	$1	$108	$25	$23	$5	$596	-$7	-$13	$77	$8	$1	$7
2023	$0	$4	$11	$5	$202	$26	$11	$46	$3	$5	-$332	-$5	-$6	-$1	$0	$6	$2	$207	$48	$29	$11	$1,213	-$93	-$31	$147	$16	$0	$14
2024	$0	$4	$11	$5	$189	$25	$10	$43	$3	$5	-$313	-$4	-$5	-$1	$0	$6	$2	$196	$46	$28	$10	$1,113	-$74	-$25	$139	$15	$0	$13
2025	$0	$4	$10	$4	$188	$24	$10	$41	$3	$5	-$314	$0	$1	$0	$0	$6	$2	$192	$45	$23	$10	$1,069	-$134	-$27	$137	$15	$0	$13
	$0	$30	$75	$34	$1,345	$174	$71	$320	$26	$34	-$2,186	$10	$12	$0	$2	$41	$17	$1,388	$322	$219	$68	$7,728	-$601	-$137	$974	$102	$5	$89

CO2 COST ($/Ton)

Base Case	High	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year		Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	0.0	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676	2,880,676
2007	0.0	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696	3,063,696
2008	0.0	3,515,189	3,515,189	3,515,189	3,515,189	3,515,189	3,515,189	3,515,189	3,515,189
2009	0.0	3,673,904	3,668,169	3,486,579	3,678,007	3,475,899	3,678,007	3,673,957	3,669,223
2010	0.0	3,796,902	3,792,695	3,611,105	3,799,523	3,594,903	3,799,523	3,796,934	3,794,163
2011	0.0	3,728,284	3,725,736	3,544,146	3,729,986	3,529,701	3,729,986	3,728,304	3,726,591
2012	0.0	3,677,167	3,674,095	3,492,505	3,679,228	3,475,693	3,679,228	3,677,191	3,675,418
2013	0.0	3,779,265	3,776,703	3,595,113	3,780,558	3,571,534	3,780,558	3,779,279	3,778,017
2014	0.0	3,746,596	3,741,028	3,559,438	3,749,309	3,533,117	3,749,309	3,746,633	3,743,440
2015	6.3	3,686,006	3,680,720	3,499,130	3,689,115	3,430,251	3,689,115	3,686,043	3,682,948
2016	7.8	3,664,622	3,658,204	3,476,614	3,668,621	3,401,999	3,730,618	3,664,668	3,660,716
2017	9.3	4,250,921	4,242,404	4,060,814	4,259,841	3,825,645	3,763,651	4,251,023	4,242,493
2018	10.9	4,155,557	4,145,441	3,963,851	4,163,214	3,685,094	3,373,502	4,155,644	4,147,895
2019	12.6	4,555,931	4,545,323	4,363,733	3,889,340	3,932,900	3,252,428	4,556,038	4,546,145
2020	14.4	4,612,665	4,602,518	4,420,928	3,938,576	3,956,241	3,797,424	4,612,777	4,622,843
2021	16.3	4,484,843	4,473,933	4,292,343	3,810,752	3,833,471	3,717,574	4,484,953	4,475,264
2022	18.4	4,674,325	4,664,063	4,482,473	3,985,212	3,963,608	3,853,623	4,674,419	4,665,220
2023	20.5	5,011,637	4,993,199	4,811,609	3,805,286	3,947,648	3,863,209	5,011,811	4,996,688
2024	22.8	4,987,794	4,970,821	4,789,231	3,744,015	3,871,797	3,829,940	4,987,955	4,973,822
2025	25.2	5,133,942	5,117,673	4,936,083	3,875,215	3,957,869	3,936,780	5,134,102	5,120,045
	M tons	81.080	80.932	77.845	74.705	72.447	72.684	81.081	80.980
M tons Benefit elect		0.119	0.266	3.353	6.493	8.752	8.515	0.117	0.218
M tons Benefit Other									

D3

	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year	Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$0	$0	$0	$0
2011	$0	$0	$0	$0	$0	$0	$0	$0
2012	$0	$0	$0	$0	$0	$0	$0	$0
2013	$0	$0	$0	$0	$0	$0	$0	$0
2014	$0	$0	$0	$0	$0	$0	$0	$0
2015	$23,222	$23,189	$22,045	$23,241	$21,611	$23,241	$23,222	$23,203
2016	$28,474	$28,424	$27,013	$28,505	$26,434	$28,987	$28,474	$28,444
2017	$39,534	$39,454	$37,766	$39,617	$35,578	$35,002	$39,535	$39,455
2018	$45,379	$45,268	$43,285	$45,462	$40,241	$36,839	$45,380	$45,295
2019	$57,496	$57,362	$55,070	$49,083	$49,633	$41,046	$57,497	$57,372
2020	$66,422	$66,276	$63,661	$56,715	$56,970	$54,683	$66,424	$66,569
2021	$73,237	$73,059	$70,094	$62,230	$62,601	$60,708	$73,239	$73,081
2022	$85,867	$85,679	$82,343	$73,208	$72,811	$70,791	$85,869	$85,700
2023	$102,789	$102,411	$98,686	$78,046	$80,966	$79,234	$102,792	$102,482
2024	$113,622	$113,235	$109,099	$85,289	$88,200	$87,246	$113,626	$113,304
2025	$129,170	$128,761	$124,192	$97,500	$99,580	$99,049	$129,174	$128,820
	$765,212	$763,118	$733,254	$638,898	$634,625	$616,826	$765,232	$763,725
	$1,773	$3,867	$33,731	$128,088	$132,361	$150,159	$1,753	$3,260

	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year	Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$0	$0	$0	$0
2011	$0	$0	$0	$0	$0	$0	$0	$0
2012	$0	$0	$0	$0	$0	$0	$0	$0
2013	$0	$0	$0	$0	$0	$0	$0	$0
2014	$0	$0	$0	$0	$0	$0	$0	$0
2015	$14,969	$14,948	$14,210	$14,982	$13,930	$14,982	$14,969	$14,957
2016	$17,481	$17,450	$16,584	$17,500	$16,228	$17,795	$17,481	$17,462
2017	$23,114	$23,068	$22,081	$23,163	$20,802	$20,465	$23,115	$23,069
2018	$25,269	$25,207	$24,103	$25,315	$22,408	$20,513	$25,269	$25,222
2019	$30,491	$30,420	$29,205	$26,030	$26,322	$21,767	$30,492	$30,426
2020	$33,548	$33,474	$32,153	$28,645	$28,774	$27,619	$33,549	$33,622
2021	$35,228	$35,143	$33,716	$29,933	$30,112	$29,202	$35,229	$35,153
2022	$39,337	$39,250	$37,722	$33,538	$33,356	$32,430	$39,338	$39,260
2023	$44,846	$44,681	$43,056	$34,051	$35,325	$34,570	$44,848	$44,713
2024	$47,212	$47,052	$45,333	$35,439	$36,649	$36,253	$47,214	$47,080
2025	$51,117	$50,955	$49,147	$38,584	$39,407	$39,197	$51,119	$50,979
	$362,613	$361,648	$347,311	$307,181	$303,312	$294,792	$362,622	$361,941
	$816	$1,780	$16,118	$56,248	$60,116	$68,636	$806	$1,487
		Added PV Benefit	$14,338					

	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year	Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0
2010	$0	$0	$0	$0	$0	$0	$0	$0
2011	$0	$0	$0	$0	$0	$0	$0	$0
2012	$0	$0	$0	$0	$0	$0	$0	$0
2013	$0	$0	$0	$0	$0	$0	$0	$0
2014	$0	$0	$0	$0	$0	$0	$0	$0

2015	$13	$34	$772	$0	$1,051	$0	$12	$25
2016	$19	$50	$916	$0	$1,272	-$296	$19	$38
2017	$49	$95	$1,082	$0	$2,361	$2,698	$48	$94
2018	$47	$108	$1,212	$0	$2,907	$4,802	$46	$93
2019	$63	$134	$1,350	$4,525	$4,233	$8,787	$63	$129
2020	$70	$144	$1,464	$4,972	$4,844	$5,999	$69	$94
2021	$76	$162	$1,588	$5,371	$5,193	$6,103	$76	$152
2022	$69	$156	$1,684	$5,868	$6,050	$6,976	$68	$146
2023	$136	$301	$1,926	$10,931	$9,657	$10,413	$134	$270
2024	$134	$295	$2,014	$11,907	$10,698	$11,094	$133	$266
2025	$140	$302	$2,110	$12,673	$11,850	$12,060	$139	$279
	$816	$1,780	$16,118	$56,248	$60,116	$68,636	$806	$1,487

	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year	Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0
2010	$21,270	$21,247	$20,230	$21,285	$20,139	$21,285	$21,271	$21,255
2011	$29,913	$29,893	$28,436	$29,927	$28,320	$29,927	$29,913	$29,899
2012	$38,805	$38,772	$36,856	$38,827	$36,679	$38,827	$38,805	$38,786
2013	$49,866	$49,832	$47,436	$49,883	$47,125	$49,883	$49,866	$49,850
2014	$59,767	$59,678	$56,781	$59,810	$56,361	$59,810	$59,768	$59,717
2015	$69,678	$69,579	$66,146	$69,737	$64,844	$69,737	$69,679	$69,621
2016	$80,631	$80,489	$76,494	$80,719	$74,852	$82,083	$80,632	$80,545
2017	$107,357	$107,141	$102,555	$107,582	$96,616	$95,051	$107,359	$107,144
2018	$119,127	$118,837	$113,632	$119,347	$105,640	$96,708	$119,130	$118,908
2019	$146,905	$146,563	$140,708	$125,411	$126,816	$104,874	$146,909	$146,590
2020	$166,033	$165,668	$159,132	$141,769	$142,405	$136,689	$166,037	$166,400
2021	$173,094	$172,673	$165,665	$147,077	$147,954	$143,481	$173,098	$172,725
2022	$193,154	$192,730	$185,226	$164,678	$163,785	$159,241	$193,158	$192,778
2023	$221,420	$220,605	$212,583	$168,122	$174,412	$170,681	$221,428	$220,760
2024	$235,312	$234,512	$225,945	$176,634	$182,662	$180,687	$235,320	$234,653
2025	$258,326	$257,508	$248,371	$194,991	$199,150	$198,088	$258,335	$257,627
	$1,970,660	$1,965,728	$1,886,194	$1,695,799	$1,667,761	$1,637,052	$1,970,707	$1,967,255
	$4,116	$9,048	$88,582	$278,977	$307,015	$337,724	$4,069	$7,520

	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year	Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0
2010	$17,499	$17,480	$16,643	$17,511	$16,568	$17,511	$17,499	$17,487
2011	$23,438	$23,422	$22,280	$23,448	$22,189	$23,448	$23,438	$23,427
2012	$28,957	$28,933	$27,503	$28,973	$27,370	$28,973	$28,957	$28,943
2013	$35,439	$35,415	$33,712	$35,451	$33,491	$35,451	$35,439	$35,427
2014	$40,453	$40,392	$38,432	$40,482	$38,148	$40,482	$40,453	$40,419
2015	$44,915	$44,851	$42,638	$44,953	$41,799	$44,953	$44,916	$44,878
2016	$49,500	$49,413	$46,961	$49,554	$45,953	$50,392	$49,501	$49,447
2017	$62,769	$62,643	$59,962	$62,901	$56,490	$55,574	$62,771	$62,645
2018	$66,334	$66,173	$63,274	$66,457	$58,825	$53,851	$66,336	$66,212
2019	$77,907	$77,726	$74,620	$66,508	$67,253	$55,617	$77,909	$77,740
2020	$83,858	$83,674	$80,372	$71,603	$71,924	$69,037	$83,860	$84,043
2021	$83,261	$83,059	$79,688	$70,747	$71,169	$69,017	$83,263	$83,083
2022	$88,486	$88,292	$84,854	$75,441	$75,032	$72,950	$88,488	$88,314
2023	$96,605	$96,249	$92,749	$73,351	$76,095	$74,468	$96,608	$96,317
2024	$97,777	$97,444	$93,885	$73,395	$75,900	$75,079	$97,780	$97,503
2025	$102,229	$101,905	$98,289	$77,164	$78,810	$78,390	$102,232	$101,952
	$999,427	$997,071	$955,862	$877,940	$857,016	$845,193	$999,450	$997,837
	$1,950	$4,307	$45,516	$123,437	$144,362	$156,184	$1,927	$3,541
		Added PV Benefit	$41,209					

	Supply 1	Supply 2	Supply 2A	Supply 3	Supply 4	Supply 5	Supply 6	Supply 7
Year	Wind 5MW 2009	LFG 5 MW -0 Em	LFG 5 MW - Adjusted	CO2 capture units	RPS 15% 2020	Nuclear 2018	NPPD Wind PPA 5Mw	NPPD Wind PPA 10Mw
2006	$0	$0	$0	$0	$0	$0	$0	$0
2007	$0	$0	$0	$0	$0	$0	$0	$0
2008	$0	$0	$0	$0	$0	$0	$0	$0
2009	$0	$0	$0	$0	$0	$0	$0	$0
2010	$12	$31	$868	$0	$943	$0	$12	$25
2011	$11	$27	$1,168	$0	$1,259	$0	$11	$21
2012	$16	$40	$1,470	$0	$1,603	$0	$16	$30
2013	$12	$36	$1,739	$0	$1,960	$0	$12	$24
2014	$29	$89	$2,050	$0	$2,334	$0	$29	$63
2015	$38	$102	$2,315	$0	$3,154	$0	$37	$75
2016	$54	$141	$2,594	$0	$3,601	-$837	$53	$107
2017	$132	$257	$2,939	$0	$6,411	$7,327	$130	$256
2018	$122	$284	$3,182	$0	$7,632	$12,606	$121	$245
2019	$162	$343	$3,448	$11,561	$10,816	$22,452	$160	$329
2020	$174	$359	$3,660	$12,429	$12,108	$14,995	$172	-$11
2021	$181	$383	$3,754	$12,695	$12,273	$14,425	$178	$358
2022	$156	$350	$3,787	$13,201	$13,610	$15,692	$154	$328
2023	$293	$648	$4,148	$23,546	$20,802	$22,430	$289	$581
2024	$278	$611	$4,170	$24,660	$22,155	$22,976	$275	$552
2025	$281	$605	$4,220	$25,345	$23,699	$24,119	$277	$557
	$1,950	$4,307	$45,516	$123,437	$144,362	$156,184	$1,927	$3,541