

**INTEGRATED RESOURCE PLAN
CALENDAR YEARS
2016 TO 2020**

LINCOLN COUNTY POWER DISTRICT NO. 1
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Adopted February 8, 2016

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SECTION 1

SUMMARY

1. General

The Lincoln County Power District No. 1 (Lincoln) has prepared this integrated resource plan (IRP) in conformance with the Energy Planning and Management Program developed by the Western Area Power Administration as set forth in 10 CFR 905. The IRP prepared by Lincoln covers the period including calendar years 2016 through the end of 2020. A significant amount of research, analysis, public input and management thought has gone into development of LCPD's IRP. This report provides a summary of Lincoln's IRP.

2. Loads and Resources

As presented in the following sections of this report, Lincoln's base system energy requirement is expected to increase at an average annual rate of 0.75% over the next several years. Lincoln's existing allocation of Boulder Canyon Project power would be sufficient to meet these expected loads through the term of this IRP. However, since the onset of the drought in the Colorado River drainage basin, generation from Hoover Dam has been reduced. Lincoln has not received its full allocation of Hoover Dam power since 2005. This hydrologic situation is not expected to improve during this IRP planning period. During these low water release periods, Lincoln has and will continue to have to purchase supplemental power from the wholesale energy markets.

3. Goals and Programs

In consideration of the information contained in this report, Lincoln has established the following goals relating to this IRP. These goals are based on the underlying premise that Lincoln has an abundance of resource capacity but due to low capacity factor of the Hoover resource, a need to conserve energy.

Supply Side Goals

- Resource Diversification. It is the goal of Lincoln to continue to diversify its resource portfolio to make it less susceptible to curtailments in the supply chain, such as those caused by drought within the Colorado River drainage basin.

- **Cost Stabilization.** It is the goal of Lincoln to identify and incorporate non-natural gas fueled generation resources into its power supply mix in order to minimize the impact of increases in natural gas prices on Lincoln’s rates.

Resource Delivery Goals

- **Loss Mitigation.** It is the goal of Lincoln to continue to rehabilitate and upgrade its aged electric infrastructure to improve reliability and to reduce energy losses from the current level of 9%.
- **Distributed Generation.** It is the goal of Lincoln to continue to look for opportunities to install distributed generation within Lincoln’s electric system to assist with losses minimization.

Demand Side Goals

- **Residential Energy Conservation.** It is the goal of Lincoln to develop and offer programs to assist residents in lowering their energy consumption and electric bills.
- **Agriculture Energy Conservation.** It is the goal of Lincoln to develop and offer programs to assist agriculture producers in lowering their energy consumption and electric bills.
- **Low Income Assistance.** It is the goal of Lincoln to develop programs and offer services specifically targeted to low income and elderly residents of Lincoln County to help them reduce their energy consumption and electric bills.

4. Programs

As presented in this IRP report, Lincoln plans to ensure the continued efficient use of its resources, including federal hydroelectric power, through a series of programs designed to promote renewable energy purchases and to promote energy conservation by end-users served by Lincoln or local distribution utilities. These programs include:

Small Scale Utility Owned Solar Development

- During the IRP planning period, Lincoln intends to construct or contract for approximately 270 KW of renewable solar photovoltaic generation.

Customer Owned Small Scale Renewable Energy Projects

- Annually for the term of this IRP, Lincoln shall offer a rebate program for the installation of customer owned small scale renewable energy projects.

Meadow Valley Reconductoring

- During the term of this IRP, Lincoln shall replace and reconnector approximately 15 miles of the Meadow Valley distribution circuit in order to reduce system losses.

Residential and Commercial High Efficiency Air Conditioning and Heating

- Annually for the term of this IRP, Lincoln shall offer a rebate program for the installation of high efficiency air conditioners and air source heat pumps.

LED Lighting

- Annually for the term of this IRP, Lincoln shall distribute up to 600, 10 watt LED bulbs to encourage customers to switch to this energy efficient lighting alternative.

Weatherization

- Annually for the term of this IRP, Lincoln shall partner with the Rural Nevada Development Corporation and shall offer a weatherization program to assist low-income households in weatherizing their homes in Lincoln County.

Irrigation Efficiency

- Annually for the term of this IRP Lincoln shall offer a rebate program for the installation of irrigation system parts and components to reduce water and energy use by agriculture producers served by Lincoln.

Table 1-1 summarizes Lincoln’s planned budget and expected energy savings by year under this IRP for the period 2016 through 2020.

Table 1-1 Program Summary					
	2016	2017	2018	2019	2020
1.a. Small Scale Utility Owned Solar	\$180,000.00	\$272,950.00	\$0.00	\$0.00	\$225,102.00
1.b. Customer Owned Small Scale Renewables	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00
2.a. Meadow Valley Reconductoring	\$564,543.00	\$596,995.00	\$0.00	\$0.00	\$0.00
3.a. Residential and Commercial High Efficiency Air Conditioning and Heating.	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00

3.b. LED Lighting	\$4,170.00	\$4,170.00	\$4,170.00	\$4,170.00	\$4,170.00
3.c. Weatherization	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00
3.d. Irrigation Efficiency	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00
Total Annual Budget	\$769,713.00	\$895,115.00	\$25,170.00	\$25,170.00	\$250,272.00
Expected Energy Savings (KWh)	204,072	255,072	54,825	54,825	224,825
Cumulative Energy Savings (KWh)	204,072	459,143	513,968	568,793	793,618

As evident from the table, the programs to be undertaken by Lincoln during the IRP planning period are expected to produce a total energy savings of 793,618 KWH, with 58% or 459,000 KWH resulting from Lincoln’s planned development of solar photovoltaic generation.

SECTION 2

BACKGROUND

1. Lincoln County Power District No. 1

The Lincoln County Power District No. 1 (Lincoln) is a political subdivision of the State of Nevada, created on June 24, 1935 by Order and Opinion of the Public Service Commission of the State of Nevada as a Power District under Chapter 72 of the laws of Nevada. These laws were subsequently revised and Lincoln is now considered a General Improvement District governed by Chapter 318 of the Nevada Revised Statutes. As a General Improvement District, Lincoln is governed by a five member board elected by citizens residing within Lincoln's boundaries.

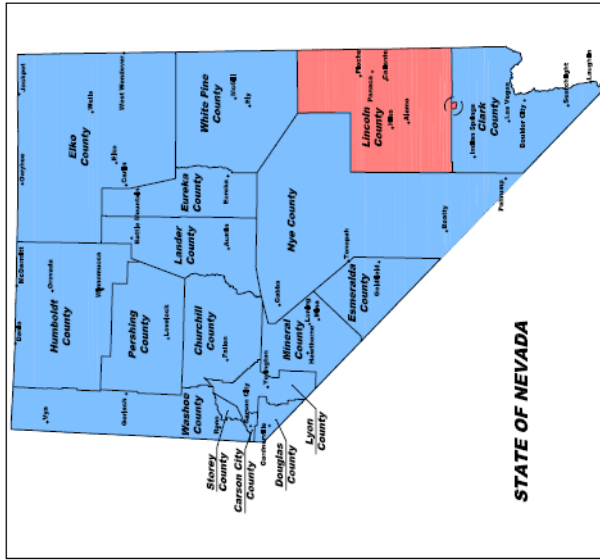
The function of Lincoln is to provide electric service throughout Lincoln County, Nevada and adjoining areas. The map on the following page identifies Lincoln's service territory and the communities served. As a General Improvement District, Lincoln does not profit from the sale of electric energy and its primary purpose is to provide a public good by serving the electric energy needs of its customers.

Lincoln, headquartered in Caselton, Nevada, does not own any significant electric generation facilities and purchases most of the electric power necessary for its customers from two sources. The primary source of electric power used in Lincoln County is from the Boulder Canyon Project (Hoover Dam), a hydroelectric generation station operated by the U.S. Bureau of Reclamation. This power allocated to Lincoln through a long-term contract with the Colorado River Commission of Nevada, a state agency. To meet needs above and beyond that which can be served from Lincoln's allocation of hydroelectric power, Lincoln purchases electric power from Silver State Energy Association from the wholesale power supply markets.

In 2015 Lincoln constructed a 90 kW solar photovoltaic generating plant. The generating station was placed into service on July 1, 2015 and is expected to generate approximately 153,000 kWhs annually. A portion of this project was offered by Lincoln to its customers for direct participation, making the project the first community solar project in the state of Nevada.

Lincoln owns and operates, or has long-term contractual arrangements for, all of the necessary transmission facilities to import hydroelectric and supplemental power into Lincoln County, and Lincoln owns all of the necessary transmission and distribution facilities to distribute electric power to Lincoln's customers within Lincoln County.

LINCOLN COUNTY POWER DISTRICT NO. 1 SERVICE AREA MAP



LINCOLN COUNTY POWER DISTRICT NO. 1 SERVICE AREA LEGAL DESCRIPTION
 All of Lincoln County, Nevada excluding the designated services areas of Alamo Power District No. 3, City of Callente, Ploche Public Utilities and Penoyer Valley Electric Cooperative and including that portion of Clark County, Nevada known as the Coyote Springs LLC annexation described as follows:

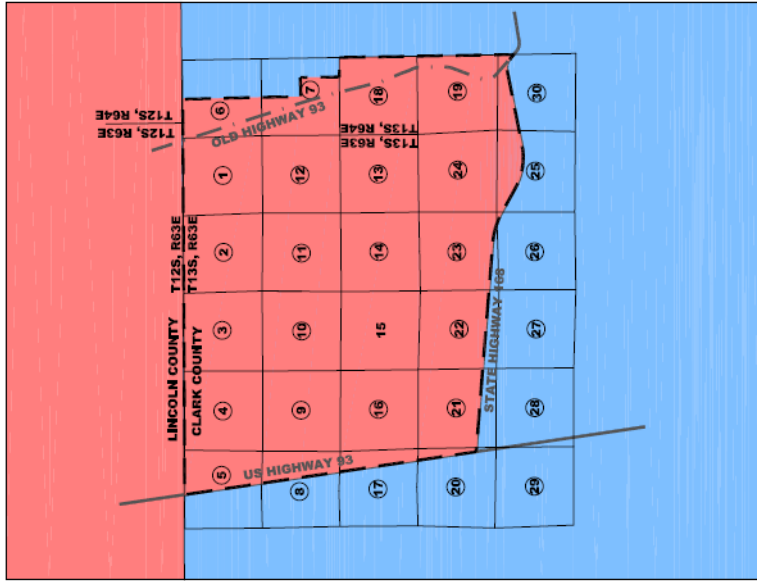
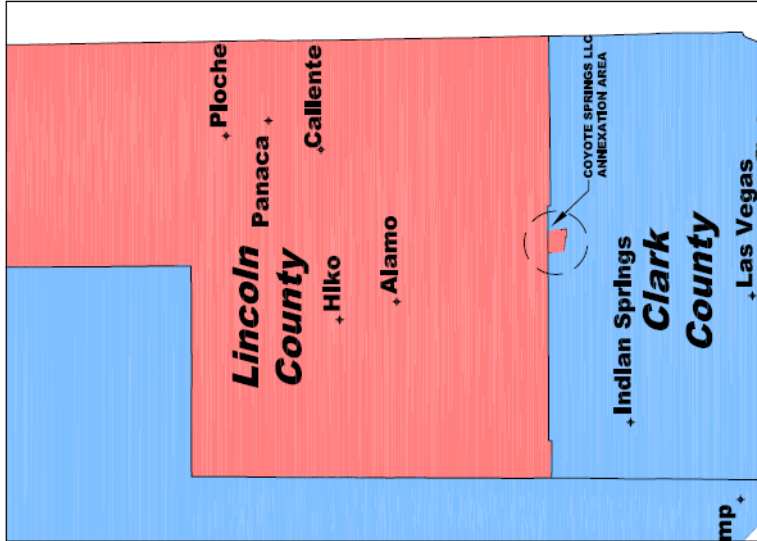
Township 13 South, Range 63 East, MDM, Clark County, Nevada.

All of Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16 and 24;
 Sections 5, 8 and 17; those portions east of the centerline of US Highway 93;
 Sections 21, 22, 23, 25 and 26; those portions north of the centerline of Nevada State Highway 168;

Section 20; that portion east of the centerline of US Highway 93 and north of the centerline of Nevada State Highway 168.

Township 13 South, Range 64 East, MDM, Clark County, Nevada.

Section 6; W1/2;
 Section 7; W1/2, W1/2SE1/4;
 All of Sections 18 and 19
 Section 30; that portion north of the centerline of Nevada State Highway 168.



**Lincoln County Power
 District No. 1 Service Area**



LINCOLN COUNTY POWER DISTRICT NO. 1
 HC 74, Box 101
 Ploche, Nevada 89043

Prepared by Electrical Consultants, Inc.

2. Service Area

The service area of Lincoln encompasses all of Lincoln County, Nevada, and a small portion of Clark County, Nevada. This service area includes approximately 10,635 square miles in Lincoln County and 20 square miles in Clark County.

The elevation of Lincoln’s service area changes drastically from low areas of 2,000 feet above sea level in the southern portion of the service area to high mountain peaks in excess of 9,000 feet above sea level in the northern portion of Lincoln’s service area. These elevation differences create significant residential energy usage differences between homes located in the south of Lincoln’s service area and homes located in the north of Lincoln’s service area.

3. Residential Sector Changes

Although the southern end of Lincoln’s service area is located approximately 50 miles north of the out skirts of the Las Vegas metropolitan area (Clark County), Lincoln’s service area did not significantly benefit from the rapid growth in the metropolitan area during the period prior to 2007 as shown by Table 2-1. However, the table does reveal that as with many of the areas of the country, the economic slow-down from 2008 through 2013 did result in a loss of jobs in Lincoln County and an overall decline in Lincoln County population.

Table 2-1 Historical Population								
County	1990		2000		2010		2014	
	Population	Avg. Annual Growth	Population	Avg. Annual Growth	Population	Avg. Annual Growth	Population	Avg. Annual Growth
Lincoln	3,775	0.11%	4,165	0.99%	5,345	2.53%	5,184	-0.31%
Clark	741,459	4.82%	1,375,765	6.38%	1,951,267	3.56%	2,069,681	0.59%

Source: U.S. Census Bureau
**On-line databases from 1980 census to present.*

Although the population of Lincoln County slightly declined between 2010 and 2014 according to the U.S. Census Bureau, population levels have stabilized and are again increasing at historical rates. Table 2-2 provides the expected increase in population over the next five years.

Table 2-2 Population Projections		
Year	Population Change From Prior Year	Percent Change
2015	41	0.8%
2016	31	0.6%
2017	24	0.5%
2018	16	0.3%
2019	12	0.2%
<i>Source: State of Nevada Office of Demographer, 2015 state wide population projections by county.</i>		

Although the out year projected growth by the state demographer maybe understated, the short term growth appears consistent with local building permit activity. Twelve new building permits were issued in 2014 in Lincoln County with 18 expected to be issued by the end of 2015.

Low population levels within Lincoln County coupled with the large expanse of the County result in a population density of less than 0.5 persons per square mile which remains the lowest of all counties in Nevada. In comparison Clark County has a population density of 247.3 persons per square mile.

4. Commercial/Industrial Sector Changes

The land area of Lincoln County is generally undeveloped, with 98.8 percent held by various agencies of the United States government, including the Bureau of Land Management and the Department of Defense as shown by Table 2-3.

Table 2-3 Lincoln County Land Use Summary		
Ownership	Land Use	Total Acres
Federal	Range/Forested/Undeveloped Land	6,696,858
State	Park/Range/Undeveloped Land	7,620

Local Gov.	Park/Range/Undeveloped Land	3,169
Private	Residential, Commercial, Crop, Range, Undeveloped Land	163,168
Total		6,870,815
<i>Source: Lincoln County Public Land Policy Plan, 2010.</i>		

Of the private land in Lincoln County, a significant portion is used for farming and ranching operations. The main agriculture production in Lincoln County focuses on cattle, hay, corn and potatoes. All of these products have seen an increase in sales price over the past few years. The U.S. Department of Agriculture NASS Agriculture Price report for Nevada reveals the average price of hay in June of 2010 was \$91/ton. In comparison, the average price of hay in Nevada in June of 2015 is reported as \$185/ton. With the dramatic increases in prices received in Nevada for these products, agriculture production continues to increase in Lincoln County. The U.S. Department of Agriculture 2012 Census of Agriculture reports irrigated farm lands in Lincoln County at 22,007 acres, up from 18,320 as reported in the 2007 census. Although the next census will not be produced until 2017, antidotal evidence indicates irrigated acreage will be higher in 2017. Agriculture is, and is projected to remain the predominant export industry of Lincoln County. Gross sales of crops and livestock from Lincoln County increased from \$15,518,000 in 2007 to \$23,215,000 in 2012.¹

Services, retail trade, and local, state and federal governments historically have been and are expected to remain the predominant employer in Lincoln County. Although, small commercial enterprises may be developed within Lincoln’s service area over the next few years, no new large scale commercial or governmental facilities are forecast in the IRP planning period.

In the past, mining and milling operations constituted a large portion of Lincoln’s annual loads and were the largest industry in Lincoln County. However, as rich mineral deposits were depleted, leaving only lower grade ores, the mines and mills ceased production. Currently, only one mining and milling operation is listed as operating in Lincoln County.² This mining and milling operation is a small scale perlite surface mining operation employing approximately 9 employees. Several sand and gravel

¹ 2007 and 2012 Census of Agriculture, Lincoln County Profile, United States Department of Agriculture.

² State of Nevada Department of Business and Industry, Directory of Nevada Mine Operations, 2014.

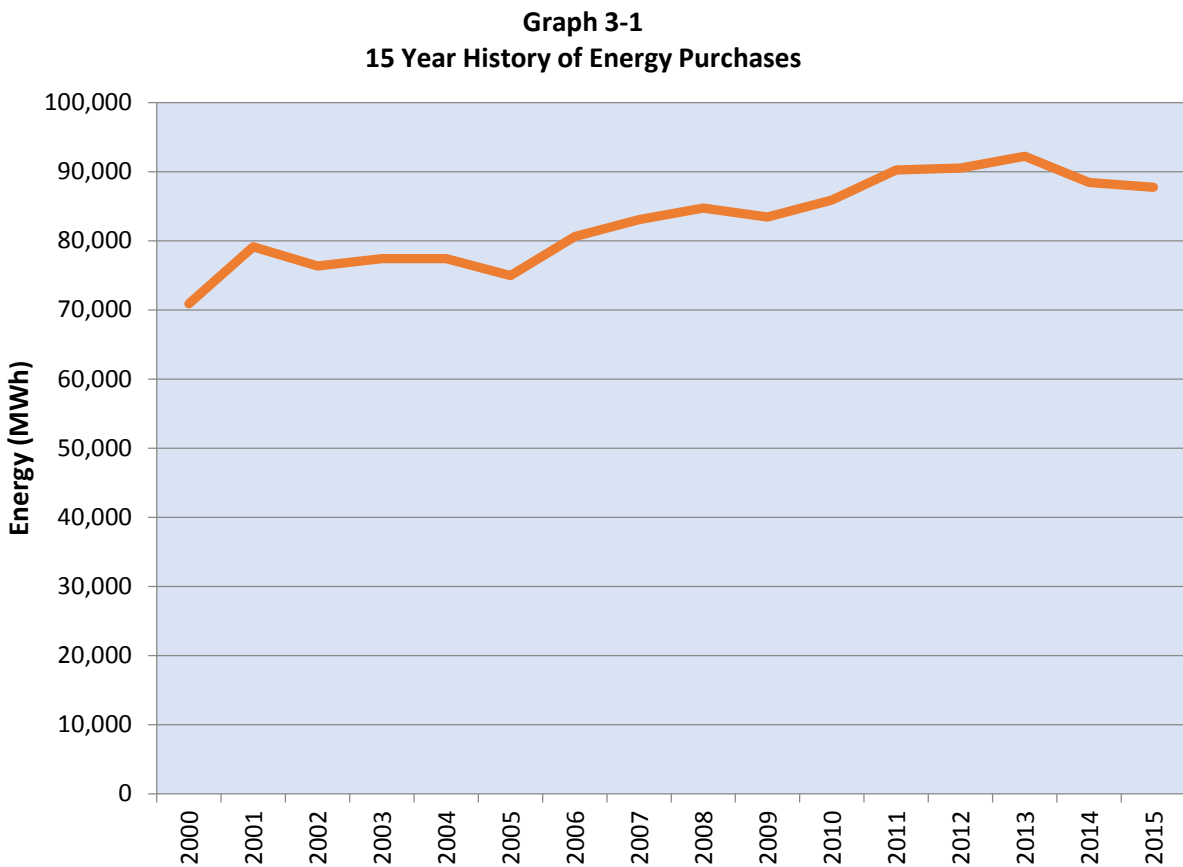
pits that operate on a sporadic basis are listed in the County.³ Although gold and silver prices have continued to increase in significant years, no mine or milling operations have contacted Lincoln regarding the reactivation of existing facilities. Several companies have performed exploratory drilling in the area, but no new mining or milling operations are forecast in the IRP planning period.

³ Ibid.

SECTION 3
ENERGY AND CAPACITY REQUIREMENTS

1. Historical System Loads

Lincoln’s system requirements represent the amount of energy and capacity that must be purchased each month for (1) sales to customers, (2) line losses, and (3) Lincoln’s own use. Lincoln’s system requirements for the past fifteen years is summarized in the graph below. As the graph demonstrates, Lincoln’s loads have increased a relatively modest, but constant rate over the past 15 years.



There is no natural gas service within Lincoln County and electric heating is the predominate heat source. Accordingly, a significant percentage of Lincoln’s winter load is created by electrical heaters and Lincoln’s summer load is created by irrigation pumps. As such, cold winters produce increased demand and energy sales while mild winters produce less. Similarly dry summers produce increased energy sales while wet summers create less energy sales. The impact of weather on Lincoln’s

loads is evident in graph 3-1 for the years 2014 and 2015 energy. The slight decrease in Lincoln's energy sales to during these years was primarily driven by weather conditions which included above average precipitation in the summer and above average temperatures in the winter, and development of local solar generation which will be discussed further in section 4 of this plan.

Lincoln will continue to remain susceptible to weather changes throughout the IRP planning period.

2. Forecast Methodology

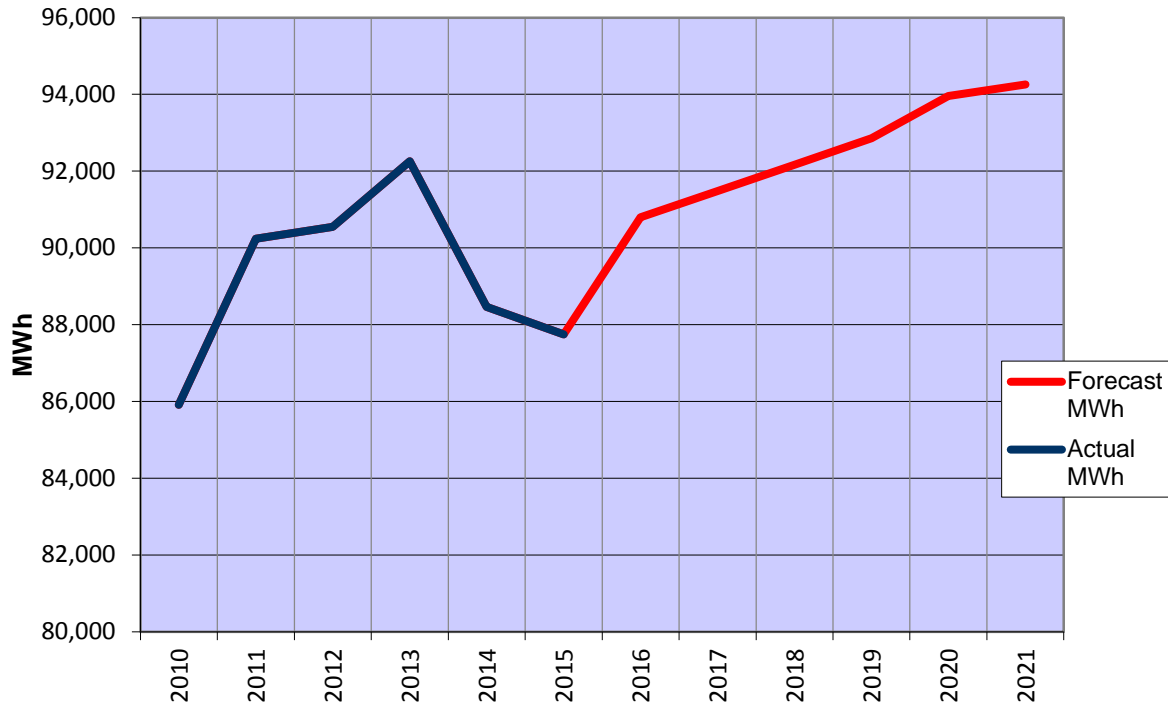
The methodology used by Lincoln to forecast its future system requirements employs a trend/time line analysis, adjusted for known and expected changes. Lincoln believes the methodology is appropriate for Lincoln due to the size of the Lincoln's load and the limited number of customers served. Specifically there are three generally accepted forecasting techniques used in the electric utility industry. These techniques are time/trend analysis, end-use analysis, and econometric analysis.⁴ Lincoln does not have sufficient data to perform an end-use analysis and given the historical growth rates within Lincoln County, the time and expense required to perform an econometric analysis is not justified. In years past, Lincoln has used econometric analysis of its loads in order to satisfy load forecasting requirements of the Rural Electrification Administration of the U.S. Department of Agriculture (now known as Rural Utility Services). Lincoln's experience was that given the small statistical sample size, econometric analysis proved less reliable than time/trend analysis for Lincoln. Given Lincoln is no longer an REA borrower, econometric analysis is no longer performed.

3. System Forecast

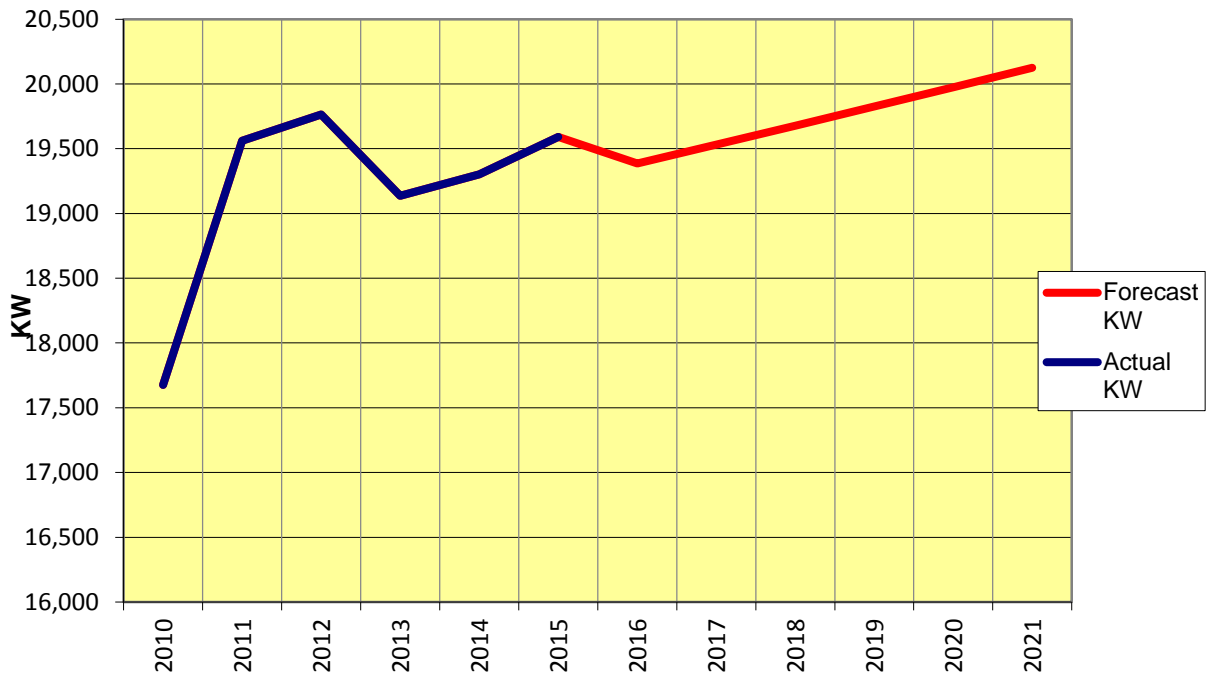
Under the Expected Load Forecast, the conditions which have existed over the past few years are expected to continue for at least the next five years. There are no known spot loads such as mines, factories, housing developments, or similar projects which are expected to come on line during the planning period. As a result base system needs are expected to increase at an average annual rate of 0.75% per year. The forecast of expected energy requirements and system demand are summarized in graph 3-2 and 3-3 on the following page.

⁴ Integrated Resource Planning, Volume 2, Section 4 – Load Forecasting, Western Area Power Administration.

Graph 3-2
System Energy - Actual and Forecast
Expected Load Case - 11/30/2015



Graph 3-3
System Peak Demand - Actual and Forecast
Expected Load Case - 11/30/2015



As evident from the graph, barring weather induced fluctuations Lincoln does not expect its system peak demand to exceed 20 MW or its energy requirements to reach 94,000 MWh until near the end of the planning period.

4. Customer Class Information

Lincoln provides electric service to customers located throughout its service area. Service is provided at both the retail and the wholesale (sale for resale), levels. Lincoln's current rate classifications appear as follows:

- Retail - Rural
 - Residential
 - Small Commercial
 - Commercial & Industrial Over 50 kVA
 - Large Municipal Water Pumping
 - Irrigation
 - Small Mixed Agricultural Use
 - Large Mixed Agricultural Use
- Retail - Urban
 - Small Commercial
 - Commercial & Industrial Over 50 kVA
 - Large Municipal Water Pumping
- Sales for Resale
 - SFR- Alamo Power District No. 3
 - SFR – City of Caliente
 - SFR- Pioche Public Utilities

The number of customers served and total energy sales to each classification is summarized in Table 3-1.

Table 3-1						
Customer Class Sales						
Classification	2006		2010		2014	
	Cust.	KWh	Cust.	KWh	Cust.	KWh
Residential	670	9,872,361	728	10,551,146	780	10,136,812
Small Commercial	123	3,046,852	131	3,044,395	150	3,330,228
Commercial & Industrial Over 50 kVA	25	2,380,731	26	3,066,910	29	3,109,786
Large Municipal Water Pumping	2	4,160,719	3	2,414,315	3	3,843,094
Irrigation	64	8,732,974	70	9,890,172	85	12,620,769
Small Mixed Agricultural Use	6	1,600,000	8	2,430,036	5	1,210,100
Large Mixed Agricultural Use	4	5,711,798	2	6,142,400	2	5,781,808
Small Commercial - Urban	0	0	2	56,342	4	93,933
Comm. & Ind. Over 50 kVA - Urban	0	0	0	0	7	1,114,066
Large Muni. Water Pumping - Urban	0	0	1	1,671,920	3	2,140,765
Sales For Resale	6	34,150,200	6	37,089,280	5	35,163,600
System Total	900	69,655,635	976	76,356,916	1,072	78,544,961
¹ Average number over the 12-month period.						

During 2014 Lincoln provided electric service to an average of 1,072 meters, of which 1,067 were retail type customer meters. However, these retail customers only accounted for 55.2% of Lincoln's total sales. The balance of Lincoln's energy sales were made to five sales for resale accounts. The five sales for resale accounts represent three customers, two of which have multiple delivery points. These three sales for resale customers accounted for the remaining 44.8% of Lincoln's energy sales. Over the past twenty years, the majority of energy sales have shifted from sales for resale classifications to retail classifications as shown in table 3-2.

Table 3-2				
Retail and Sales for Resale Energy Sales Trends				
Customer Classification	% of Total Sales 1992	% of Total Sales 2004	% of Total Sales 2007	% of Total Sales 2014
Retail	26%	49.5%	50.1%	55.2%
Sales for Resale	74%	50.5%	49.9%	44.8%

This shift between sales between retail and sales for resale is largely due to two factors. First, prior to 1992 there were eleven separate electric utilities operating in Lincoln County and receiving all-requirements sales for resale service from Lincoln. All but the three remaining electric utilities have since transferred utility responsibility to Lincoln and Lincoln now provides retail service to customers located in these affected areas. Second, Lincoln in the past several years has seen a small increase in retail load within the urban customer classification, largely due to three municipal water wells and one golf course located within the urban area. Further significant changes in the proportion of sales to retail and sales for resale customer classifications are not anticipated during the IRP planning period.

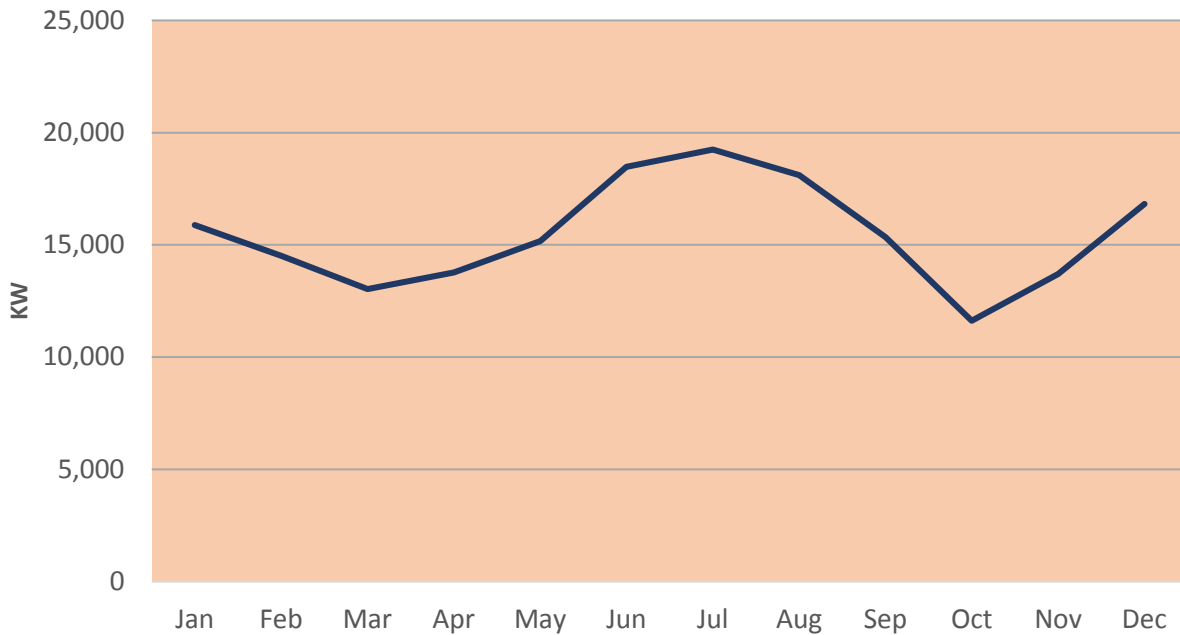
5. Seasonal Load Profile

Lincoln’s electric system exhibits a very typical load profile with peaks occurring in the summer and winter periods and low demand periods occurring in the fall and spring periods. However, unlike many systems, the difference between Lincoln’s summer and winter peaks can be minimal depending upon weather. Most years Lincoln’s peak load will occur during the summer months. However, occasionally when unseasonably cold temperatures occur, Lincoln’s system can peak during the winter months. These winter peaks occurred in 2007 and 2000. In addition, even in years when Lincoln’s peak load occurs during the summer, winter peaks are only slightly lower. For example, in 2013 Lincoln’s summer peak was 19,136 KW and its winter peak was 18,436 KW.

This unusual characteristic associated with Lincoln’s system is the result of the extensive use of electric heaters for residential heating during the winter months and the use of electric pumps for irrigation pumping during the summer. As a result, colder than normal winters followed by cooler, wetter summers can result in a winter system peak for Lincoln.

Lincoln’s five year average seasonal profile is shown in graph 3-4.

Graph 3-4
5 Year Average Monthly Peak Demand

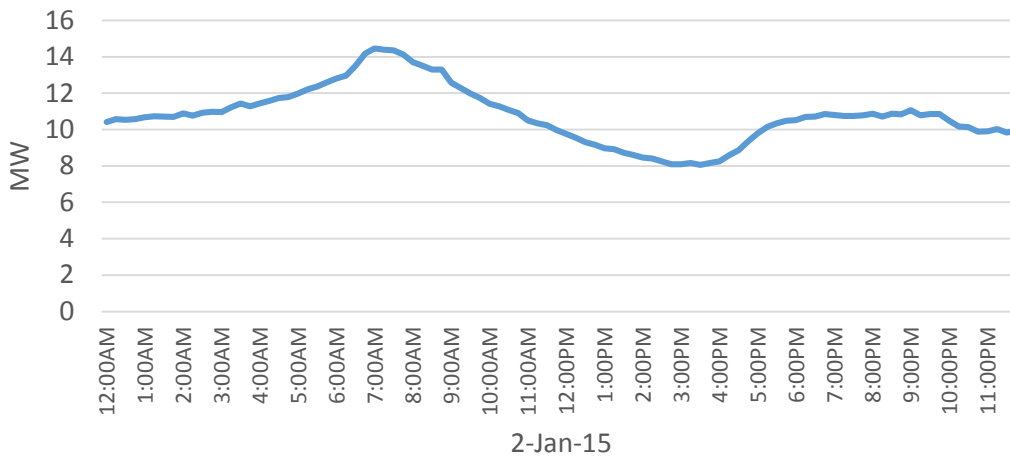


6. Daily Load Profile

Lincoln's 15-minute integrated load profiles for the summer and winter peaks for 2015 are shown by the graphs below. These graphs present the summation of data taken from Lincoln's 69-kV master meter at the Tortoise Substation and Lincoln's 138-kV meter at the Yucca Switch Station, less Overton Power District No. 5's 138-kV meter at the Canyon Substation. Consequently, the data represents all of Lincoln's system. These graphs reveal that summer daily peaks occurring in mid-afternoon hours while winter daily peaks occur in early morning hours.

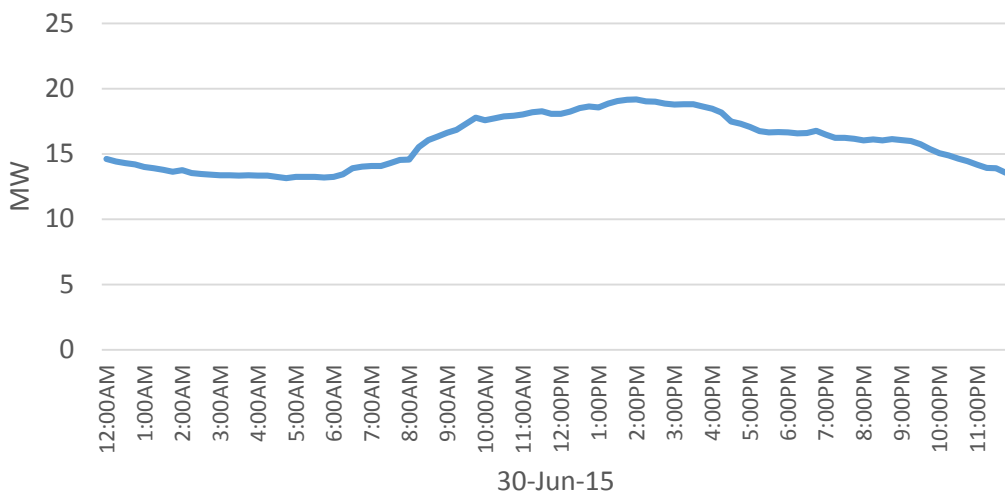
The winter peak occurred at 7:00 a.m. on January 2, 2015. This winter peak is driven primarily by residential loads. Given the lack of natural gas service and limited propane use within Lincoln County, as residences begin to arise starting at about 5:00 a.m., electric space heating, electric water heating, electric cooking and electric light energy consumption increases. These residential uses continue to increase until about 7:45 a.m. at which time people begin to depart for work. Energy loads continue to decline throughout the day until about 4:00 p.m., at which time people begin to return home and again turn up electric heaters, turn on lights and turn on electric stoves.

Graph 3-5
15 Minute Integrated Demand



The summer peak occurred at 2:00 p.m. on June 30, 2015. As graph 3-6 shows, during the summer Lincoln’s system maintains a high base load 24-hours per day due to irrigation pumps running on a 24 hour daily basis, with increases in load starting at about 6:30 a.m. caused by residential electric uses. As the day progress, electric powered air conditioning begins and creates a situation whereby Lincoln’s daily load remains high and relatively constant from about 10:00 a.m. until nearly 10:00 p.m. Actual peak demand can occur anywhere between these hours but typically occurs in the late afternoon between 2:00 p.m. and 5:00 p.m. each day.

Graph 3-6
15 Minute Integrated Demand



SECTION 4 EXISTING RESOURCES

1. Hoover Dam Power

Lincoln has capacity and energy entitlements to hydroelectric power generated at the Boulder Canyon Project (Hoover Dam). These entitlements of 26,167 KW and 98,248,343 KWh were granted to Lincoln by the Colorado River Commission of Nevada (CRC) and are set forth in Contract No. P06-50 between the parties. This contract extends through September 30, 2017, but pursuant the Act of Congress approved December 20, 2011 (125Stat. 777), Lincoln and other contractors to CRC have been guaranteed a right of renewal of their Hoover Contract pursuant to terms and conditions provided for in the new contracts currently being developed.

The primary reason Lincoln received such a large allocation of Hoover Dam power was to promote economic growth in Lincoln County, Nevada. Specifically, CRC's marketing program for federal hydroelectric power states:

"Rural development and diversification is considered by the Commission [CRC] to be of paramount importance. By allocating power to those utilities which primarily serve the rural areas, the Commission may provide assistance necessary for these areas to grow and reach the level of self-sufficiency enjoyed by the Las Vegas Valley."⁵

The composite cost of Hoover Dam power to Lincoln fluctuates year to year and month to month. Year to year fluctuations are caused by annual adjustments in the cost of Hoover Dam power as set by the Western Area Power Administration and administrative charges set by CRC. Month to month fluctuations are caused by the energy output of Hoover Dam. Given contracts for Hoover Dam power are take-or-pay in nature, Lincoln is obligated to pay for energy regardless of the level of output from Hoover Dam. As a result Lincoln has seen wide fluctuations in the composite delivered cost, ranging from lows in the 15 mill range to highs above 25 mills.

The December 2015 delivered cost to Lincoln for Hoover Dam power was \$0.0242/KWh or \$24.2/MWh. In comparison, the current cost of market power in the region is as shown in Table 4-1.

⁵ Regulations for Marketing Nevada's Share of Electric Power from the Boulder Canyon and the Parker-Davis Projects, State of Nevada, Colorado River Commission, September 13, 1985.

Table 4-1 December Market Prices ⁶	
Location	Price
Mead 230 Bus	\$31.35/MWh flat \$28.35/MWh off peak

Due to the abundance of natural gas and the availability of market power, Lincoln continues to be able to purchase market power at rates comparable to Hoover. This anomaly is expected to change in the next several years once the current glut of available natural gas begins to diminish or additional costs associated with carbon are imposed on natural gas based generation. Therefore, Lincoln believes Hoover Dam power will continue to be the most important portion of its power supply portfolio for many years to come.

The U.S. Census Bureau reported 2014 median household income in Lincoln County at \$40,550 with 14.1% of the population living below the poverty line, making Lincoln one of the poorest counties in Nevada behind only Esmeralda and Mineral Counties.⁷ As such Lincoln believes the continued availability of low-cost federal hydroelectric power is essential for the growth and prosperity of Lincoln County, Nevada. Lincoln continues to seek opportunities to maximize the benefit its customers receive from low-cost federal hydroelectric power.

2. Market Power Purchases

Although Lincoln’s allocation of hydroelectric power generated at Hoover Dam would be sufficient to meet Lincoln’s capacity and energy needs, Lincoln has not received its full allocation since 2004 given drought conditions in the Colorado River drainage basin. As a result, Lincoln through its membership in the Silver State Energy Association (SSEA) purchases supplement resources from the wholesale power supply market. These purchases are made at the Mead 230-kV bus. In 2015 Lincoln made market purchases of \$401,205, which represents 30.3% of the cost of Lincoln’s power supply mix for 2015.

SSEA is a joint action agency formed by its member in 2007. The SSEA is a political subdivision of Nevada established through a cooperative agreement pursuant to the Interlocal Cooperation Act.

⁶ Market Purchases by Lincoln for the Month of December 2015.

⁷ U.S. Census, 2014.

Members of SSEA are Lincoln, the City of Boulder City, the Colorado River Commission of Nevada, the Overton Power District No. 5 and the Southern Nevada Water Authority. The SSEA is an association of public agencies with the common goal to jointly plan, develop, own and operate power resources to meet their own needs and those of their customers. The economies of scale produced by this energy association will offer improved project development opportunities and power purchasing capabilities, the sharing of resources and expertise, and the opportunity for jointly managing energy needs. The SSEA has the operational authority to

- Own, finance, design, develop, construct, operate and maintain projects.
- Secure contracts for power, transmission, fuel, hedging and ancillary services in connection with operating, scheduling, hedging or optimizing power resources.
- Jointly exercise the authority of any of the members.

3. Solar Generation Project

In addition to federal hydroelectric power and purchases of supplemental power on from the wholesale market, Lincoln constructed a 90 kW solar photovoltaic generating project in 2015. Using National Renewable Energy Laboratories (NREL) analysis software, the project is expected to generate 153,000 kWh in its first 12 months of production and 3,054,847 kWh over the project’s twenty year life. Since placement into service the project has been producing in excess of model predictions by 7.74%. The net equivalent cost of this resource to Lincoln is \$41.76/MWh. Although currently more costly than Hoover or market power purchases being made by Lincoln, this resource integrates well with Lincoln’s Hoover resource and wholesale purchases which can be scheduled during off peak hours. In addition, at a fixed cost of \$41.76/MWh this resource compares favorably with projected on peak prices in the near future as shown by Table 4-2.

Table 4-2	
Mead 230 Bus Summer On Peak Market Prices⁸	
Year	Price
2016	\$41.50/MWh
2017	\$46.45/MWh
2018	\$48.95/MWh

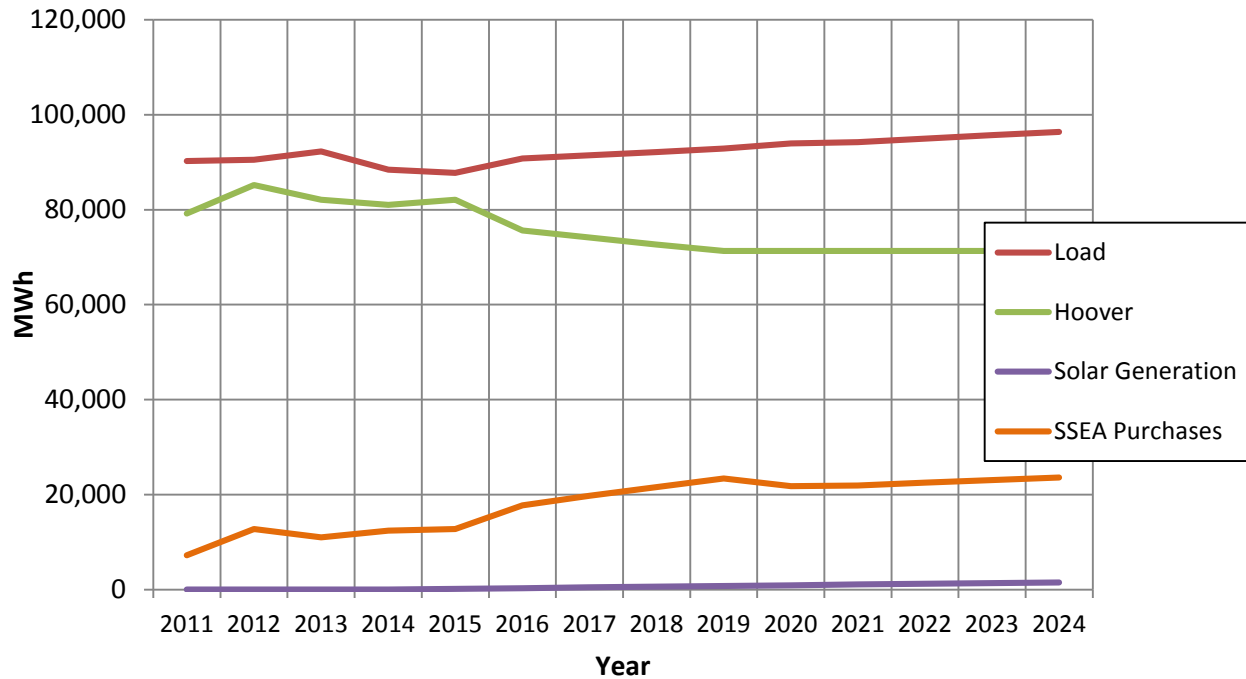
⁸ Electricity West Daily Report, Tradition TFS Energy LLC, October 29, 2015.

SECTION 5
LOAD AND RESOURCE ANALYSIS

1. Existing Loads and Resource

Lincoln’s projection of future loads and Lincoln’s existing resources are summarized and compared in graph 5-1. Currently Lincoln has only purchased supplemental wholesale power from SSEA through the end of 2017. For the purposes of this graph, it is presumed that Lincoln would continue to purchase supplemental power from SSEA to meet its needs beyond 2017. Accordingly, as the graph shows, Lincoln’s existing resources are expected to be sufficient to meet its needs through the end of 2020 (the term of this IRP planning period) and beyond.

Graph 5-1
Load and Resource Comparison
Expected Load Forecast Case



Actual thru 11/30/15

SECTION 6
IRP GOALS

1. General Mission

Lincoln, as a power district under Chapter 318 of the NRS is charged with many obligations and responsibilities. Paramount among these is to provide a public service for the benefit of all electric power consumers located within its service area, including those that may be served by other local distribution systems that purchase wholesale power from Lincoln. In order to help guide the Board, management and employees of Lincoln in completing Lincoln's statutory obligations, in the late 1980's Lincoln established a mission statement as follows:

"It is the mission of the Lincoln County Power District No. 1 to construct, operate and maintain a system which will provide our customers with electric service in the most economical and efficient manner consistent with sound business practice.

In support of this statement we are committed to:

- Provide programs and services in the most equitable and cost effective manner.
- Utilize available resources as a vehicle to promote economic development within areas we serve at retail and at wholesale.
- Meet present and future power needs with consideration for energy conservation, environmental quality and economic benefits.
- Attract and retain service oriented employees who are recognized for their dedication, cooperation and knowledge.
- Be recognized as a leader within the areas we serve at retail and at wholesale in regards to practicing and promoting safety among our employees and the public."

2. IRP Goals

Utilizing the foregoing mission statement and in consideration of the information contained in sections 2 through 5 of this report regarding the unique circumstances of Lincoln's service area, expected system loads, and existing and future generation resources, Lincoln has established the following goals relating to this IRP covering calendar years 2016 through 2020. These goals are based on

the underlying premise that Lincoln has an abundance of resource capacity but due to low capacity factor of the Hoover resource, a need to conserve energy.

Supply Side Goals

- Resource Diversification. Lincoln's resource portfolio is primarily made up of two resources, hydroelectric generation and natural gas fueled generation. It is the goal of Lincoln to continue to diversify its resource portfolio to make it less susceptible to curtailments in the supply chain, such as those caused by drought within the Colorado River drainage basin.
- Cost Stabilization. Natural gas fueled generation accounts for over 30% of Lincoln's power supply cost. Although natural gas prices have been at historic lows, it is expected the price for natural gas will increase in the near future. It is the goal of Lincoln to identify and incorporate non-natural gas fueled generation resources into its power supply mix.

Resource Delivery Goals

- Loss Mitigation. In 2014 Lincoln purchased 88,460,563 kWh and sold 78,544,961 kWh. The remaining energy was lost through transmission losses in third party system; losses in Lincoln's transmission and distribution systems; and ramping, regulation and spinning reserves at Hoover. Of energy losses, approximately 9% are lost in Lincoln's electric system. It is the goal of Lincoln to continue to rehabilitate and upgrade its aged electric infrastructure to improve reliability and to reduce energy losses.
- Distributed Generation. For reasons similar to that stated above regarding loss mitigation, it is the goal of Lincoln to continue to look for opportunities to install distributed generation within Lincoln's electric system.

Demand Side Goals

- Residential Energy Conservation. Residential energy (from both Lincoln's retail and sales for resale sales) accounts for an estimated 53% of the total energy use in Lincoln County. It is the goal of Lincoln to develop and offer programs to assist residents in lowering their energy consumption and electric bills.
- Agriculture Energy Conservation. Agriculture is the primary export industry of Lincoln County and accounts for 25% of the total energy use in Lincoln County. It is the goal of

Lincoln to develop and offer programs to assist agriculture producers in lowering their energy consumption and electric bills.

- Low Income Assistance. Lincoln County is the third poorest county in Nevada and is home to a large elderly population. The U.S. Census report 19.8% of the population to be 65 years and older as of July 2014⁹. It is the goal of Lincoln to develop programs and offer services specifically targeted to low income and elderly residents of Lincoln County to help them reduce their energy consumption and electric bills.

⁹ U.S. Census, 2014.

**SECTION 7
PROGRAM EVALUATION**

1. Supply Side Programs

To achieve Lincoln’s goals in regard to resource diversification and cost stabilization, Lincoln will continue to look for additional resource opportunities during the IRP planning period. Particular emphasis will be placed on renewable resources.

Based on Lincoln’s resource needs, Lincoln could integrate into its supply side portfolio up to 10,000,000 KWh of additional resources which would displace wholesale market purchases of natural gas fueled generation. This amount of resource opportunity is the equivalent of an approximate 3.5 MW single axis tracking, solar photovoltaic generating project. Given Lincoln’s location, solar is the most likely opportunity for additional resources. Geothermal does not exist in Lincoln County at temperatures sufficient for generation purposes and wind resources are not sufficient in most areas of the county with ready access to Lincoln’s electrical grid. Accordingly, Lincoln has and continues to focus on solar development.

During 2015 Lincoln received proposals from three solar developers. The first was from SunEdison in January 2015 for a 1 MW plant, the second in July 2015 from Enerparc for a 3.75 MW plant, and the third in August 2015 from First Solar for a 3 MW share in a large solar project. Table 7-1 summarizes pricing for each of these proposals.

Table 7-1 Solar Project Purchased Power Agreement Costs			
Terms	SunEdison	Enerparc	First Solar
20 Year Fixed	Confidential	Not offered	Confidential
20 Year Variable (20 Yr Avg shown)	Confidential	Confidential	Confidential

In comparison, Lincoln constructed a 90 kW, fixed axis, solar photovoltaic project in 2015. As indicated in section 4 of this IRP, the net equivalent cost of this resource to Lincoln is \$41.76/MWh. Based on the proposals received, Lincoln has concluded that small scale solar development in the size range needed by Lincoln is more economical if constructed by Lincoln as compared to entering into a purchased power agreement (PPA) with a solar developer.

Program Proposal 1.a, Small Scale Utility Owned Solar.

Lincoln will continue to seek development of small, utility scale, solar generating resources in its service area. Development will be through projects designed and constructed by Lincoln on its property. Development will occur in small blocks of 67.5 KW to 100 KW installed capacity on an annual basis. During the IRP planning period, Lincoln proposes to install approximately 267.5 KW of solar generation to its system. Table 7-2 provides an estimate of costs and planned construction dates.

Table 7-2			
Solar Photovoltaic Generation Development			
Year	Project	Estimated Generation	Estimated Cost
2016	67.5 KW Solar	117,000 KWh	\$180,000
2017	90 – 100 KW Solar	170,000 KWH	\$272,950
2020	90 – 100 KW Solar	170,000 KWH	\$225,102

Lincoln will continue to monitor pricing available for small utility scale solar projects from solar project developers in the form of PPAs. Should PPA pricing become comparable to Lincoln’s self-construction costs, Lincoln shall entertain executing of the PPA in lieu of continued self-construction.

Program Proposal 1.b, Customer Owned Small Scale Renewable Projects.

In 2011, Lincoln adopted a program for small scale renewable energy projects owned by its customers. Under the program, individuals and business are eligible for a cash rebate of \$425/kilowatt of installed capacity for qualifying small scale renewable energy projects, up to a maximum of \$1,000 per residence or small commercial business. Small scale renewable energy projects are those projects with a nominal peak capacity rating of 10 kW or less that use solar photovoltaic, wind turbine, in-conduit hydrogenation or geothermal technology. These Small scale renewable energy project installations must comply with Lincoln’s policies, regulations and design standards for such installations and must contain an approved grid tie inverter and an approved safety disconnect switch. Pursuant to Lincoln’s policies, regulations and design standards, designs and manufacturer data for the system must be provided to Lincoln for review and approval prior to installation by the customer. Small scale renewable energy project equipment and components must be UL® approved. Participants in the program agree to

transfer to Lincoln any renewable energy credits that are or may become available for the small scale renewable energy project under the laws of the State of Nevada.

To date only three solar photovoltaic with a combined total nameplate capacity of 14 kW have been installed under the program. Because Lincoln has a rural service area and low residential electric rates, solar installation marketers have not targeted Lincoln's customers. Customer owned solar installations, while becoming economically more attractive, still produce energy at a cost greater than the rates offered by Lincoln.

Due to significant cost impacts that can be caused when large numbers of customers exit a utility system, the Public Utilities Commission of Nevada is currently reconsidering its position regarding rooftop solar to ensure consumers without solar panels are not paying a higher bill due to payments made to consumers with solar panels.

Although Lincoln is not regulated by the PUCN, and although only three installations have been installed to date, Lincoln believes it prudent to reduce costs that promote customer owned installations. Accordingly, Lincoln proposes to reduce solar development incentives from the current level to \$100/kilowatt (\$0.10 per watt) of installed capacity for qualifying small scale renewable energy projects, up to a maximum of \$1,000 per residence or small commercial business. Lincoln shall continue to reimburse customers for excess energy generated on a monthly basis at Lincoln's avoided cost pursuant to its net metering policy. This change in payments for customer owned solar should have minimal impact on the promotion of solar development given the availability of Lincoln's community owned solar project as discussed above and the continued decline in solar installation costs. During the planning period, Lincoln anticipates 20 KW of customer solar to be installed under this program.

2. Resource Delivery Programs

Most of Lincoln's system is constructed of long, radial, overhead distribution lines. Many of these lines were constructed in the 1930's and 1940's with various size conductors ranging from #2AWG copper to 4/0 ACSR. Losses in these lines are the sum of the I^2R , or resistance losses. In other words, as current increases in lines with small conductor size, losses increase with the square of the current. Lincoln continues to evaluate its distribution system and has identified several distribution feeders in need of reconductoring with larger sized conductor. Two of these distribution feeders, Meadow Valley and Goldsprings, were also constructed in the 1930 and in need of structural rehabilitation as well. Because of the long radial transmission line lengths, Lincoln's electric system is capacity restricted and suffers significant voltage drop. These limitations significantly impair Lincoln's ability to serve new

customers. In addition, the vast majority of Lincoln’s electric transmission system was constructed in 1936 and now is over 70 years of age. Significant areas of this transmission system are in need of replacement in the near future in order to ensure continued reliable delivery of energy to Lincoln’s customers.

Program Proposal 2.a, Meadow Valley Reconductoring.

During the IRP planning period, Lincoln intends to concentrate efforts on reconstruction and reconductoring of the Meadow Valley distribution circuit. This feeder is a critical tie feeder and serves an area experiencing growth. This 23 mile long line will be reconstructed as a 22-kV, distribution feeder with 336 ACSR conductor in lieu of its current #2 AWG copper conductor. Cost of changing out the structures and reconductoring the line is estimated at \$75,000 per mile.

The feeder experiences loading that varies from 685 KW to 5480 KW. By making simplifying assumptions regarding the loading cycle and load distribution along the distribution circuit, the estimated energy savings from this project upon its completion will be approximately 75,616 KWh annually.

The total estimated cost of the distribution line replacement and upgrade is \$1,650,000. This system improvement project will reduce Lincoln’s cost of purchased power by an estimated \$2,370 per year. Because this project results in a 696 year payback on Lincoln’s investment at current load levels, it would not normally be pursued for energy savings purposes. However, this project is required and must be implemented based on age of the existing distribution line and to provide system capacity for possible load growth in the Meadow Valley area of Lincoln’s service area.

Table 7-3 provides an estimate of costs and planned construction dates for this project.

Table 7-3 Meadow Valley Distribution Line Reconductoring		
Year	Miles	Estimated Cost
2016	7.57	\$564,543
2017	7.96	\$596,995

Lincoln has already completed 4 miles of the Meadow Valley distribution circuit replacement and upgrade project in 2014 and will complete the remaining 3 miles of the project after the IRP

planning period due to the necessity to fund other critical capital projects in the 2018 through 2020 time period.

3. Demand Side Programs

As outlined in section 6 of this report, Lincoln has established three primary demand side goals of this IRP. In order to achieve these goals, demand-side programs developed by Lincoln must not adversely impact rates, must continue to focus on energy reduction, and must provide direct benefit to retail consumers. Further, given the daily, monthly and seasonal load profiles presented in section 3, coupled with possible growth in Lincoln's residential sector, Lincoln has determined that its demand-side programs shall strive to achieve strategic conservation and peak reduction by encouraging energy efficiency in new and existing homes. Using the above screening criteria, Lincoln has determined the following demand-side programs to be appropriate for its electric system during the IRP planning period.

Program Proposal 3.a, Residential and Commercial High Efficiency Air Conditioning and Heating.

In Lincoln's service area, electric heating is the most significant factor driving winter peak demand and electric cooling in conjunction with irrigation loads combine to establish summer peak demand. Accordingly, Lincoln proposes to develop programs intended to promote high efficiency air conditioning and heating.

Up to 50 percent of a home's energy costs may be going directly to heating and cooling according to the U.S. Environmental Protection Agency, Energy Star program. Energy efficient heating and cooling equipment that's sized and installed according to best practices can keep a home more comfortable year-round and save energy.

Air conditioning and heating equipment efficiencies are rated according to the following standards:

- SEER. The Seasonal Energy Efficiency Ratio (SEER) rating of a unit is the cooling output during a typical cooling-season divided by the total electric energy input during the same period. The higher the unit's SEER rating the more energy efficient it is. In the U.S., the SEER is the ratio of cooling in British thermal unit (BTU) to the energy consumed in watt-hours. Efficiency of central air conditioners are typically reported by a SEER rating.
- EER. The Energy Efficiency Ratio (EER) of a particular cooling device is the ratio of *output* cooling energy (in BTU) to *input* electrical energy (in watt-hours) at a given operating point. EER is generally calculated using a 95 °F outside temp and an inside

(return air) temp of 80 °F and 50% relative humidity. Efficiency of window air conditioners are typically reported by an EER rating.

- HSPF. The Heating Seasonal Performance Factor (HSPF) is used to measure the efficiency of air source heat pumps. The higher the HSPF rating of a unit, the more energy efficient it is. HSPF is a ratio of BTU heat output over the heating season to watt-hours of electricity used. It has units of BTU/watthour.

SEER rating reflects overall system efficiency on a seasonal basis and EER reflects the system's energy efficiency at one specific operating condition. Both ratings are useful when choosing products, but the same rating must be used for comparisons.

It is rare to see systems rated below SEER 9 in the United States because aging, existing units are being replaced with new, higher efficiency units. The United States requires that residential systems manufactured after 2005 have a minimum SEER rating of 13. ENERGY STAR qualified Central Air Conditioners must have a SEER of at least 14.5. Window units are exempt from this law so their SEERs are still around 10.

Substantial energy savings can be obtained from more efficient systems. For example by upgrading from SEER 9 to SEER 13, the power consumption is reduced by 30% (equal to $1 - 9/13$).

In 2011 the US Department of Energy (DOE) revised energy conservation rules to impose elevated minimum standards and regional standards for residential HVAC systems. The regional approach recognizes the differences in cost-optimization resulting from regional climate differences. Starting January 1, 2015, split system central air conditioners installed in the installed in the Southwestern Region must be a minimum 14 SEER and 12.2 EER.

HSPF ratings have similarly increased over time. An HSPF of 8 or greater can be considered high efficiency and currently eligible for federal tax credits.

In Lincoln's service area, electric air conditioning options include central air conditioners (also called "split-systems") with ducts, heat pumps (both air source and geothermal source), evaporative coolers, window air conditioners, and ductless heat pumps. Ductless heat pumps incorporate the use of a condenser unit that is placed outside the home, with refrigerant and electrical lines that go through the exterior wall to connect to one or more compact, wall-mounted cooling units (zones) inside the home. They are efficient and allow retrofit of existing homes without the installation of ducts.

To encourage the retirement of older, less efficient units, and to encourage the installation of high efficiency air conditioning and heating equipment on new and existing buildings,

Lincoln shall offer incentives to residences installing high efficiency equipment as shown in table 7-4. Incentives will be paid as credits on customer bills for electric service or as cash rebates. Incentive payments shall be capped at one incentive payment per location during the 5 year IPR planning period. Applicants will have six months from date of purchase to apply for incentives.

Table 7-4 Residential and Commercial High Efficiency Air Conditioning and Heating		
New System Being Installed	New System Minimum Efficiency	Incentives
Air Source Heat Pump	9.0 HSPF, 15 SEER	\$200
Air Source Heat Pump	9.5 HSPF, 16 SEER	\$400
Ductless Mini Split Air Conditioner and Heat Pump – Single Head (single air handler unit)	9.5 HSPF, 16 SEER	\$400
Ductless Mini Split Air Conditioner and Heat Pump – Multiple Head (multiple air handler units)	9.5 HSPF, 16 SEER	\$800
Central Air Conditioners	15 SEER	\$100
Central Air Conditioners	16 SEER	\$150
Central Air Conditioners	17 SEER	\$200
Evaporative Cooler – Permanently Installed		\$150

- **Air Source Heat Pump Qualifications:** New air source heat pump must become the primary heat source and must service at least 80 percent of the home's conditioned living space. Heat pump must be a new, air-source split or packaged unitary heat pump with an AHRI (Air Conditioning, Heating, and Refrigeration Institute) Standard Rating Cooling Capacity of 65,000 BTU/hr (5.4 tons) or less. Heat pump must be listed on the AHRI Certified Directory: ahridirectory.org. Heat pump must be Energy Star rated.
- **Ductless Mini Split Air Conditioner and Heat Pump Qualifications.** New ductless heat pump must become the primary heat source and must service at least 80 percent of the home's conditioned living space. Previous primary heat source must have been a permanently installed ductless electric resistance heating system (e.g. electric baseboard, electric ceiling/wall heat) serving at

least 80 percent of the home's conditioned area. Incentive is not available to customers replacing an existing ducted heat pump (air or geothermal). Ductless heat pump must be a new AHRI (Air Conditioning, Heating, and Refrigeration Institute) rated ductless (mini-split) system with an AHRI Standard Rating Cooling Capacity of 65,000 BTU/hr (5.4 tons) or less. Unit must be listed on the AHRI Certified Directory: ahridirectory.org. Ductless mini split air conditioner and heat pump must employ an inverter driven outdoor compressor unit and a variable speed fan for indoor blower and be fully ductless. Ductless mini split air conditioner and heat pump must be Energy Star rated.

- Central Air Conditioner Qualifications. Central air conditioner must be a new, air source-split system equipment with a matching condensing unit and evaporator coil or packaged unitary air conditioner. SEER determined by AHRI (Air Conditioning, Heating, and Refrigeration Institute) Standard 210/240 and listed in the AHRI Certified Directory of Unitary Equipment: ahridirectory.org. Central air conditioner must have an AHRI Standard Rating Cooling Capacity of 65,000 BTU/hr (5.4 tons) or less. Window air conditioning units, packaged terminal units, and heat pumps are not eligible. Central air conditioner must be Energy Star rated.
- Evaporative Cooler Qualifications. Evaporative coolers must be new, with a minimum 2,500 CFM rating. Evaporative cooler must be permanently installed in a window or on a roof. The residence of building being cooled must use evaporative cooling exclusively. The evaporative cooler shall not be installed in conjunction with other cooling equipment. Evaporative cooler must be Energy Star rated.

Program Proposal 3.b, LED Lighting.

Compact fluorescent light bulbs (CFL) first emerged on the market as more efficient lighting technology as compared to standard incandescent bulbs. A CFL bulb uses approximately one fourth the energy of a standard incandescent lamp while the light output of the fluorescent lamp is equivalent to that of the incandescent lamp. Unfortunately CFL bulbs had several disadvantages as compared to incandescent bulbs. First, the initial cost of a CFL is 10-15 times greater than an incandescent bulb. Second, they could not be used in a dimmer application. Third, they required a warm up period that could be several minutes in cold weather before they would reach full light output. Fourth, they contain small amounts of mercury and create disposal problems. They are most appropriate for heavily used fixtures that are not turned on and off frequently.

In recent years a new technology has emerged that appears to solve several of the problems of CFL bulbs. This technology is the light-emitting diode (LED) bulb. LEDs are a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven-segment displays, and were commonly seen in digital clocks.

Recent developments in LEDs permit them to be used in environmental and task lighting. LEDs have many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light-emitting diodes are now used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes and lighted wallpaper. As of 2015, LEDs have become powerful enough for room lighting and prices have begun to drop dramatically.

Table 7-5 provides a comparison of LEDs, CFLs and Incandescent light bulbs.

Table 7-5			
LED, CFL, Incandescent Comparison for 60 Watt Equivalent			
	LED	CFL	Incandescent
Light bulb projected lifespan	50,000 hours	10,000 hours	1,200 hours
Watts per bulb (equiv. 60 watts)	10	14	60
Cost per bulb	\$6.95	\$2.95	\$1.25
KWh of electricity used over 50,000 hours	500	700	3000
Cost of electricity (@ \$0.075/KWh)	\$37.50	\$52.50	\$225.00
Bulbs needed for 50,000 hours of use	1	5	42
Cost of buying bulbs for 50k hours of use	\$6.95	\$14.75	\$52.50

Total cost for 50,000 hours	\$44.45	\$67.25	\$277.50
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To encourage the replacement of less efficient bulbs with higher efficiency bulbs, Lincoln shall replace its current CFL program with an LED lighting program. Under the program, Lincoln shall make available to residential customers in Lincoln County, one 60 watt equivalent, daylight (5000K), A19 Energy Star, dimmable, LED light bulb each year, up to a total of 600 bulbs. Information describing the energy reduction benefits of the program will be distributed to each residential customer. Although energy savings will vary depending upon daily light use, at 3 hours of daily use the 10 watt bulbs will result in an energy reduction of up to 32,850 KWh per year if bulbs are used to replace incandescent bulbs. The residential lighting retrofit will cost up to \$4,170 per year and would reduce Lincoln’s cost of purchased power by an estimated \$1,030 per year. As a result, discounting operating margins, this project results in a 4 year payback on Lincoln’s investment at current market prices for wholesale power.

After the initial distribution of LED bulbs, residential customers will be allowed to request and receive an additional LEB bulb each year for the term of this IRP.

Program Proposal 3.c, Weatherization.

The U.S. Census Bureau reports that 2,730 housing units existed in Lincoln County in 2014. Of this stock, 2,043 were single family units, 132 were multi-family units, and 555 units were mobile homes. Further the Census reports that 55.1% of these units were constructed before 1960 as indicated in table 7-6¹⁰.

Table 7-6 Age of Housing Stock	
Year Structure Built	Percent of Total Housing Stock
2010 or later	1.1%
2000 to 2009	20.1%
1980 to 1999	23.7%

¹⁰ U.S. Census, 2014.

1960 to 1979	25.9%
1940 to 1959	16.2%
1939 or earlier	13.0%

From these statistics it is clear that most of the housing units in Lincoln County are older homes or mobile homes with relatively few modern units. As a result it is believed that many could significantly benefit from various weatherization type programs including insulation, duct sealing, shell sealing, caulking, weather stripping, exterior door replacement, window replacement, evaporative cooler covers, solar screens, appliance upgrades, insulation of water heaters and pipes, and low flow shower heads.

Further the U.S. Census Bureau further reported 2014 household income in Lincoln County at \$40,550 with nearly 15.1% of the population living below the poverty line, making Lincoln one of the poorest counties in Nevada; and the U.S. Census Bureau report 19.8% of the population to be 65 years and older as of July 2014 making it a county with a significantly higher percentage of elderly residents as compared to the statewide average¹¹.

To provide opportunities for weatherization of older homes in Lincoln County, Lincoln shall offer a program that funds most if not all of the needed repairs. To achieve this objective, Lincoln believes it in the best interest of its customers for Lincoln to continue to team with the Rural Nevada Development Corporation (RNDC). The RNDC is a non-profit organization created to implement the grant programs of the Nevada Division of Housing, including a low income weatherization assistance program. The goal of the program is to assist low-income persons in reducing their utility bills by providing various energy conservation measures. Assistance is provided free of charge. Assistance is available to homeowners or renters who reside in either mobile homes, single family homes or multi-family homes, provided the household's annual gross income is at or below 150% of the federal poverty income guidelines (established by the Office of Management and Budget). Individuals participating in the state's Energy Assistance Program (EAP) are eligible for services as well. For example, a household of five individuals with household income of \$41,355 would currently qualify for the program.

¹¹ U.S. Census, 2014.

Weatherization measures completed by the RNDC at no cost to the homeowner or renter are dependent on funding, program guidelines, regional climate, and the needs of the building, but are identified by the RNDC to include:

- Ceiling, floor, and duct insulation
- Duct leakage sealing (return and supply systems)
- Shell infiltration sealing (replace broken windows, replace exterior doors, weather stripping, caulking, evaporative cooler covers, etc.)
- Insulation of water heater and water heater pipes
- Installation of low-flow showerheads (2.5 gpm or less)
- Solar screens (Southern Nevada only)
- Minor home repairs
- Heating and cooling system repairs/replacements
- Refrigerators
- Health and safety measures (carbon monoxide testing of combustion appliances, assurance of indoor air quality standards, and installation of carbon monoxide detectors)

Based on past records maintained by the RNDC, weatherization projects in Lincoln's area typically result in an average reduction in energy use of 7,475 kWh per year.

Under Lincoln's arrangement with the RNDC, Lincoln shall contribute additional grant money to the RNDC for use on weatherization projects in Lincoln County. Specifically, Lincoln shall fund one-half the cost of weatherization projects in Lincoln County by the RNDC, up to \$10,000 per year. Based on records of past weatherization projects, each project costs between \$2,000 and \$4,000. Historically, RNDC completes an average of 3 projects in Lincoln County each year.

Program Proposal 3.d, Irrigation Efficiency.

In 2015, Lincoln provided electric service to 76 fields irrigated by pivot systems, and 29 fields irrigated by wheel or hand lines. These irrigated fields accounted for approximately 25% of the energy use in Lincoln County in 2015. To ensure peak operating efficiency, it is important the irrigation systems are properly maintained. This includes utilizing efficient nozzles and sprinklers, and eliminating leaks within the system. By replacing old and deteriorated irrigation system parts with new parts, water use and electric energy consumption can be reduced.

To encourage proper maintenance of irrigation systems, Lincoln proposes to pay an incentive for the purchase of specified replacement parts and components for existing irrigation systems. The incentive shall vary by the sprinkler component or part incorporated in the sprinkler system. Incentives shall be offered for 11 specific sprinkler parts as listed in table 7-7. Incentives will be paid as credits on customer bills for electric service. Incentive payments shall be capped at \$1,000 per location during the 5 year IPR planning period. Applicants will have six months from date of purchase to apply for incentives.

Table 7-7	
Irrigation Efficiency Improvement Incentives	
Replacement Part	Incentive
New flow-control-type nozzles (Entire pivot or line must be upgraded and flow may not be increased)	\$1.50 Each Nozzle
New nozzles for impact, rotating or fixed head sprinkler (Entire pivot or line must be upgraded and flow may not be increased)	\$0.25 Each Nozzle
New impact or rotating type sprinklers (Entire pivot or line must be upgraded and flow may not be increased)	\$2.75 Each Sprinkler
New or rebuilt wheel line levelers (Self leveler which automatically keeps the sprinkler heads on an irrigation wheel-line in a steady upright position)	\$0.75 Each Leveler
New drains for pivots and wheel lines (Entire pivot or line must be upgraded)	\$1.00 Each Drain
New risercaps and gaskets for hand lines, wheel lines or portable mainline (Entire line must be upgraded)	\$1.00 Each Riser-cap
New wheel line hubs (Entire line must be upgraded)	\$12.00 Each Hub
New gooseneck with drop tube or boomback	\$1.00 Each Outlet
Cut and pipe press or weld repair of leaking hand lines, wheel lines and portable mainline (invoice must show number of joints repaired)	\$8.00 Each Joint
New center pivot base boot gasket	\$125.00 Per Pivot
New low pressure regulators (Entire pivot must be upgraded)	\$5.00 Per Regulator

**SECTION 8
ACTION PLAN**

1. Program Summary

Table 8-1 summarizes Lincoln’s planned budget and expected energy savings by year under this IRP for the period 2016 through 2020. Details of each program are provided in the sections following the table.

Table 8-1 Program Summary					
	2016	2017	2018	2019	2020
1.a. Small Scale Utility Owned Solar	\$180,000.00	\$272,950.00	\$0.00	\$0.00	\$225,102.00
1.b. Customer Owned Small Scale Renewables	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00
2.a. Meadow Valley Reconductoring	\$564,543.00	\$596,995.00	\$0.00	\$0.00	\$0.00
3.a. Residential and Commercial High Efficiency Air Conditioning and Heating.	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00
3.b. LED Lighting	\$4,170.00	\$4,170.00	\$4,170.00	\$4,170.00	\$4,170.00
3.c. Weatherization	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00
3.d. Irrigation Efficiency	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00
Total Annual Budget	\$769,713.00	\$895,115.00	\$25,170.00	\$25,170.00	\$250,272.00
Expected Energy Savings (KWh)	204,072	255,072	54,825	54,825	224,825
Cumulative Energy Savings (KWh)	204,072	459,143	513,968	568,793	793,618

As evident from the table, the programs to be undertaken by Lincoln during the IRP planning period are expected to produce a total energy savings of 793,618 KWH, with 58% or 459,000 KWH resulting from Lincoln's planned development of solar photovoltaic generation.

2. Small Scale Utility Owned Solar

Lincoln County Power District No. 1 (Lincoln) owns 17 acres of land ideally suited for a small scale solar photovoltaic project in Panaca, Nevada. The site is located on the northeast corner of the intersection of U.S. Highway 93 and Bullionville Road in Panaca. Although this site was purchased for a future relocation of Lincoln's headquarters, there is sufficient room at the site to accommodate both purposes. It is believed the site could accommodate up to 900 kW of fixed axis, solar photovoltaic development in addition to its planned use for Lincoln's headquarters.

Given budgetary limitations and to provide Lincoln with an opportunity to develop expertise in solar installations, Lincoln is planning solar development in a series of phases over a ten year period, with the next phase under this IRP being constructed at 67.5 kW DC. The installation shall consist of ground mounted, fixed axis, solar photovoltaic arrays. Each array would consist of 30, 250 watt solar panels. Three arrays would provide input to one 28 kW grid tie inverter. Three grid tie inverters would provide input into one, 480 volt to 4,160 volt step-up transformer which would feed the power output into Lincoln's electric system.

Two additional phases of solar development will occur during the IRP planning period, with each being size at approximately 90 to 100 KW.

3. Customer Owned Small Scale Renewable Projects

The budget for this program shall be \$2,000 per year over the term of this IRP. In the first quarter of 2016 Lincoln shall publish notice of the program in Ruralite Magazine and in the local newspaper describing the program. In addition, Lincoln shall provide program information in postings on its website and Facebook pages, and in bill inserts. Details of the program are as follows:

- The program shall be available to all residential and small business end-use customers within Lincoln's service area including those directly served by Lincoln, the Alamo Power District No. 3, the City of Caliente, and Pioche Public Utilities; except as noted herein. This program shall not be available for the new large scale residential or commercial subdivisions or developments that may occur in Coyote Springs.

- Individuals and business shall be eligible for a cash rebate of \$100/kilowatt of installed capacity for qualifying small scale renewable energy projects, up to a maximum of \$1,000 per residence or small commercial business.
- Small scale renewable energy projects shall be those projects with a nominal peak capacity rating of 10 kW or less that use solar photovoltaic, wind turbine, in-conduit hydrogenation or geothermal technology.
- Small scale renewable energy project installations must comply with Lincoln's policies, regulations and design standards for such installations and must contain an approved grid tie inverter and an approved safety disconnect switch. Pursuant to Lincoln's policies, regulations and design standards, designs and manufacturer data for the system must be provided to Lincoln for review and approval prior to installation by the customer.
- Small scale renewable energy project equipment and components must be UL® approved.
- Participants in the program must agree to transfer to Lincoln any renewable energy credits that are or may become available for the small scale renewable energy project under the laws of the State of Nevada.
- To qualify an individual or small commercial business must complete an application and provide all required technical information. Applications must be submitted within six months of the small scale renewable project installation in order to be eligible.
- To receive the rebate, representatives of Lincoln must inspect the installation and verify that the small scale renewable energy project is properly connected and operational.
- Applications for rebates will be reviewed and approved on the basis of the order in which eligible applications are received by Lincoln. The number of rebates to be issued each year is subject to the program budget limitation set by Lincoln. Applications received after funding limits have been reached shall be retained for consideration in the following year.

3. Meadow Valley Reconductoring

During the IRP planning period, Lincoln intends to reconstruction and reconductor the Meadow Valley distribution circuit. This feeder is a critical tie feeder and serves and area experiencing growth. This 23 mile long line will be reconstructed as a 22-kV, distribution feeder with 336 ACSR conductor in lieu of its current #2 AWG copper conductor. Cost of changing out the structures and reconductoring the line is estimated at \$75,000 per mile. This project will be completed over a three year period of 2016, 2017 and 2021. This project has been approved and is included in Lincoln 12 year capital

improvement program. The total estimated cost of the distribution line replacement and upgrade is \$1,650,000.

4. Residential and Commercial High Efficiency Air Conditioning and Heat Pumps

The budget for this program shall be \$5,000 per year over the term of this IRP. In the first quarter of 2016 Lincoln shall publish notice of the program in Ruralite Magazine and in the local newspaper describing the program. In addition, Lincoln shall provide program information in postings on its website and Facebook pages, and in bill inserts. Details of the program are as follows:

- The program shall be available to all customers within Lincoln's service area including those directly served by Lincoln, the Alamo Power District No. 3, the City of Caliente, and Pioche Public Utilities; except as noted herein. This program shall not be available for the new large scale residential or commercial subdivisions or developments that may occur in Coyote Springs. Developers of large scale residential or commercial subdivisions or developments in Coyote Springs shall be required to install air conditioning and air source heat pumps that are Energy Star[®] rated, and neither the developers nor the purchaser shall be eligible to apply for a rebate under this program.
- The program is available for new construction or for replacement of existing evaporative coolers, room air conditioners, central air conditioners, electric wall heaters, or air source heat pumps.
- Lincoln shall provide incentives to residences installing high efficiency equipment as shown in incentive table. Incentives will be paid as credits on customer bills for electric service or as cash rebates. Incentive payments shall be capped at one incentive payment per location during a 5 year period. Applicants will have six months from date of purchase to apply for incentives.

Incentives		
Residential and Commercial High Efficiency Air Conditioning and Heating		
New System Being Installed	New System Minimum Efficiency	Incentives
Air Source Heat Pump	9.0 HSPF, 15 SEER	\$200
Air Source Heat Pump	9.5 HSPF, 16 SEER	\$400
Ductless Mini Split Air Conditioner and Heat Pump – Single Head (single air handler unit)	9.5 HSPF, 16 SEER	\$400
Ductless Mini Split Air Conditioner and Heat Pump – Multiple Head (multiple air handler units)	9.5 HSPF, 16 SEER	\$800
Central Air Conditioners	15 SEER	\$100
Central Air Conditioners	16 SEER	\$150
Central Air Conditioners	17 SEER	\$200
Evaporative Cooler – Permanently Installed		\$150

- **Air Source Heat Pump Qualifications:** New air source heat pump must become the primary heat source and must service at least 80 percent of the home's conditioned living space. Heat pump must be a new, air-source split or packaged unitary heat pump with an AHRI (Air Conditioning, Heating, and Refrigeration Institute) Standard Rating Cooling Capacity of 65,000 BTU/hr (5.4 tons) or less. Heat pump must be listed on the AHRI Certified Directory: ahridirectory.org. Heat pump must be Energy Star rated.
- **Ductless Mini Split Air Conditioner and Heat Pump Qualifications.** New ductless heat pump must become the primary heat source and must service at least 80 percent of the home's conditioned living space. Previous primary heat source must have been a permanently installed ductless electric resistance heating system (e.g. electric baseboard, electric ceiling/wall heat) serving at least 80 percent of the home's conditioned area. Incentive is not available to customers replacing an existing ducted heat pump (air or geothermal). Ductless heat pump must be a new AHRI (Air Conditioning, Heating, and Refrigeration Institute) rated ductless (mini-split) system

with an AHRI Standard Rating Cooling Capacity of 65,000 BTU/hr (5.4 tons) or less. Unit must be listed on the AHRI Certified Directory: ahridirectory.org. Ductless mini split air conditioner and heat pump must employ an inverter driven outdoor compressor unit and a variable speed fan for indoor blower and be fully ductless. Ductless mini split air conditioner and heat pump must be Energy Star rated.

- Central Air Conditioner Qualifications. Central air conditioner must be a new, air source-split system equipment with a matching condensing unit and evaporator coil or packaged unitary air conditioner. SEER determined by AHRI (Air Conditioning, Heating, and Refrigeration Institute) Standard 210/240 and listed in the AHRI Certified Directory of Unitary Equipment: ahridirectory.org. Central air conditioner must have an AHRI Standard Rating Cooling Capacity of 65,000 BTU/hr (5.4 tons) or less. Window air conditioning units, packaged terminal units, and heat pumps are not eligible. Central air conditioner must be Energy Star rated.
- Evaporative Cooler Qualifications. Evaporative coolers must be new, with a minimum 2,500 CFM rating. Evaporative cooler must be permanently installed in a window or on a roof. The residence of building being cooled must use evaporative cooling exclusively. The evaporative cooler shall not be installed in conjunction with other cooling equipment. Evaporative cooler must be Energy Star rated.
- To qualify an end-user must complete an application, and provide (1) a copy of the invoice or receipt for the high efficiency air conditioning unit or heat pump, and (2) a copy of the Energy Guide label identifying the SEER or EER rating.
- To receive an incentive payment, representatives of Lincoln must inspect the installation and verify that the high efficiency air conditioning unit or air source heat pump is connected and operational.
- Applications for incentive payments will be reviewed and approved on the basis of the order in which eligible applications are received by Lincoln. The number of incentive payments to be issued each year is subject to the program budget limitation set by Lincoln. Applications received after funding limits have been reached shall be retained for consideration in the following year.

5. LED Lighting

The budget for this project shall be \$4,200 per year over the term of this IRP. In the first quarter of 2016 Lincoln shall publish notice of the program in Ruralite Magazine and in the local newspaper describing the program. In addition, Lincoln shall provide program information in postings on its website and Facebook pages, and in bill inserts. Details of the program are as follows:

- The program shall be available to Lincoln's customers. This program shall not be available to residential customers located in Coyote Springs.
- The program is available for new construction or for replacement of existing incandescent lamps.
- Annually during the term of this IRP Lincoln shall make available to each of its customers, one 10 watt LED bulb and information regarding the conservation benefits and optimum use of LED bulbs.
- Customers shall be responsible for installation of the LED bulbs.

6. Weatherization

The budget for this project shall be \$10,000 per year over the term of this IRP. In the first quarter of 2016 Lincoln shall publish notice of the program in Ruralite Magazine and in the local newspaper describing the program. In addition, Lincoln shall provide program information in postings on its website and Facebook pages, and in bill inserts. Details of the program are as follows:

- The program shall be available to all residential end-use customers within Lincoln's service area including those directly served by Lincoln, the Alamo Power District No. 3, the City of Caliente, and Pioche Public Utilities; except as noted herein.
- The program is available through the Rural Nevada Development Corporation for weatherization of existing mobile homes, single family homes or for multi-family homes.
- The rules, regulations, requirements and limitations of the RNDC Low Income Weatherization Program shall apply.
- Lincoln shall provide customers with applications and program information and shall assist customers in contacting and preparing applications for the RNDC Low Income Weatherization Program.

7. Irrigation Efficiency

The budget for this project shall be \$4,000 per year over the term of this IRP. In the first quarter of 2016 Lincoln shall publish notice of the program in Ruralite Magazine and in the local newspaper describing the program. In addition, Lincoln shall provide program information in postings on its website and Facebook pages, and in bill inserts. Details of the program are as follows:

- The program shall be available to all Irrigation, Small Mixed Agricultural Use, and Large Mixed Agricultural Use customers served directly by Lincoln.
- Lincoln will pay an incentive for the purchase of specified replacement parts and components for existing irrigation systems. The incentive shall vary by the sprinkler component or part incorporated in the sprinkler system. Incentives shall be offered for 11 specific sprinkler parts as listed in the incentive table. Incentives will be paid as credits on customer bills for electric service. Incentive payments shall be capped at \$1,000 per location during a 5 year period. Applicants will have six months from date of purchase to apply for incentives.

Incentives	
Irrigation Efficiency Improvement	
Replacement Part	Incentive
New flow-control-type nozzles (Entire pivot or line must be upgraded and flow may not be increased)	\$1.50 Each Nozzle
New nozzles for impact, rotating or fixed head sprinkler (Entire pivot or line must be upgraded and flow may not be increased)	\$0.25 Each Nozzle
New impact or rotating type sprinklers (Entire pivot or line must be upgraded and flow may not be increased)	\$2.75 Each Sprinkler
New or rebuilt wheel line levelers (Self leveler which automatically keeps the sprinkler heads on an irrigation wheel-line in a steady upright position)	\$0.75 Each Leveler
New drains for pivots and wheel lines (Entire pivot or line must be upgraded)	\$1.00 Each Drain
New risercaps and gaskets for hand lines, wheel lines or portable mainline (Entire line must be upgraded)	\$1.00 Each Risercap
New wheel line hubs (Entire line must be upgraded)	\$12.00 Each Hub
New gooseneck with drop tube or boomback	\$1.00 Each Outlet
Cut and pipe press or weld repair of leaking hand lines, wheel lines and portable mainline (invoice must show number of joints repaired)	\$8.00 Each Joint
New center pivot base boot gasket	\$125.00 Per Pivot
New low pressure regulators (Entire pivot must be upgraded)	\$5.00 Per Regulator

- To qualify an Irrigation, Small Mixed Agricultural Use, and Large Mixed Agricultural Use customers must complete an application, and provide supporting data including invoices from installers or suppliers.
- To receive the incentive payment, representatives of Lincoln must inspect the installation and verify that the irrigation efficiency project is properly installed and operational.
- Applications for incentive payments will be reviewed and approved on the basis of the order in which eligible applications are received by Lincoln. The number of incentive payments to be issued each year is subject to the program budget limitation set by Lincoln. Applications received after funding limits have been reached shall be retained for consideration in the following year.

SECTION 9
PUBLIC INVOLVEMENT

1. Public Involvement

Lincoln's IRP has been developed with full public involvement. To encourage public input, meetings were held on January 11, 2016 and February 8, 2016 during which the IRP was discussed and reviewed. Notices of the scheduled public meetings were posted at the Lincoln County Courthouse, U.S. Post Office in Pioche, Lincoln County Telephone System Office, Lincoln County Power District Office, Panaca Market, and the U.S. Post Office in Panaca. In addition, in order to solicit input from those not attending the public meetings, legal notices were placed in the Lincoln County Record, the local paper. These notices indicated:

Draft Integrated Resource Plan Available For Review

The Lincoln County Power District No. 1 (LCPD) is required by its contract for power from Hoover Dam to prepare an Integrated Resource Plan (IRP) every five years. The purpose of the IRP is to verify LCPD is using Hoover Dam power efficiently. To ensure the efficient use of hydroelectric power, under the IRP LCPD will offer various conservation programs to its customers. The draft IRP identifies the programs LCPD is planning for the next five years. The draft IRP is available for customer review at LCPD's office in Caselton. Copies will be made available upon request. Customers may offer comments and suggestions on the planned programs for consideration. Comments should be submitted in writing to LCPD before February 3, 2016. Submit comments to Lincoln County Power District No. 1, Box 101 – HC 74, Pioche, Nevada 89043.

Additional notices regarding the availability of Lincoln's draft IRP were placed on Lincoln's website and on Lincoln's Facebook page.

As a result of the planning and public comment process, Lincoln's IRP has been specifically tailored to meet the needs, goals and objectives for Lincoln's system.