Central Valley Electric Cooperative, Inc.

A Touchstone Energy® Cooperative

2017 INTEGRATED RESOURCE PLAN

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2017 Integrated Resource Plan
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UTILITY BACKGROUND

Central Valley Electric Cooperative, Inc. (CVEC) is a consumer owned, RUS utility serving over 15,600 meters. Central Valley Electric serves members in Eddy, Chaves, and portions of Lea and Otero counties in southeastern New Mexico. CVEC derives its current power needs from purchase contracts provided by Southwestern Public Service Company (SPS), Western Area Power Administration (WAPA), and Western Farmers Electric Cooperative (WFEC).

CVEC's peak demand for 2016 was over 117 megawatts (MW), with energy sales over 765 million kilowatt hours (kWh). The historical growth rate for CVEC in the past 3 years has been an estimated average of -1.14 percent for capacity and an estimated average of -0.64 percent for energy. These decreases have been a result of decreased activity in the oil and gas industry.

With the utility industry changing as rapidly as it has in the past couple of years, namely the creation of the Southwest Power Pool (SPP) integrated market, it has been difficult to make specific long term plans because of the uncertainty in the industry. All future long-term plans will be considered through WFEC. Since CVEC first energized its lines in October 1938, the co-op purchased all of its wholesale power from SPS. In 2009, SPS gave notice that it was going to cancel its contract with the co-op. CVEC and SPS have entered into a Replacement Power Sales Agreement (RPSA) that will allow CVEC to incrementally reduce wholesale power purchases over an extended period. This reduction in wholesale power will be done in four different phases as discussed further below. In an effort to secure future wholesale power, CVEC has become a member of Western Farmers Electric Cooperative (WFEC), a generation and transmission cooperative headquartered in Anadarko, Oklahoma. In 2014, CVEC assigned the SPS RPSA to WFEC.

2016 UTILITY PROFILE DATA

System Peak: 117,988 KW Date: June 2016
Energy Sales: 765,864,795
Annual Load Factor: 77.67%

Generation and Purchases:

A.	Contract Energy Purchases	
	1. Southwestern Public Service	648,462,946
	2. Western Area Power Administration	10,470,633
	3. Western Farmers Electric Cooperative	177,184,000
	4. Net Metering Purchases	6,753
B.	Total Purchases (without losses)	802,743,682
C.	System Losses	36,113,710
D.	System Losses in Percent	4.50%
E.	Total Energy to Customers	765,864,795

NOTE: SPS wholesale rate charges losses for deliveries from generation bus to delivery points.

Number of Customers & Energy Delivered By Customer Class:

Customer Class:	# of Customers:	kWhs:
Residential	5,613	77,050,588
Commercial	1,024	21,129,595
Irrigation	705	56,485,944
Industrial	3,845	557,308,055
Oil Wells	4,289	53,890,613
Office		765,177
TOTALS	**15,476**	**766,629,972**

LOAD FORECASTING INFORMATION

In 2016, CVEC, in conjunction with WFEC, updated its Load Forecast. This forecast will be used as a basis for engineering studies, financial forecasts, system planning and other special studies. This forecast is reviewed annually to update projections on systems load. The forecast is provided to WFEC, SPP and SPS for planning purposes.

The contract with SPS, as a total power provider, historically was beneficial to Central Valley Electric. Scheduling for unexpected load changes due to weather conditions or variations in customer loads is unnecessary for CVEC because any unforeseen additional power requirements are supplied by SPS by virtue of a transmission agent agreement, as long as system limitations are not exceeded.

EXISTING ENERGY RESOURCES

A good starting point when evaluating and comparing alternative supply and demand-side resources would be to review CVEC's current energy sources, allocations, and pricing. As mentioned earlier, Central Valley Electric has separate purchase power contracts with Western Area Power Administration, SPS and WFEC. These purchase power contracts, are listed below.

Western Area Power Administration:

WAPA's current contract with Central Valley Electric Co-op runs through 2024. CVEC's demand and energy allotment fluctuates depending upon water flows and other restrictions.

Below are the 2016 energy purchases from WAPA:

	Energy		Energy
January	1,196,081	July	1,174,627
February	1,088,810	August	1,252,016
March	1,218,919	September	1,002,506
April	1,284,964	October	0
May	1,166,965	November	0
June	1,085,745	December	0

Total: 10,470,633 **Energy Charges: $0.01219 per kWh**

Southwestern Public Service:

SPS has been serving CVEC for 79 years. However, SPS chose not to renew the co-ops purchase power agreement. In response to this decision by SPS, the co-op has acquired all necessary regulatory approval and has joined WFEC. CVEC will continue to own and maintain its transmission and distribution system, just as it does now, and the immediate, short-term and load following power requirements will continue to be provided by SPS through the summer of 2022. CVEC and SPS, by way of the RPSA, have agreed to incrementally step away from the wholesale power relationship over an extended period of time. The incremental step away of wholesale power purchases are as follows:

- June 1, 2012, CVEC took 29 MW off the SPS generation system
- June 1, 2017, CVEC will take an additional 26 MW off the SPS generation system
- By 2022, SPS will only provide CVEC a total of approximately 45 MW
- By 2024, SPS will only provide CVEC a total of approximately 30 MW
- By the end of 2026, CVEC will receive all of its wholesale power from WFEC

Western Farmers Electric Cooperative began providing wholesale power to CVEC in June 2012, and in 2014, CVEC assigned the SPS RPSA to WFEC. The SPS RPSA does allow for CVEC to reduce up to 5 percent of the Phase I and Phase II capacity reductions by demand side resource programs and an additional 5 percent through renewable energy programs.

Scheduling of WAPA power and additional load requirements for CVEC are currently handled by SPS personnel. This allows CVEC to utilize its resources more efficiently by eliminating the need for a full-time planner/power scheduler. With so many unknown variables in forecasting loads it can be financially disastrous if a utility misses a daily or hourly forecast. CVEC's demand charge is based on the actual delivery amount or 65 percent of the previous twelve month peak, whichever is greater.

Below are the 2016 energy purchases from SPS:

	KW Billed	Energy		KW Billed	Energy
January	81,572	53,384,504	July	87,635	60,091,261
February	84,829	51,762,232	August	87,296	55,722,852
March	83,148	56,783,986	September	80,712	49,647,038
April	75,734	49,495,048	October	85,412	54,282,728
May	78,582	51,934,744	November	74,106	52,677,291
June	88,988	54,696,460	December	86,554	57,984,802

KW Billed Total: 994,568 **Capacity Charges: $6.64 to $7.23 per KW**
Energy Total: 648,462,946

Western Farmers Electric Cooperative (WFEC):

On June 1, 2012, CVEC took 29 MW off the SPS system. A Purchased Power Agreement (PPA) with WFEC was negotiated to provide for CVEC's first incremental load reduction of wholesale power from SPS. On June 1, 2017, WFEC will provide an additional 26 MWs to meet the Phase II load reduction required by the SPS RPSA.

Below are the 2016 energy purchases from WFEC:

	KW Billed	Energy		KW Billed	Energy
January	18,000	13,392,000	July	29,000	18,280,000
February	19,000	12,864,000	August	29,000	17,649,000
March	20,000	14,110,000	September	20,000	14,064,000
April	21,000	14,784,000	October	18,000	13,392,000
May	22,000	15,552,000	November	20,000	13,265,000
June	29,000	16,368,000	December	19,000	13,464,000

KW Billed Total: 264,000
Energy Total: 177,184,000

Capacity Charges: $7.23 per KW

IDENTIFYING OTHER RESOURCE OPTIONS

There are several supply-side and demand-side options to consider. Each option must be evaluated to determine cost effectiveness and compliance with the WFEC wholesale contract. Financial issues, as well as environmental issues, societal issues, and concern regarding future natural resources must be considered in planning for the future.

Conventional resources and renewable resources are currently being reviewed from both the supply-side and the demand-side perspective, keeping in mind the benefit of each to the utility, WFEC, and the customer. In reviewing these two types of resources, various issues which affect our society as a whole must be considered as well as determining the economics of pursuing these resources as viable and long term alternatives.

Supply-Side Options

Over the years Central Valley Electric's philosophy has been to refrain from ownership in any type of generating facility, however prior to CVEC's RPSA with SPS and membership in WFEC, CVEC did conduct an economic analysis of the available options to meet the long term wholesale power needs. The economic analysis performed by EnerVision of Atlanta, Georgia, indicated a purchase power agreement was more favorable than constructing a generation resource. WFEC will be contracting and/or constructing generation resources to serve CVEC's loads and CVEC will have equity ownership in WFEC. With the utility industry changing so rapidly with the advent of Regional Transmission Organizations and the concern of global warming and fossil fuel emissions, it appears CVEC's decision to become a member of WFEC was a good decision given no clear road map from Congress and regulators has been decided.

WFEC will conduct all power plant evaluations on behalf of its membership including CVEC. Issues to consider in power plant construction would be member's rates, long term economic conditions, availability of capital and the associated interest rates, social, and regulatory issues.

Pursuant to a state mandated Renewable Portfolio Standard, in 2015, no less than five percent of CVEC's retail electric sales must include renewable energy. This will increase at a rate of one percent per year until 2020, at which time the renewable portfolio standard will be 10 percent. In 2016, CVEC received 80 percent of its wholesale power from SPS, and 6.95 percent of that power was a mix of bundled energy and green tagged power from renewable energy resources. The remaining 20 percent of CVEC's wholesale power came from WFEC, and there is no distinction as to how that power was

generated. CVEC retired 45,998 Renewable Energy Credits (REC) to meet the six percent RPS compliance requirement in 2016. CVEC will retire RECs sufficient to meet the seven percent RPS requirement for 2017.

Wind Energy

Large Wind Systems:

Wind energy has proven to be a cost-effective and an environmentally attractive source of power supply as long as a large enough plant is constructed. Currently, New Mexico has 1,112 MW of total wind capacity online, and is ranked 17th in the United States. There is also 1,003 MW of wind capacity under construction in New Mexico. For the 12 month period ending July 2016, wind energy provided 9.54% of all in-state electricity production (American Wind Energy Association).

WFEC receives wind power from four different wind farms in Oklahoma (366.15 MW total), and two wind farms in New Mexico (45 MW total).

Solar Energy

In 2015, New Mexico installed 56 MW of solar electric capacity ranking the state 15th nationally. Currently there is 406 MW of solar energy in New Mexico ranking the state 13th in the country in installed solar capacity. Of this 38 MW are residential, 52 MW are commercial and 317 MW are utility-scale. There is enough solar energy installed in the state to power 93,000 homes. Over the next 5 years, New Mexico is expected to install 1,392 MW of solar electric capacity. Installed solar photovoltaic system prices in the U.S. have dropped steadily – by 12 percent from 2015 and by 66 percent from 2010 (Solar Energy Industries Association).

WFEC will purchase power generated by the 25 MW Caprock Solar Project located near Tucumcari in Quay County.

A small solar electric or photovoltaic (PV) system can be a reliable and pollution-free producer of electricity for a home or office. Small PV systems may also reduce wholesale capacity purchases for generation and SPP transmission if the PV system is generating during peak periods. Small PV systems also provide a cost-effective power supply in locations where it is expensive or impossible to extend conventional power lines.

However, before choosing a solar system a resident should consider reducing energy consumption by making the residence or business more energy efficient. Reducing energy consumption will significantly lower utility bills and will reduce the size of the home-based renewable energy system needed.

CVEC members can take advantage of a Photovoltaic (PV) Water Pumping rate, and members can use the sun to pump water for livestock wells or other small needs. In order for the location of the watering system to qualify for this rate, the system must be located at least one-half mile from existing lines. Currently, there are eight of these small PV systems in CVEC's service area. Six of the systems are three kilo-watts (KW) and two of the systems are four KW.

CVEC members who do not wish to install renewable energy on their property can still purchase renewable energy. CVEC members can purchase renewable energy in 100 kWh blocks for $2.25, or a member can elect to have 100 percent of their electricity come from renewable sources for an additional $0.0225 per kWh above the current filed rate. These renewable energy purchases are considered to be

"at a premium," meaning the block rate charged is in addition to what a member is already being charged for their monthly usage. Currently, CVEC has not had any members interested in purchasing renewable energy.

Biomass

Compared with other renewable resources, biomass is very flexible; it can be used as fuel for direct combustion, gas fired, used in combined heat and power technologies, or biochemical conversions. Due to the wide range of feed stocks, biomass has a broad geographic distribution.

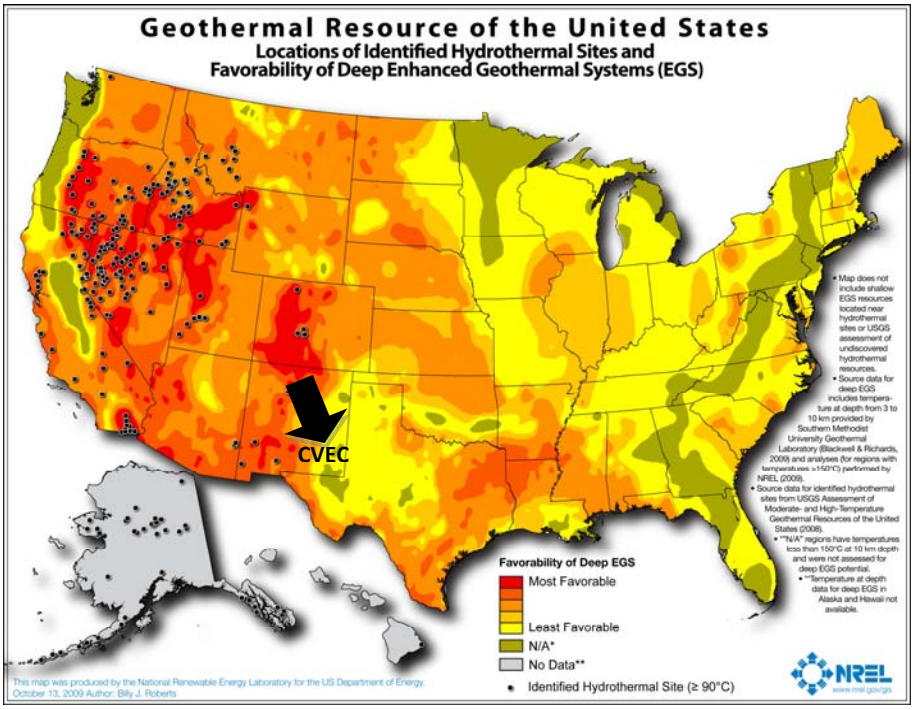
According to the U.S. Department of Energy, farms and animal-processing operations create animal wastes that constitute a complex source of organic materials with environmental consequences. This waste can be used to make energy or biopower. In southeastern New Mexico the methane generation potential from animal manure is good.

Central Valley Electric does consider biomass to be a viable renewable energy and in conjunction with WFEC would be agreeable to meet with others interested in pursuing this resource.

Geothermal

Geothermal power plants use steam produced from reservoirs of hot water found a few miles or more below the Earth's surface to produce electricity. The steam rotates a turbine that activates a generator, which produces electricity. There are three types of geothermal power plants: dry steam, flash steam, and binary cycle. The U.S. Geological Survey estimates that potentially 500,000 MWs of geothermal resources are available in the western U.S. – about half of the current installed electric power generating capacity in the United States (National Renewable Energy Laboratory).

According the Geothermal Resource Potential Map below, CVEC's service area is not a favorable area for geothermal power production.



Demand-side Options

Demand-side management (DSM) programs are designed to reduce the demand for power or to shave high demand peaks. Many utilities in need of additional capacity and energy consider DSM programs as an alternative to increased generation, because these programs are more cost effective than new generation. Additionally, the SPP bills for network transmission service and schedule 11 base plan upgrades based on peak demand. Less generation will result in fewer air pollutants and will help preserve natural resources for future generations. Obviously, less consumption also means fewer revenues for utilities which could possibly influence retail rate structures.

Central Valley Electric is dependent on power sales to maintain financial stability in order to continue to provide low cost power to its consumers. CVEC is a not-for-profit, consumer owned cooperative; therefore, it is faced with the difficult decision of considering DSM programs that are cost effective while having to deal with the issue of lower revenues. Raising rates or redesigning rates are one way to compensate for the lost revenue but that does not always benefit the majority.

Central Valley Electric currently has several programs in place which are considered to be Demand Side Management Programs. The co-op will continue to evaluate these program benefits to the co-op and its members. The programs in place consist of:

Marathon Water Heater Energy Efficiency Program

Water heating accounts for about nine percent of the energy consumed in the home. Using hot water efficiently enables members to save energy and money. By selling Marathon Water Heaters, CVEC is encouraging members to install energy efficient electric water heaters.

Marathon Water Heaters are advertised to be 95 percent efficient, with the strongest tank in the residential water heater industry. The tanks have a lifetime warranty, and will not rust or corrode. The tank design is a seamless blow-molded polybutene inner tank wrapped in 2.5 inches of filament-wound fiberglass. These water heaters are great for brutal well water conditions, and have no stand-by heat loss.

In April 2009, CVEC began collecting a Renewable Energy and Energy Conservation fee. New Mexico Public Regulation Commission Rule 572 gives co-ops the ability to recover some costs from the state. Currently, CVEC pays one-half percent of its operating revenue to the Commission for inspection and supervision fees. In accordance with Rule 572, CVEC can recover that fee by collecting one percent of additional revenue from its members. The funds collected from the state and CVEC members must be used for renewable energy and energy efficiency programs that benefit CVEC members. CVEC's Board of Trustees decided not to collect the one percent of additional revenue from its members in 2016. The board felt the fund was well established to fund current and future renewable energy and energy conservation programs.

Because this fund is available to use on energy efficiency programs and to encourage members to install energy efficient water heaters, CVEC offers its members a 60 percent discount off the co-ops purchase price of Marathon Water Heaters.

Since the program started in September of 2009, CVEC has sold 333 energy efficient Marathon water heaters (as of December 31, 2016). That is a potential estimated annual wholesale demand savings to the co-op of 7.26 KW, or $629.88 (based on a $7.23 generation demand charge from SPS). The estimated

annual transmission demand savings to the co-op is $368.52 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission demand savings to CVEC is approximately $998.40.

There is also a potential energy savings to CVEC members of 99,089 kWh, or $7,966.76 (based on CVEC's 2016 average residential rate of $0.08040 per kWh). The demand and energy savings will continue to increase as the co-op continues to sell water heaters.

Commercial & Industrial Lighting Rebate Program

According to the U.S. Energy Information Administration, lighting accounts for more than 20 percent of energy usage in commercial buildings in the United States.

Energy efficient lighting can help CVEC members save money on their energy bills; at the same time it can help the co-op lower wholesale power demands, thereby reducing the need for additional generation. Therefore, commercial and industrial members who are building new (new construction), or replace/upgrade (retrofit) are eligible for a rebate. Efficient lighting options include but are not limited to: T8 fluorescent, T5 fluorescent, compact fluorescent lighting (CFL), light emitting diodes (LED), and plasma.

Retrofit Rebates

The rebate on lighting projects is determined by comparing the actual lighting KW usage with the proposed KW lighting usage to be installed for existing buildings. The rebate amount is $450 per KW reduced.

New Construction Rebates

The rebate for new construction is 40 percent of equipment cost (labor costs not included) for members installing LED, CFL or plasma lighting.

Since the program started in August of 2011, CVEC has given 25 rebates for commercial and industrial lighting projects. As of December 31, 2016, there is a potential estimated annual wholesale demand savings of 340.35 KW, or $29,528.77 (based on a $7.23 generation demand charge from SPS). The estimated annual transmission demand savings to the co-op is $17,276.17 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission demand savings to CVEC is approximately $46,804.94.

There is also a potential energy savings to CVEC members of 364,931 kWh, or $28,415.72 (based on CVEC's 2016 average large commercial rate of $0.077866 per kWh). The demand and energy savings will continue to increase as more members take advantage of this rebate program.

Home Energy Audit Program

A home energy audit is the first step in assessing how much energy a home consumes, and can be used to evaluate what measures need to be taken to make the home more energy efficient. CVEC believes air infiltration and duct efficiency are two areas that can be assessed in a home energy audit that has the potential to lower a home's energy use and promote better air quality within the home.

CVEC has contracted with a qualified company to perform free home energy audits for residential members and to make home improvement in the areas of air infiltration and duct efficiency.

This program is available to all CVEC residential members who have a home set on a permanent foundation.

The program started in September 2012, and as of December 31, 2016, there have been 211 homes that have received this free home energy audit. Based on calculations from the homes where audits were performed, there is an estimated annual wholesale demand savings of 215.25 KW, or $18,675.09 (based on a $7.23 generation demand charge from SPS). The estimated annual transmission demand savings to the co-op is $10,926.09 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission demand savings to CVEC is approximately $29,601.18.

There is also a potential energy savings to CVEC members of 616,726 kWh, or $49,584.77 (based on CVEC's 2016 average residential rate of $0.08040 per kWh). The demand and energy savings will continue to increase as more members take advantage of the Home Energy Audit Program.

Heating & Air Conditioning Rebate Program

According to the U.S. Department of Energy, heating and cooling accounts for about 20 percent of the energy consumed in the home. CVEC wants to encourage members to install energy efficient heating and cooling products when constructing new buildings or remodeling existing buildings. Therefore, CVEC offers an Air Source and Ground Source Heat Pump rebate program.

As members of Western Farmers Electric Cooperative, CVEC jointly participates in WFEC's Rebate Program for ground source heat pumps.

Ground Source Heat Pumps (GSHP) Rebate – GSHPs use the constant temperature of the earth as the exchange medium instead of the outside air temperature. This allows the system to reach fairly high efficiencies (300%-600%) on the coldest of winter nights. System life is estimated at 25 years for the inside components and 50 plus years for the ground loop. A desuperheater is a small auxiliary heat exchanger that uses superheated gases from the heat pump's compressor to heat water. This hot water then circulates through a pipe to the home's storage water heater tank. In the summer, the desuperheater, if installed, uses the excess heat that would otherwise be expelled to the ground. Therefore, when the geothermal heat pump runs frequently during the summer, it can heat all of your household water. During the fall, winter, and spring – when the desuperheater isn't producing as much excess heat – members need to rely more on storage or demand water heater to heat the water. (SOURCE: U.S. Department of Energy).

Residential Program (Includes manufactured homes on permanent foundation)

Ground Source Heat Pump (GSHP) Rebate (*Desuperheater not required)*

- Up to $3,200 per ton rebate ($700 from WFEC; $2,500 from CVEC)
  On site verification required
- Minimum Specifications – specifications based on 2nd stage values:
  - Closed or Open Loop: ≥ 15.9 EER & ≥ 3.3 COP
  - Split System:
    Closed Loop: ≥ 15.5 EER & ≥ 3.3 COP
    Open Loop: ≥ 18.0 EER & ≥ 3.6 COP

An additional $150 will be paid by WFEC if a desuperheater is installed.

GSHP to GSHP:

- Up to $2,750 per ton rebate ($250 from WFEC; $2,500 from CVEC)
  On site verification required
- Minimum Specifications:
  - Closed Loop: ≥ 3.0 EER Increase & ≥ 3.3 COP
  - Open Loop: ≥ 3.0 EER Increase & ≥ 3.6 COP

Air Source Heat Pump (ASHP) Rebate

- Up to $175 per ton rebate
- Minimum Specifications:
  - Minimum SEER of 16
  - Minimum HSPF of 8.5
  - Backup/Supplemental heat can be Natural Gas or Propane

Commercial and Industrial Program

Ground Source Heat Pump (GSHP) Rebate (*Desuperheater not required)*

- Up to $2,750 per ton rebate ($250 from WFEC; $2,500 from CVEC)
  On site verification required
- Minimum Specifications:
  - Same specifications as residential program

In New Mexico there is a 30% (maximum $9,000) tax credit for installing a GSHP (expires December 31, 2020). The federal tax credit for geothermal installations expired December 31, 2016 and was not renewed.

* EER – Energy Efficiency Rating is how many British Thermal Units (BTU) per hour are used for each watt of power it draws.

*COP – Coefficient of Performance is heat delivered (output) in BTUs per hour divided by the heat equivalent of the electric energy input. The higher the COP, the higher the efficiency of the equipment.

*Seasonal Energy Efficiency Ratio (SEER), which is the total heat removed from the conditioned space during the annual cooling season, expressed in Btu, divided by the total electrical energy consumed by the heat pump during the same season, expressed in watt-hours.

*Heating Season Performance Factor (HSPF), which is the total space heating required during the heating season, expressed in Btu, divided by the total electrical energy consumed by the heat pump system during the same season, expressed in watt-hours.

One rebate for the installation of a geothermal heat pump system has been issued since 2015, with an estimated annual wholesale demand savings to the co-op of 0.71 KW, or $61.60 (based on a $7.23 generation demand charge from SPS). The estimated annual transmission demand savings to the co-op is $36.04 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission

demand savings to CVEC is approximately $97.64. The demand savings will continue to increase as more members take advantage of this rebate program.

Since the co-op started offering an air source heat pump rebate in 2015, two rebates have been issued, with an estimated KW savings of 14.16 KW, or $1,228.52 (based on a $7.23 generation demand charge from SPS). The estimated annual transmission demand savings to the co-op is $718.76 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission demand savings to CVEC is approximately $1,947.28. The demand savings will continue to increase as more members take advantage of this rebate program (as of December 31, 2016).

New Mexico Energy Smart Program

Mortgage Finance Authority (MFA) is a quasi-public entity responsible for administering housing programs for low to moderate income families throughout the state of New Mexico. One of the programs that MFA manages is the NM Energy Smart Weatherization Assistance Program. The program reduces energy costs for low-income families by improving the energy efficiency of their homes while ensuring their health and safety. The program targets low income, elderly individuals, people with disabilities, and families with young children for services. A range of repairs and improvements are offered to home owners including sealing common home air leaks, installing smoke and carbon monoxide detectors throughout the home. Low income households typically spend 17 percent of their total income on energy versus 4 percent for other households. With NM Energy $mart improvements, homeowners can save up to an average of $400 per year. Improvements include, but are not limited to, insulating ducts, attics, walls, and crawlspaces; installing energy efficient windows, ventilation, doors, water heaters, refrigerators, furnaces, and light bulbs. There are strict guidelines for qualification that are determined by MFA and only the person requesting the help can apply for assistance.

CVEC has partnered with the MFA to sponsor a specific number of homes, in the co-op's service territory, and the MFA matches the co-op's sponsorship fees. The MFA assumes all program administration and reporting requirements. CVEC works with their member during the process and monitors the progress, satisfaction, and finished services provided. Since CVEC started working the MFA and the NM Energy Smart program in 2015, the co-op has successfully worked with eight members and their families to make energy efficient improvements to their homes. That is a potential estimated annual wholesale demand savings to the co-op of 7.79 KW, or $675.86 (based on a $7.23 generation demand charge from SPS). The estimated annual transmission demand savings to the co-op is $395.42 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission demand savings to CVEC is approximately $1,071.28.

There is also a potential energy savings to CVEC members of 65,255 kWh, or $5,246.50 (based on CVEC's 2016 average residential rate of $0.08040 per kWh). The demand and energy savings will continue to increase as the co-op continues to participate in this program.

This program has helped these families implement much needed weatherization repairs to their homes that they might not have otherwise been able to do. All home repairs were performed by subcontractors of the Southwestern Regional Housing Community and Development Corporation.

Variable Frequency Drives Program

This program was approved by CVEC's board of trustees in July 2015. The objective of the program is to promote energy efficient methods for motors and pump based systems using variable frequency drives

(VFD). Members can receive $100 per horsepower (HP) for installing VFDs to control end-use pump and motor equipment/systems up to 200 HP.

All installed VFDs, regardless of the HP, must meet or exceed the institute of Electrical and Electronics Engineers standard on Harmonic Control & Limitations (IEEE 519) for electric power systems. A minimum of a 12 pulse system is required; filters may also be required to prevent harmonic issues. Motors other than irrigation must have assumed annual load factors of at least 50 percent. Should the use of a VFD create unacceptable levels of harmonic distortion, the member will be responsible for resolving the issue to a level acceptable by CVEC.

Rebates are capped at $75,000 annually for any one member.

Since the VFD program started in 2015, CVEC has issued 5 VFD rebates (as of December 31, 2016) with a potential estimated annual wholesale demand savings to the co-op of 174.06 KW, or $15,101.45 (based on a $7.23 generation demand charge from SPS). The estimated annual transmission demand savings to the co-op is $8,835.29 (based on a $4.23 estimated SPP transmission charge). The total generation and transmission demand savings to CVEC is approximately $23,936.74. The demand savings will continue to increase as more members take advantage of this rebate program.

Four perspectives to consider when determining DSM programs:

Participant's Perspective

The cost would be the initial capital cost, ongoing operation and maintenance, and any removal cost for old equipment. The benefits are lower utility bills and rebates from utilities, if applicable.

Ratepayer Perspective

This affects those who do not participate in the program. They are affected if electric rates increase due to DSM programs, or would experience a slight reduction in allocated patronage capital margins for the year as the DSM programs increase expenses. The costs are revenue losses from the programs, utility cost for operating the program, and rebates paid, if applicable. The benefit to ratepayers comes from the reduction in wholesale capacity and energy purchases.

Utility Perspective

This deals with the financial impact on the utility. The costs are program costs, rebates, if applicable, and any additional supply cost. Lost revenue is not considered because it can be recovered through higher rates. Benefits are avoided capacity and energy cost.

Total Resource Cost Perspective

This looks at the overall cost and benefit to society. The environmental effects of generation are estimated to be a 10 percent external factor which is added to the cost of generation. The costs are the program cost, participant's cost, and supply cost, if any. The benefits are reduced capacity and energy cost, plus the 10 percent external factor for the environmental effects of generation.

The goal is to have all perspectives benefit from DSM programs, although in many cases, the ratepayer perspective does not benefit because not everyone participates in the program. Non-participants are

affected negatively with rate increases to help cover lost revenues and reduced capital credits allocated. In reviewing the various DSM options, Central Valley Electric wanted to identify programs that had a short pay-back period and would benefit members. Central Valley Electric envisions that an Interruptible Rate program may be beneficial once full transition to WFEC occurs, and the evaluation of such a program is planned.

ENERGY EFFICIENCY OBJECTIVES

Energy efficiency is using less energy to provide the same service. Energy efficiency is not energy conservation, which is reducing or going without a service to save energy. Anywhere energy is used; there are opportunities to increase efficiency. In most cases, energy efficiency measures will pay for themselves over time in the form of lower energy bills.

How quickly they pay back their investment depends on a lot of factors, such as the cost of energy, and the overall use of the measure – for example, how many hours an appliance is in use. Weather is a factor when the measure is related to maintaining environmental conditions – in air conditioning, or heating for example.

Energy Efficiency Means:

- Using advanced and state-of-the-art technologies to provide better quality energy services with less energy.
- Getting the most productivity from every unit of energy.
- Getting the desired energy services – comfortable homes, profitable businesses, convenient transportation – with less energy use, less air pollution, and lower total cost.
- Using energy wisely.
- Eliminating energy waste.
- Using technology to easily reduce energy use without having to each day “remember” to do it yourself.

Energy efficiency is a valuable resource that creates a win-win solution on multiple fronts. One action equals five major consumer and societal benefits. It saves consumers money, increases comfort, protects the environment, and enhances the economy.

When energy efficiency is combined with smart energy practices – such as turning off lights, TVs, computers, and electronics that are not in use – all of the benefits above are compounded.

Since 2015, CVEC has replaced over 14,000 meters with Advanced Metering Infrastructure (AMI) meters. These meters allow CVEC to automate processes like meter reading to save the co-op time, and money. The AMI meters bring in more usage information and this allows CVEC members to better track and compares usage patterns through the use of the co-op’s SmartHub tool.

SmartHub not only allows CVEC members to pay their electric bill online, but they can also get detailed information on their actual electric use. SmartHub allows members to view their current bill, along with bills from the previous month or even the previous summer, if they want to compare usage. They can also chart their electric use monthly, daily or even hourly. This detailed information allows CVEC members to take steps to reduce their energy consumption and lower their bills.

2016 Energy Efficiency Goals

The following are energy efficiency goals for CVEC for the year 2016:

- CVEC will continue to educate members on the many advances in energy efficiency through any means available to the co-op. CVEC will provide ongoing information to members at the co-op and through outreach opportunities within the co-op's service area.
    - In the past year CVEC hosted an open house and member appreciation events in Roswell and Artesia. At those events and at the co-op's annual meeting we had information available regarding the current energy efficiency programs at the time, including energy efficient water heaters for sale, home energy audits, heating and cooling rebates, commercial lighting rebates, a filter change program, as well as Touchstone Energy materials regarding ways to save money and ways to become more energy efficient. CVEC also offered a weatherization program in partnership with the Mortgage Finance Authority/New Mexico Energy Smart. This program helped members weatherize their homes with repair or replacement of windows, doors, ductwork, vents, lighting, and when necessary upgrading water heaters and refrigerators. CVEC also provides materials in the quarterly newsletter, the *Enchantment* magazine, bill inserts, new member packets, in the co-op lobby, on the co-op website, e-mails, radio and television ads, and in local newspapers. CVEC was regularly on a morning radio shows in both Roswell and Artesia, letting people know about all of the energy efficient programs available at the co-op. In 2016, CVEC started using social media (Face Book) as a way to help reach members about our various programs.

- CVEC will continue to actively work with the Grassroots projects sponsored by the New Mexico Rural Electric Cooperative Association.
    - In the past year, CVEC has been involved with the Grassroots projects that include New Mexico's response to the Clean Air Act. That particular response requirement has been postponed, but CVEC will continue to work with the Grassroots coordinator on any issues that may affect our service territory.

- CVEC will actively seek geothermal resources for residential and commercial applications, while working closely with Geo Energy Services and WFEC.
    - CVEC continues to showcase the geothermal installation at the co-op's headquarters facility. In the last year we had one member who successfully completed a residential geothermal installation. From that installation, we participated in a geo Ranch public event where equipment providers and others were able to see the process of the drilling and equipment installation from start to finish. Geo Energy Services participated in community events with CVEC throughout the year and will continue working with CVEC for the next several months.

2017 Energy Efficiency Goal

The following are energy efficiency goals for CVEC for the year 2017:

- CVEC will actively inform members of the SmartHub app so members can better monitor and manage their energy usage.
- CVEC will continue to educate members on the many advances in energy efficiency through any means available to the co-op. CVEC will provide ongoing information to members at the co-op and through outreach opportunities within the co-op's service area.

- CVEC will continue to actively work with the Grassroots projects sponsored by the New Mexico Rural Electric Cooperative Association.
- CVEC will actively seek and market geothermal resources for residential and commercial applications, while working closely with Geo Energy Services and WFEC to identify well drillers and HVAC installers
- CVEC will evaluate current tariffs and redesign tariffs that will more accurately reflect fixed and variable costs so as to remove rate tilt over time.
- CVEC will evaluate member-owned supply side resource programs in an effort to reduce wholesale generation and SPP transmission capacity costs to the benefit of the CVEC membership.
- CVEC will continue to monitor existing demand side programs and evaluate potential new programs to the benefit of the co-op membership.

LEAST-COST OPTIONS

The purpose of DSM programs is to help utilities lower loads because of the lack of available capacity and energy, avoid the high cost of new generation and transmission, and to help preserve natural resources.

DSM programs may be used as a way to save energy. Whatever happens in the industry and as a result of load reductions in the RPSA, Central Valley Electric needs to consider what is best for the utility and the member's. The DSM programs listed above do have a positive benefit to cost factor, but are customers willing to spend the extra money to purchase the more efficient equipment if the utility does not provide rebates?

IRP ACTION PLAN

Traditionally, utilities have relied upon 20 year planning horizons in their decision making process. The days of long-term power planning are over with the creation of the SPP Integrated Market, and utilities are faced with a new set of rules that have not been completely outlined. With this uncertainty, power planning and utility decision making for the future are very difficult due to all utilities treading into unknown waters. Over the past several years climate change, greenhouse gas emissions and global warming have become topics of increasing interest in Congress and the utility industry. In an effort to address global warming issues, Congress could impose limits on the emissions of carbon dioxide from generation plants. These limits, along with high wind farm saturations, could make it economically unfeasible to build new coal-fired generation plants which are needed to meet the increasing demand for electricity, and could affect all electric utilities.

As a means of minimizing the uncertainty utilities are facing, integrated resource planning has been introduced to help utilities recognize their strengths and weaknesses more clearly in an era of unprecedented change. Understanding where the utility is positioned in terms of current and future resources, the price of those resources, and the reliability of those resources will help the utility prepare itself to meet future load requirements in an economically and environmentally safe manner.

Having an action plan as a roadmap will help Central Valley Electric meet the needs of its customers. With all the anticipated changes in the industry, CVEC is submitting a two-year and a five-year plan to

include its plans for the future. These plans are intended to test the residential and commercial markets with technologies that will save customers money over time.

Two -Year Plan

The two-year plan will consist of the following goals and objectives:

- Central Valley Electric will continue to rely upon the existing SPS Replacement Power Sales Agreement and wholesale power purchases from WFEC to meet current and future power needs. This decision is based upon the following reasons:

    1. The SPS RPSA is a contractual commitment until 2026.

    2. WFEC is expected to build generation resources to meet CVEC's long term wholesale power requirements. CVEC will have an equity ownership in these power plants and started paying equity to WFEC. Additionally, WFEC has provided for CVEC's Phase I Load Reduction within the SPS RPSA that began June 1, 2012, and will provide for CVEC's Phase II load reduction commencing June 1, 2017.

    3. Power reliability has been good with SPS, as well as their handling of Central Valley Electrics scheduling and power needs. This allows the co-op to forego having a full-time forecaster and planner/scheduler for daily and hourly power requirements. WFEC will take over this function beginning in 2022.

Central Valley Electric Cooperative is recommending the above programs and will research ways in which we can incorporate additional energy efficiency programs.

Five-Year Plan

Preparing a five-year plan is done with much conservatism. Several different load forecasts, and financial forecasts, have been prepared based on different growth scenarios. CVEC does provide an annual load forecast to WFEC, SPP and SPS for planning purposes.

1. The Load Forecast Study is expected to be updated annually.

2. WFEC will become CVEC's wholesale power provider in the future and therefore will have input into generation resource decisions as CVEC will have representation on the WFEC Board of Trustees to provide input on generation decisions.

3. In the event customer and utility needs change during this period, existing programs would need to be re-evaluated to determine if they are achieving the desired results. If not, then other customer programs would need to be evaluated.

4. CVEC will continue to evaluate current member tariffs and make periodic changes to accurately reflect wholesale and distribution cost drivers.

VALIDATION AND EVALUATION

Current projects such as the Marathon electric water heating program, the Home Energy Audit Program or the commercial and industrial lighting rebate program require different methods to validate present consumption versus projected savings. Many assumptions or estimations have to be made regarding the energy usage of various electric devices and consideration for the length of time that items are in use. Predicting the savings will be based upon manufacturer data estimates and comparing it to previous usage patterns.

ENVIRONMENTAL EFFECTS

Currently, Central Valley Electric Cooperative has two resources for its power supply. It would be reasonable to assume that the majority of Central Valley's power purchases from SPS or WFEC would come from fossil fuels and would, therefore, be considered unfriendly to the environment. However, in 2016, 6.95 percent of CVEC's wholesale power from SPS was tagged as renewable energy. Because of the vast amount of resources which SPS and WFEC possess, it is difficult to determine from which generation source Central Valley's power needs are being met.

Action taken by Board:

On, February 22, 2017, CVEC's board of trustees voted to adopt this Integrated Resource Plan.