Integrated Resource Plan

2018 to 2022

City of Fremont, Nebraska

Disclosure

This document contains estimates and forward looking trends and events, it is important to note that future events will affect this document and possibly alter the results of this document.

Acknowledgement

Electric production resource planning at the City of Fremont is an ongoing process. This integrated resource plan (IRP) is designed to evaluate the City's electric production resources and the City's electrical needs in the present as well as in the future.

1: Introduction

The City of Fremont (COF) owns its municipal electric system for the benefits of its ratepayers. The Utilities and Infrastructure Board (UIB) has oversight over the electric system and makes recommendations to the COF City Council whom has the ultimate decision making authority.

The COF electric production is part of a rapidly changing electric production environment. The electric industry is constantly changing; there are technological advancements, regulatory changes and customer preferences. COF understands it has to embrace and manage the changing environment, but still hold true to the mission of providing rate payers the safest, most reliable and cost effective energy possible.

COF has made a dramatic shift in its generating assets from primarily fossil fuel by adding renewables such as wind and solar. The COF is participating in a long-term purchase power agreement with NextEra Energy in the Cottonwood Wind Project, LLC for 41 MW's of wind energy. The COF also recently installed a community solar farm located in the COF that has an output of approximately 1.5 MW's and is in the construction phases of building a second community solar farm totaling 1 MW. When it is finished, the total community solar output will be approximately 2.5 MW's of electric power.

2: Public Works Oversight

The Utilities and Infrastructure Board

The Utilities and Infrastructure Board (UIB) consists of five (5) citizens appointed by the Mayor and approved by the City Council, to serve as oversight of public works activities. Each member serves a five-year term. The UIB makes recommendations to the COF City Council concerning public works activities.

The UIB meets the second and last Tuesday of every month at 4:00 PM in the Municipal Building at 400 E. Military Fremont, NE. These meetings are open to the public and the public is encouraged to attend. The meetings generally consist of financial, project, and department updates.

The City of Fremont City Council

The COF's governance structure consists of an elected Mayor and eight (8) elected City Council members. There are two councilmembers from each of four (4) voting wards, shown below.

The City Council meets on the second and last Tuesday of every month at 7:00 PM in the council chambers at the Fremont Municipal Building 400 E. Military Fremont, NE. The City Council receives recommendations from the UIB and acts on those recommendations. These meetings are open to the public and the public is encouraged to attend.

3: Community Outreach

It is a priority of the COF to notify and engage the public regarding City projects. The COF uses several different methods of communication to provide ratepayers and the public with information on a variety of topics.

The COF publishes a newsletter that is included in the monthly billing statements that updates ratepayers about City activities, safety topics and other related topics. A monthly electronic newsletter is also published and sent to customers that have provided the utilities with their e-mail address. This newsletter includes items such as updates for the community solar projects, links to engineering assistance, and natural gas safety.

In addition to the newsletter, the COF utilizes social media as a means to notify customers of upcoming events and programs along with outage and storm damage updates. For further information, visit the COF Facebook page. https://www.facebook.com/City-of-Fremont-NE-273002179432953/

The COF provides a link on its web site (www.fremontne.gov) to information about safety and energy related topics. COF meets with community civic groups, public forums and educational institutions to engage the public and inform them of upcoming COF projects and activities. These events have been very helpful with the implementation of the community solar projects.

Annually, the COF has a booth at the Fremont Home Show. The booth is staffed with City employees that are available to discuss various topics concerning City functions. In addition to the booth, COF

management participates in town hall type meeting with topics ranging from long term planning to community solar and wind projects, these meetings are open to the public and the public is encouraged to attend. COF staff also participates in a weekly radio session that provides information on various City topics.

COF staff participates in the "Ecology Fair" sponsored by Keep Fremont Beautiful each year for middle school children. COF staff also participate with local elementary schools and provides an educational tool called the "Energy Detective" for elementary educators to utilize. Both teachers and parents have been very supportive of this program.

The COF offers many opportunities for internships, school to career, and tours for students interested in the energy sector or to further their education. The COF annually provides tours of its facilities to students from the local high school and university. The COF staff also participate in mock interviews with the high school and local community college students.

In addition to the City Council meetings and the Utility and Infrastructure Board meetings, the City held a public meeting to discuss the Integrated Resource Plan and took public comments prior to official acceptance by the City Council.

4: History:

The COF electric system has been in operation since 1885, when the first "Light Plant" came online. The original light plant provided the streetlights from dusk to approximately 11:00 PM. The first power plant was located at 8th and Park St. (Downtown) Fremont. The plant began 24-hour electric service in 1907. The plant underwent many improvements resulting in five (5) steam driven turbine-generating units. The plant continued to operate until 1976, when it was officially decommissioned.

LDW Unit 6, located at Lon D. Wright Power Plant (LDW), started construction in 1955 with commercial operation beginning in January 1958. Shortly after LDW Unit 6 construction and commissioning was completed, construction on LDW Unit 7, adjoining the existing LDW Unit 6, came on line in 1962. During this period, the downtown plant and the LDW units served City customers.

In 1970 – 1971, the COF authorized the purchase and installation of LDW Unit 8, a 91.5 MW steam turbine generator and associated boiler and balance of plant equipment. LDW Unit 8 completed successful commissioning and established a commercial operation date in December 1976. Once LDW Unit 8 came online, the downtown plant was shut down and eventually all equipment was removed. The COF sold the downtown facility, and a developer repurposed the building as an apartment complex.

In 2003, the Derril G. Marshall Generating Station (a simple-cycle gas combustion turbine) went into service. The primary purpose of this plant to provide electric energy during peak period and to maintain electric reliability when LDW units are offline.

In 2017, the COF entered into a purchase power agreement for approximately 41 MW of wind energy from the NextEra Cottonwood Wind Project, LLC., near Blue Hill Nebraska.

In 2018, the COF built two community solar farms in the City. Ratepayers can subscribe to solar energy either by buying panels or by buying solar energy shares.

5: Community and Customer Profiles

The COF is located in the Platte River Valley in Dodge County in eastern Nebraska. Fremont is a first class City as defined by the State of Nebraska. The COF serves a diverse customer base comprised of residential, commercial, and industrial electrical loads.

Climate 2017 Data

Table 5-1

Average Daily Temperature	Average Low Deg. F	Average High Deg. F	Average Precipitation Inch	Average Snowfall Inch
January	13	33	.17	6
February	17	38	.83	7
March	27	50	1.93	6
April	38	63	2.91	2
May	50	74	4.21	0
June	60	83	4.72	0
July	65	87	3.62	0
August	62	85	3.43	0
September	52	77	3.15	0
October	40	65	2.13	1
November	28	49	1.38	3
December	16	34	1.02	7

Historic Growth – Table 5-2, below shows the population for Fremont and Dodge County from 1870 to 2016 (est.) based on U.S. Bureau of Census data.

Table 5-2

Year	City of Fremont	Dodge County
1870	1195	4212
1880	3013	11263
1890	6747	19260
1900	7241	22298
1910	8718	22145
1920	9592	23197
1930	11407	25273
1940	11862	23799
1950	14762	26265
1960	19698	32471
1970	22962	34782

1980	23979	35847
1990	23680	34500
2000	25174	36160
2010	26397	36691
2016 (est.)	26519	36757

Projected Population – The 2012 Comprehensive Plan for the COF projected the following population data for the COF in 2020 and 2030 (see Table 5-3). The population in 2040 was estimated using the data from the 2012 Comprehensive Plan.

Table 5-3

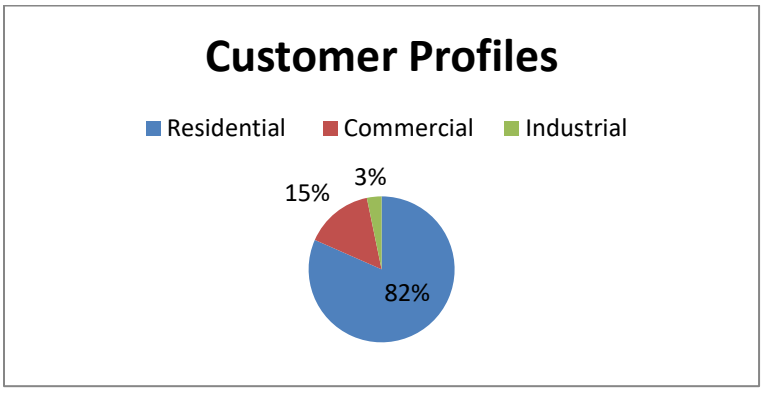
Year	City of Fremont
2020	27,466
2030	29,794
2040 (estimated)	32,319

Fremont Demographics

The COF currently occupies approximately 8.80 square miles and according to the 2010 U.S. Census data, there are approximately 11,675 households in the City. Housing characteristics are: owner occupied - approximately 7,147 units and renter occupied - approximately 4,528 units[1]. Home ownership represents 61.2% of all residential property.

The COF electric service area includes the COF and the surrounding area. A map of the service area is attached in the appendix of this document.

City Electric Customer Profile: Residential Customers: 12,457, Commercial Customers: 2,311, and Industrial Customers: 497



6: City of Fremont Distribution System

COF operates its distribution system in a manner to provide the most dependable and lowest cost electricity to the customer. Distribution circuits are periodically evaluated to determine load levels and

[1] Housing statistics derived from 2017 Dodge County housing study at www.dodgecountyhousingstudy.com.

areas where circuits need to be upgraded and/or added to provide for more flexibility in shifting loads and for future growth.

The COF evaluates transformers to ensure they are not overloaded and operating as efficiently as possible. New transformers are evaluated when purchased for not only cost, but also for losses over the expected life of the transformer.

The COF has replaced essentially all electro-mechanical relays with newer microprocessor-based relaying on both the 13.8 kV and 69 kV systems. The new equipment has resulted in fewer widespread outages and better system reliability. The COF periodically reviews fuse coordination on the system to minimize customer outages, and reviews outage records to identify potential weaknesses in the distribution system and determine placement of additional fusing.

The COF has recently completed a power factor study on the distribution system, which resulted in a plan to install additional capacitors on various distribution circuits. The addition of these capacitor banks will optimize the power efficiency of the distribution system.

In addition, COF currently offers an incentive to encourage industrial users to improve their power factor. In 2017, a large industrial customer installed 4,350 kVAR of capacitors as part of an electric system improvement to their plant, which improved their peak month power factor from 83% to 96% or greater. This resulted in reduced kVAR demand, which can now be used to serve other loads.

The COF has recently completed three (3) long-term projects to improve the safety and reliability of the system. Replacement of old and obsolete oil filled 69 kV substation breakers with new sulfur hexafluoride (SF6) gas breakers, replacement of old and obsolete 13.8 kV substation breakers with new outdoor vacuum breakers, and upgrade substations to current code requirements.

A pilot project was completed to investigate the cost/benefits and energy efficiencies of changing the existing streetlights to light-emitting diode (LED) streetlights. The pilot project results showed a reduction in the cost and increased energy efficiencies. Therefore, going forward, the COF will be installing LED street lights on all new installations, and replacing existing high-pressure sodium, mercury vapor, and metal halide fixtures as they fail with LED streetlights. Although the changeover will take several years to complete, analysis has shown that switching to LED streetlights will result in a streetlight demand reduction of approximately 372 kW and an energy consumption reduction of approximately 1,600,000 kilowatt-hours annually.

The COF is currently building two new distribution circuits (approximately 3.5 miles) to serve a new large industrial customer. The new electrical load is estimated to be 12-14 MW, and is scheduled to come online in mid-2019.

Weather can have an impact on the distribution system. In June of 2017, a thunderstorm moved through the COF service area with 115 mile-per-hour straight-line winds. The storm resulted in widespread damage to the distribution system, with outages to approximately 4,560 customers. COF crews, along with one neighboring mutual aid crew, restored service within two days to all customers who did not sustain damage to their electrical system and were able to utilize the power. The storm also

destroyed 1.2 miles of 69kV transmission line, which was rebuilt and back in service in the spring of 2018.

To further improve the COF distribution system, the COF issued a request for proposal for a Supervisory Control and Data Acquisition (SCADA) Control System to upgrade/replace the existing SCADA systems for all four City utilities (water, natural gas, electric and wastewater). This will result in a common master SCADA platform for all four (4) utilities. The project also includes replacement/upgrading of entire control systems including programmable logic controllers (PLC's), remote terminal units (RTU's), human machine interface's (HMI's), radios, network servers, etc. Monitoring of 18 lift stations and 40 gas pressure regulator/gas metering stations will be added to the upgraded system. The project is expected to result in increased reliability, enhanced monitoring and control capability, and reduced operation and maintenance costs for the City.

In addition to the SCADA upgrade, the City has contracted with a local communications contractor to install a substantial expansion of the City's fiber optic communication network. The expansion in an approximate 18-mile fiber optic ring that includes COF electric substations, distribution warehouse, power plants, water treatment plant, and waste water treatment plant. The fiber optic network ring will be used for high-speed SCADA network communication, control, and direct transfer trip relay communications. The fiber network, along with the SCADA upgrade, will provide increased reliability, security and accommodate additional future functionality, such as outage management systems, distribution management system, and advanced metering infrastructure applications.

Due to capacity constraints on the two existing 69kV transmission ties with Omaha Public Power District (OPPD), the COF has contracted with OPPD to build a new 161kV/69kV transmission tie line into the COF. The line is scheduled to be completed by January 2019. In preparation for the new line, the COF has contracted for the design and construction of a major upgrade to Substation B. The upgrade will include a new control building housing all-new relaying and control panels. The new transmission tie will have 1200-amp capacity and provide the COF with the ability to utilize additional outside "grid" resources.

In 2016, COF began using the American Public Power Association (APPA) eReliability Tracker software to track customer outages. The software allows the COF to calculate reliability indices for the distribution system and provides top-level reliability-related benchmarking information. In March of 2018, the COF was recognized by APPA for achieving excellence in reliability for 2017 by significantly outperforming the electric industry national average as reported by the Energy Information Administration (EIA). In addition, the COF earned a 2017 Gold Level Designation RP3 award from APPA, recognizing the COF as a Reliable Power Provider. The award recognizes utilities that demonstrate high marks in reliability, safety, workforce development, and system improvement.

In February of 2018, the COF commissioned a new 1.5 MW Community Solar Farm. COF's customers participating in the community solar project purchase the energy from the solar farm. The solar farm's output is connected directly to one of the COF's 13.8 kV distribution circuits. The Community Solar Farm was so successful that the COF contracted for a second, 1.0 MW solar farm that is scheduled to be completed by September of 2018.

In 2018, the COF received a Grant from the Nebraska Environmental Trust to purchase five (5) electric vehicles and install two (2) electric charging stations. The dual 240-volt Level 2 chargers were installed on the distribution system in public locations to encourage use of electric vehicles and provide convenient locations for electric vehicle (EV) owners to charge their vehicles. The COF will apply for additional grant funding in future years for additional EV's and charging stations to promote environmentally friendly EV usage in the COF. In addition, the COF is considering implementing additional EV incentives to build off-peak load.

The COF continues to use an infrared camera to monitor hot spots in substations and switchgears, motors, and electrical equipment. Regular monitoring helps to minimize unplanned outages and breakdowns. This monitoring also reduces energy losses caused by loose connections and failing equipment. The camera is shared with other City departments to help improve their operations.

In 2015, the COF purchased a commercial pole testing equipment so that COF personnel could perform wood pole testing in lieu of hiring a private contractor. From 2015 through 2017, approximately 2,454 poles were tested. The number of failed or "bad" poles is approximately 4 to 5 percent. As bad poles are found, they are replaced with new poles by COF staff. COF staff estimates that 1,000 poles will be tested each year. The COF's goal is to have all wood poles on the system tested on a 10 to 15 year cycle.

COF staff performs annual transmission line inspections, based on the inspection repairs are prioritized and completed in a timely fashion. Every two years the distribution circuits, both underground and overhead are inspected and issues are repaired as appropriate. The COF also has its own tree-trimming crew. The crew trims trees to maintain clearance on the City's electrical system in a four-year cycle. The COF has maintained very good reliability numbers by performing these tasks.

7: Environmental

One of the biggest challenges in projecting and planning for future power generation is the ever-changing environmental and regulatory climate. There have been several new environmental regulations that have affected the LDW Power Plant, including the Mercury Air Toxics Standards Rule, Cross State Air Pollution Rule and Coal Combustion Residuals Rule.

The sections below discuss several environmental regulations that affect the LDW Power Plant.

Acid Rain Program:

Title IV of the 1990 Amendments to the Clean Air Act required acid rain to be controlled, thus creating the Acid Rain Program. The Acid Rain Program requires the monitoring, recordkeeping and reporting of sulfur dioxide (SO_2), nitrogen dioxides (NO_x), carbon dioxide (CO_2), volumetric flow and opacity under 40 CFR part 75. The LDW Unit 8 and Derril G. Marshall Generating Station are subject to the Acid Rain Program and is allocated allowances annually for each unit from the Environmental Protection Agency (EPA). The LDW Unit 8 has the ability to operate on coal and natural gas. The unit also utilizes natural gas or propane for igniters and flame stabilization. The Derril G. Marshall Generating Station is a dual fuel simple cycle combustion turbine that can operate on natural gas or number two fuel oil. Annual

allowances are maintained in an account and annual SO_2 and NO_x emissions are subtracted from the annual allocated allowances. Any remaining unused allowances can be banked and used in future year's emissions.

Cross-State Air Pollution Rule (CSAPR):

The Cross-State Air Pollution Rule (CSAPR), also known as the Transport Rule was finalized by the EPA on July 6, 2011. After court challenges, the rule became effective on January 1, 2015 to reduce SO_2 and NO_x emissions by setting an annual limit on tons of pollutant emitted through the use of allowances. The rule does allow affected sources to determine how they will meet compliance. Affected sources must have enough allowances in their account at the end of the compliance period to cover the emissions for that period. Participants in the CSAPR are allowed to buy, sell or bank allowances. The LDW Unit 8 and the Derril G. Marshall Generating Station are subject to the CSAPR and holds allowances to cover annual SO_2 and NO_x emissions.

Mercury and Air Toxics Rule (MATS):

The Mercury and Air Toxics Rule (MATS) final rule became effective on April 16, 2012, and created technology based standards to limit mercury, acid gases and other pollutants emitted by power plant electric generating units (EGUs) with a capacity of 25 megawatts or greater. The MATS rule required sources to comply with the rule no later than April 16, 2015. Sources could apply to their permitting authority for a 1-year extension allowed under Section 112 of the Clean Air Act. The LDW Unit 8 is subject to the MATS Rule and installed a Spray Dryer Absorber (SDA) to control acid gases, a fabric filter baghouse to control particulate matter (PM) and a powder activation carbon (PAC) injection system to control mercury to comply with the emission standards.

National Pollutant Discharge Elimination System (NPDES):

The National Pollutant Discharge Elimination System (NPDES) permit program was created in 1972 by the Clean Water Act to address water pollution from point sources that discharge to waters of the United States. The LDW was issued their current NPDES permit from the Nebraska Department of Environmental (NDEQ) on July 3, 2017. The permit included a compliance schedule to meet the requirement of zero discharge of bottom ash transport water set forth in the 2015 revision of the Steam Electric Power Generating (ELG) category of 40 CFR Part 423. Due to pending litigation of the ELG Rule, the EPA has proposed a reconsideration of the rule that applies to bottom ash transport water at existing sources.

Coal Combustion Residuals (CCR):

The Coal Combustion Residuals (CCR) Rule was published in the *Federal Register* on April 17, 2015 and became effective on October 19, 2015. The CCR rule details requirements for the safe disposal of coal combustion residuals from coal-fired power plants into landfills and surface impoundments under Subtitle D of the Resource Conservation and Recovery Act (RCRA). Based on the CCR rule, the LDW power plant meets the definition as an existing landfill and complies with the rule.

8: Existing Electrical Supply

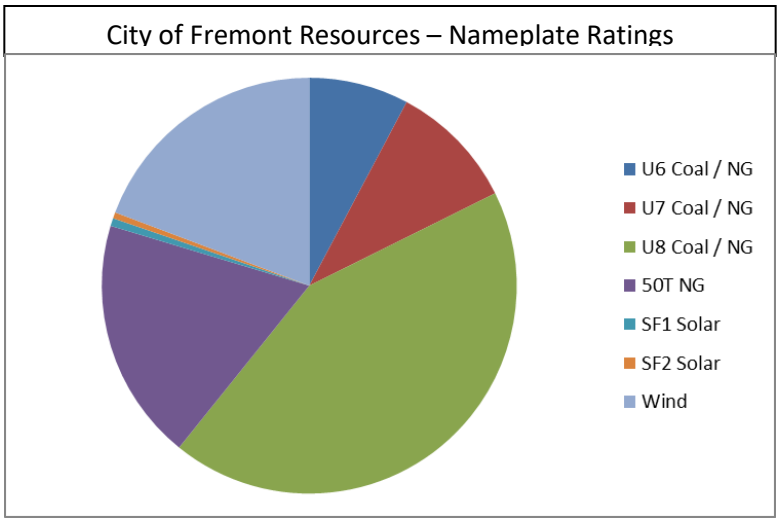
It is the mission of the COF to provide safe, reliable, economical electricity to their customer owners at the lowest cost. In order to accomplish this it is imperative that the assets of the utilities be properly maintained and operated.

The COF serves approximately 15,265 electric customers located in and around the COF. A map of the COF electric service area is included in the appendix.

The COF operates the electrical system for the ratepayers. The system includes three (3) coal and natural gas fired boilers supplying steam to three (3) steam turbine generators located at the LDW Power Plant. One (1) dual fuel combustion turbine located at the DGM Power Plant. One (1) solar farm (SF1) on the City's distribution system near the existing power plant. One (1) solar farm (SF2) currently under construction on the City's distribution system located at the City's Well Field. In addition, a Purchase Power Agreement (PPA) for wind energy with NextEra Energy Cottonwood Wind Project, LLC, near Blue Hill, Nebraska. A summary of the units below:

Table 8-1

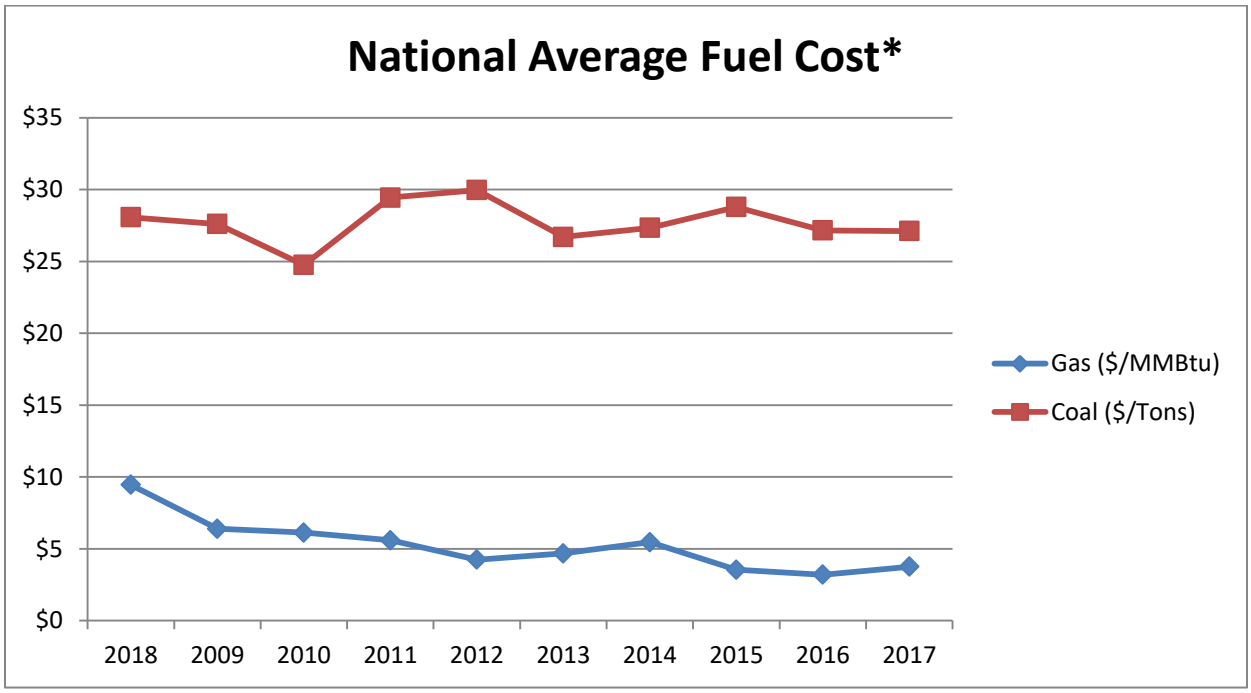
Unit	In-Service Year	Nameplate Rating MW	Rating Net MW	Fuel Supply
LDW Unit 6	1956	16.5	15	Coal / Natural Gas
LDW Unit 7	1962	21	20	Coal / Natural Gas
LDW Unit 8	1976	91.5	82	Coal / Natural Gas
Derril G. Marshall Generating Station	2003	40	36	Natural Gas / #2 Diesel
Solar Farm 1 (SF1)	2018	1.3		Renewable Solar
Solar Farm 2 (SF2)	2018	1.0		Future (10/1/2018)
Cottonwood Wind Project LLC (Joint)	2018	40.89		Renewable Wind (PPA)



City of Fremont Power Plants: LDW - Derril G. Marshall Generating Station

The LDW Power Plant and the Derril G. Marshall (DGM) Power Plant serve the City's demand and are able to produce additional electrical energy to the grid. The primary fuel for the LDW Power Plant is coal from the Powder River Basin in Wyoming. The coal is low sulfur and approximately 8,800 Btu's per pound. Coal is supplied by rail and the COF receives shipments from late March through November. The COF stockpiles coal to provide adequate fuel supply for the winter months.

The chart below indicates the national average price for coal and natural gas since 2008, plus the estimated cost of delivery to Fremont. The COF purchases approximately 315,000 tons of coal per year and approximately 175,000 MMBtus of natural gas. These amounts change based on weather and the COF's demand.



*Gas cost: Rate includes both commodity and pipeline transportation cost average for that year traded on the NYMEX.

*Coal cost: Rate includes the commodity and rail transportation cost average for that year according to the Argus Coal Weekly Pricing and Rail rate.

LDW Power Plant has seen many improvements and repairs over the years. Most of the improvements have been required to meet new state and federal regulatory requirements, while repairs are required to maintain high reliability standards. The following are some of the plant improvements made.

1978-1979:	LDW Unit 6 and LDW Unit 7 were equipped with baghouses and new induced draft fan (ID Fan) for capture of fly ash.
1979-1980:	An ash conveying and storage system was installed for all three (3) LDW units. This replaced the ash sluicing system.
1995:	A continuous emissions monitoring system was installed on LDW Unit 8 as part of the Clean Air Act to monitor SO_2, NO_X, CO2, Air Flow and Opacity.
2002	The installation of the reverse osmosis system and the water analysis equipment was installed to better monitor the boiler water and increase the efficiency of the existing demineralized water system.
2002	LDW Unit 8 cooling tower replacement.
2000-2003	Honeywell digital controls were installed to replace the original pneumatic controls on all three (3) LDW units. This installation provided improved boiler and turbine control and tuning, enhanced data collection and logging, and allowed the utilities to combine

	multiple control rooms to better staff the facility and increase communication within operations and maintenance.
2001-2003	LDW Unit 6 and 7 generator excitation systems were obsolete and replaced with new systems.
2006	LDW Unit 6 and LDW Unit 7 condenser tube replacement. This project was done to ensure reliability due to unexpected tube leaks and to aid in the efficiency.
2014	LDW Unit 8 electrostatic precipitator was rebuilt due to age and condition of the original electrostatic precipitator. The electrostatic precipitator's function is to capture fly ash from LDW Unit 8.
2014	LDW Unit 8 cooling tower fill was replaced, this allows for increased efficiency and reliability.
2015	LDW Unit 8 boiler was stiffened to protect the boiler due to the installation of the new induced draft fan.
2015	An Air Quality Control System (AQCS) was installed on LDW Unit 8. The AQCS consists of a dry scrubber, carbon injection, baghouse, ash system, and associated equipment.
2015	LDW Unit 8 Generator field rewind.
2015	LDW Unit 8 generator and turbine inspections were conducted based on hours of operation. The inspections provide an opportunity to inspect, clean and repair all internal components to allow for safe, reliable and efficient operation of the unit.
2017	LDW Unit 8 excitation system replaced due to the obsolescence of the prior system. The new system provides for reliable generator control and protection.
Ongoing	Units 6, 7 and 8 turbines and generators are inspected on a periodic basis (approximately 40,000 hours of operation).

Plant staff evaluates methods and practices to increase plant efficiency. When the units are in an outage, equipment is inspected, cleaned, and calibrated to provide efficient and reliable service. The LDW Power Plant has established a program to replace the original lighting with energy efficient LED lighting.

Below is a brief description of each of the energy sources that serve City customers:

LDW Unit 6

The construction of the LDW Power Plant began in 1955 with the construction of LDW Unit 6, a 16.5 MW General Electric steam turbine powered by a Babcock and Wilcox coal and natural gas fired boiler. LDW Unit 6 boiler operates at ~ 925° F @ 880 PSI.

LDW Unit 6 is primarily a standby unit operated when LDW Unit 8 is offline or during high demand seasons. LDW Unit 6 has seen many modifications including the addition of a baghouse and new induced draft fan, removal of original pneumatic controls and replaced with state of the art digital controls. LDW Unit 6 utilizes a non-reheat turbine and once through condenser.

LDW Unit 6 Turbine / Generator inspection is performed based on hours of operation. The boiler is inspected twice per year depending on operation of the unit. A boiler life study was conducted and the results of the study determined that the boiler and associated equipment are suitable for service.

LDW Unit 7

LDW Unit 7, commissioned in 1962, is a 21 MW General Electric Steam Turbine powered by an Erie City coal and natural gas boiler. LDW Unit 7 boiler operates at ~925° F @ 880 PSI.

LDW Unit 7, is primarily a standby unit operated when LDW Unit 8 is offline or during high demand seasons. LDW Unit 7 has seen many modifications including the addition of a baghouse and new induced draft fan, removal of original pneumatic controls and replaced with state of the art digital controls. LDW Unit 7 utilizes a non-reheat turbine and once through condenser.

LDW Unit 7 Turbine / Generator inspection is performed based on hours of operation. The boiler is inspected twice per year depending on operation of the unit. A boiler life study was conducted and the results of the study determined that the boiler and associated equipment are suitable for service.

LDW Unit 8

LDW Unit 8, commissioned in 1976, is a 91.5 MW General Electric steam turbine generator powered by a Babcock and Wilcox coal and natural gas fired boiler. LDW Unit 8 operates as a load following generator, it is the primary unit utilized to serve the City's customers.

The fuel supply for LDW Unit 8 is primarily low sulfur nominal 8,800 btu Powder River Basin (PRB) coal. LDW Unit 8 also has the ability to burn natural gas, however seasonal gas supply to the plant is insufficient to provide the quantity of natural gas to achieve full output. When natural gas is utilized, it is during start-up or co-fired with coal. LDW Unit 8 utilizes natural gas and, in an emergency propane, for start-up fuel and flame stabilization. LDW Unit 8 utilizes a reheat turbine boiler and a cooling tower for condenser cooling.

LDW Unit 8 Turbine / Generator inspection is performed based on hours of operation. The boiler is inspected twice per year depending on operation of the unit.

Derril G. Marshall Generating Station

The Derril G. Marshal Generating Station was installed and commissioned in 2003. The unit is a dual fuel (natural gas / liquid fuel) nominal 40 MW simple cycle General Electric Frame 6B combustion turbine. It is a standby unit used for reliability concerns and during peak demand. The natural gas supply for the unit comes from the City's natural gas system at 120 PSI to the inlet of a natural gas compressor that raises the pressure to the required 310 PSI.

Cottonwood Wind Project, LLC

In 2017, the COF entered into a power purchase agreement with NextEra for the purchase of nominal 41 MW of wind energy from the Cottonwood Wind Project, LLC. This is a joint project with the COF as one of the participants. The total Cottonwood Wind Project is approximately 89 MW.

On December 1, 2017, NextEra completed commissioning and turned the City's share of the wind farm over to the COF. On February 1, 2018, all documentation was completed and the City's portion of the wind farm was registered with the Southwest Power Pool (SPP) as a COF generation asset.

COF Community Solar Farm 1 and 2

The COF conducted multiple community outreach meetings to gauge the interest in a community solar farm. The response was overwhelmingly positive, prompting the COF to solicit proposals for a solar farm located on an 11-acre site adjacent to the LDW Power Plant. The solar farm was initially going to be approximately one (1) MW, however due to the large volume of customers wanting to participate, the solar farm was enlarged to approximately 1.3 MW.

On March 27, 2018, the City Council approved the purchase of Community Solar Farm #2 to be located at the COF's Well Field. The proposal for Solar Farm #2 is approximately one (1) MW.

Western Area Power Administration (WAPA)

The COF has a long-term firm energy and capacity agreement with Western Area Power Authority (WAPA). Table 8-2 below summarizes the energy received from WAPA on an annual basis.

Table 8-2

Month	Energy (MWH)	Capacity (kW)
January	2,443	4,285
February	2,249	4,345
March	2,358	3,975
April	2,138	4,049
May	1,684	3,931
June	1,855	4,090
July	2,184	4,369
August	2,453	4,792
September	1,969	4,297
October	1,746	3,104
November	2,465	4,433
December	2,706	4,790

9: Fremont Electrical Load and Forecasted Growth

The COF electric system presently serves approximately 15,265 customers. The COF has a total net generation capacity of 153 Megawatts illustrated in Table 9-1 below. The COF receives a maximum of 4.7 Megawatts per hour from the Western Area Power Administration (WAPA).

Table 9-1

Unit	**Net Winter MW Rating (Capacity)**	**Net Summer MW Rating (Capacity)**
LDW Unit 6	15 MW	15 MW
LDW Unit 7	20 MW	20 MW
LDW Unit 8	82 MW	82 MW
DGM	0 MW	36 MW
WAPA	3 MW	3 MW
Capacity Reserve 13%	16 MW	20 MW
Total Installed Capacity	120 MW	156 MW
Total Installed Capacity – Reserve	104 MW	136 MW

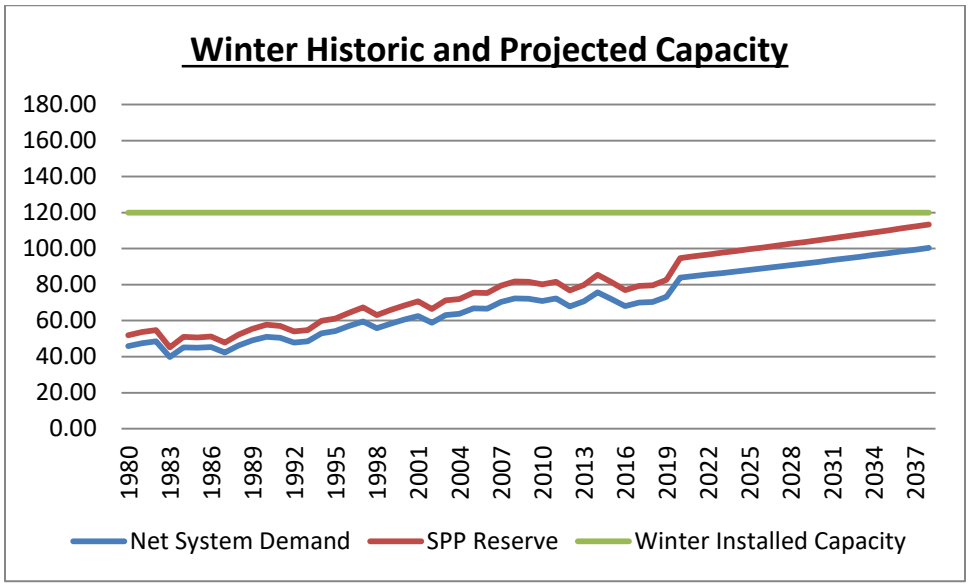
The COF operates the fleet of electric generating units to provide reliable, safe and cost effective electric energy to it ratepayers. LDW Unit 8 provides the majority of energy to supply the COF electric demand. Table 9-2 below illustrates the City's demand and the energy produced from each resource for calendar years from 2012 through 2017. During unit outages and when energy prices are low, the COF purchases energy to serve ratepayers. In Table 9-2, the off system sales are a result of the net effect of purchases and sales.

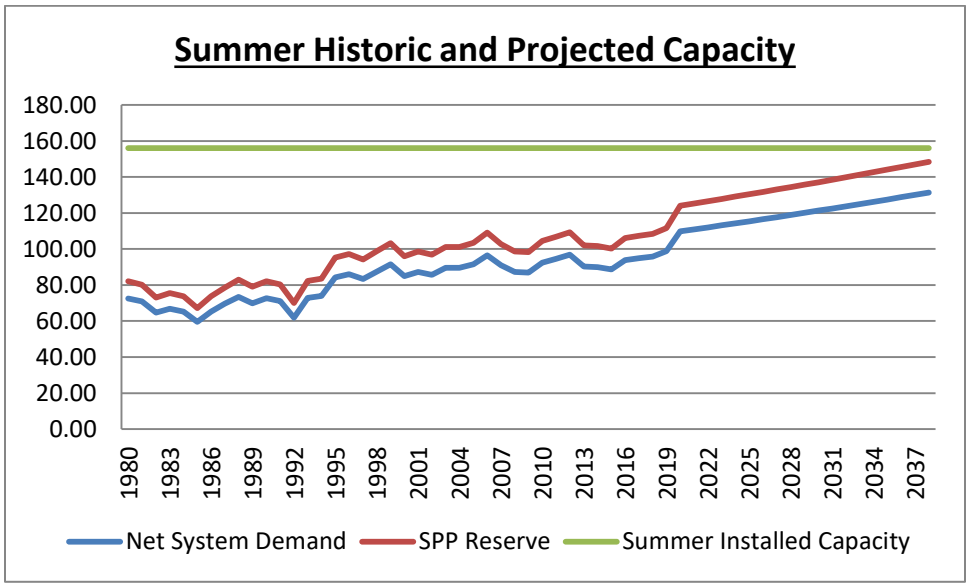
Table 9-2

Year	Fremont Demand	LDW Unit 8	LDW Unit 7	LDW Unit 6	Derril G. Marshal	WAPA	Off System Sales
2012	442,532.60	353,836.90	54,511.21	44,176.58	1,801.51	26,285.20	38,078.80
2013	437,914.07	341,597.65	80,914.23	59,920.49	7.54	26,218.80	70,744.64
2014	438,011.10	333,782.92	85,250.93	55,452.23	57.78	26,289.50	62,822.26
2015	435,002.80	306,728.04	81,542.68	43,860.50	5,745.58	26,243.90	29,117.90
2016	439,676.51	301,064.91	90,861.97	55,178.61	10,668.62	26,304.00	44,401.60
2017	432,645.96	351,918.53	66,301.22	36,070.77	499.24	26,249.50	48,393.30

The charts below illustrate the historical winter and summer peak demand for the COF from 1980 to 2017. The data assumes a 1% growth to the system from 2018 to 2038, based on historic growth of 1% from 1980 to present. The charts also include the additional industrial load that will be starting in 2019

and completed in 2020. This industrial load is assumed to be two (2) MW in 2019 and twelve (12) MW in 2020. The data for these charts is included in the appendix at the end of this report. As displayed below, the City's current resources are sufficient to meet Fremont's energy demands in both the winter and summer seasons.





The charts below illustrate various load growth scenarios for winter and summer peak demands. Chart 1 illustrates the COF's historic **summer** peak demand and growth increases of 1%, 1.5%, 2% and 2.5%.

Chart 1

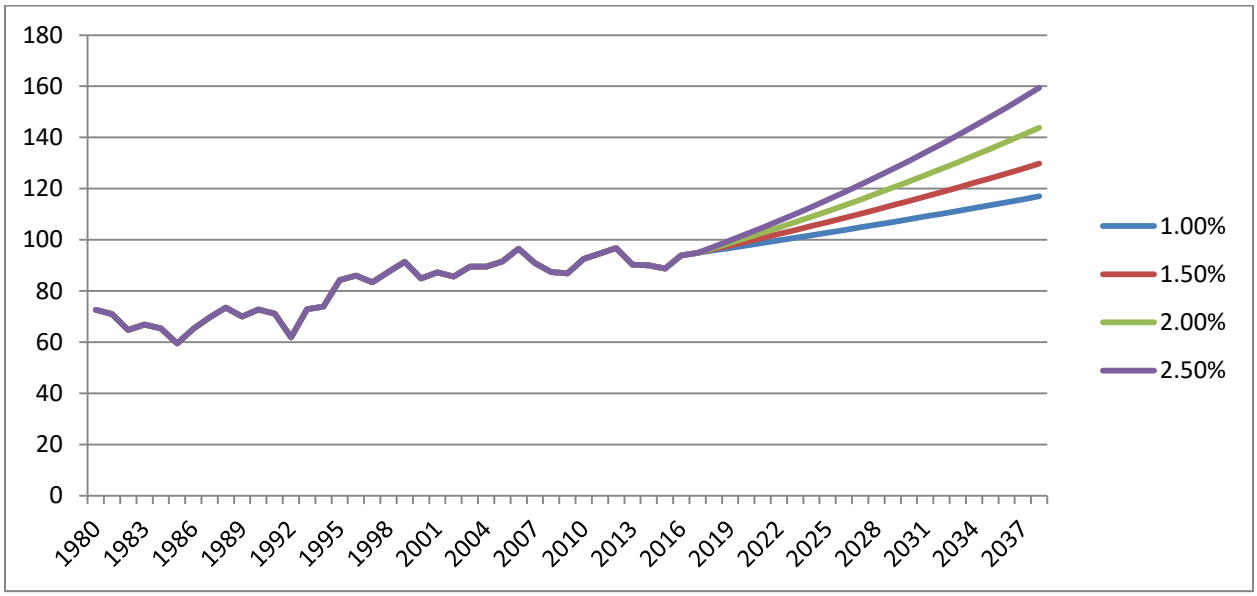


Chart 2 illustrates the COF's historic **winter** peak demand and growth increases of 1%, 1.5%, 2% and 2.5%.

Chart 2

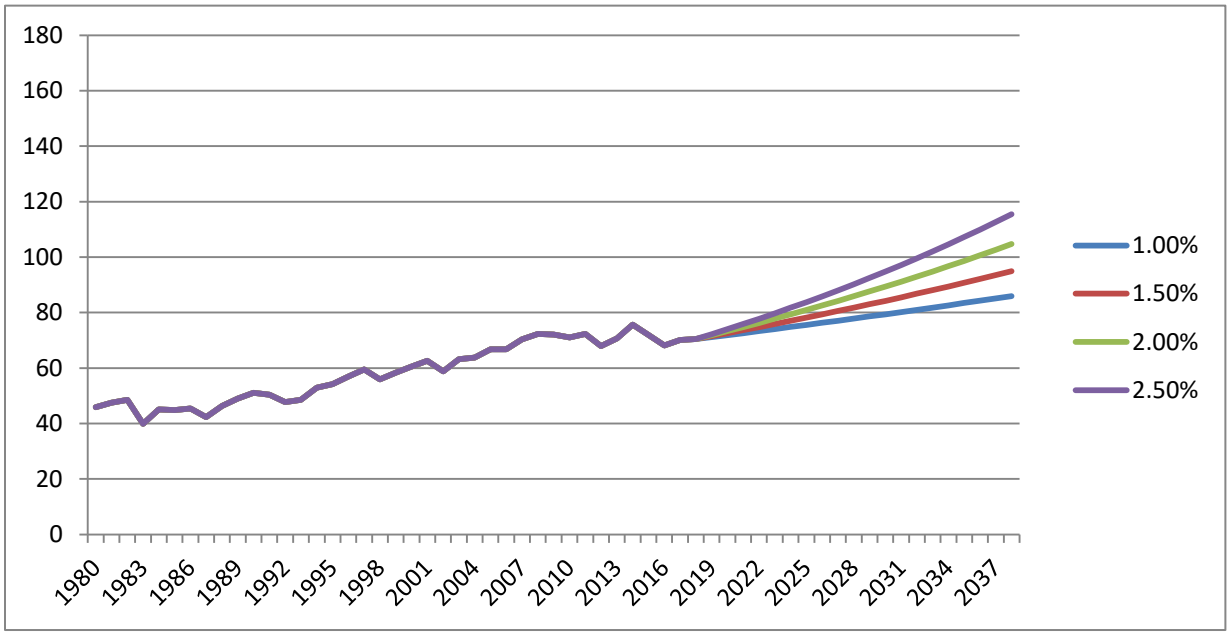


Chart 3 utilizes historic **summer** demand data, the assumed 1% growth, 12 MW of new industrial load in 2020, and growth increases of 1%, 1.5%, 2% and 2.5%.

Chart 3

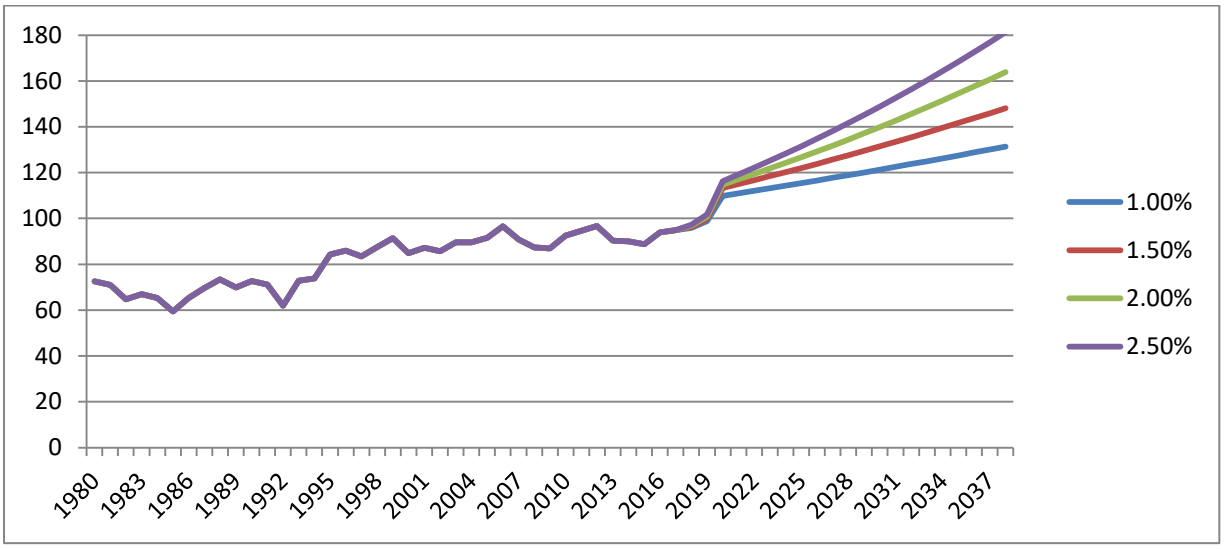


Chart 4 utilizes historic **winter** demand data, the assumed 1% growth, 12 MW of new industrial load in 2020, and growth increases of 1%, 1.5%, 2% and 2.5%.

Chart 4

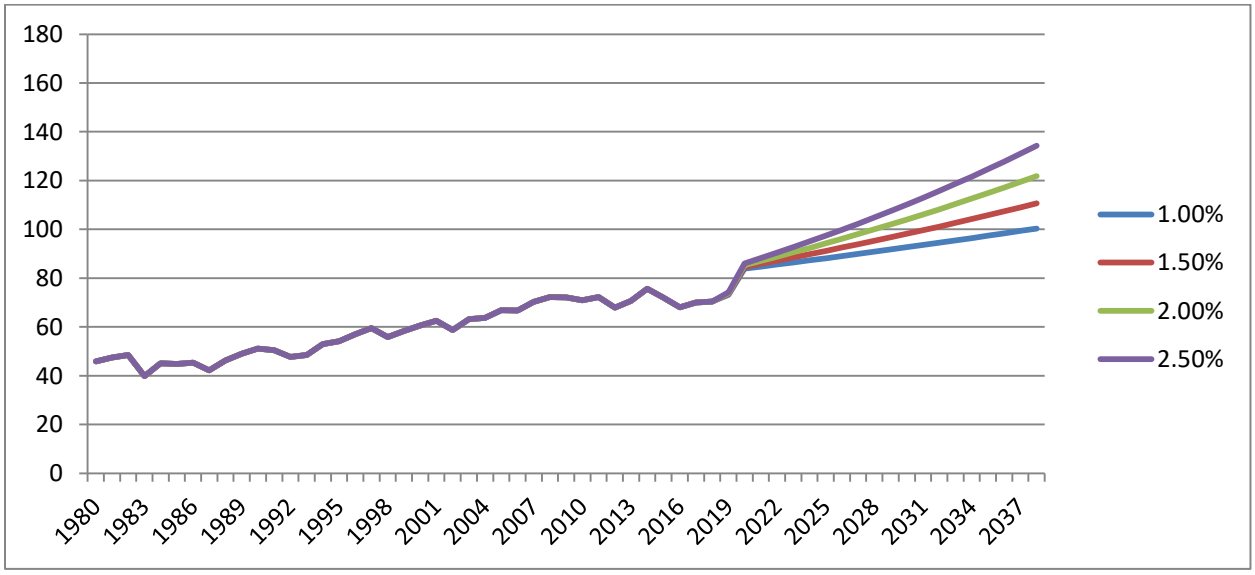


Chart 5 shows **summer** peak demand of 1% growth, 12 MW of new industrial load in 2020, and growth increases of 1%, 1.5%, 2% and 2.5%.

Chart 5

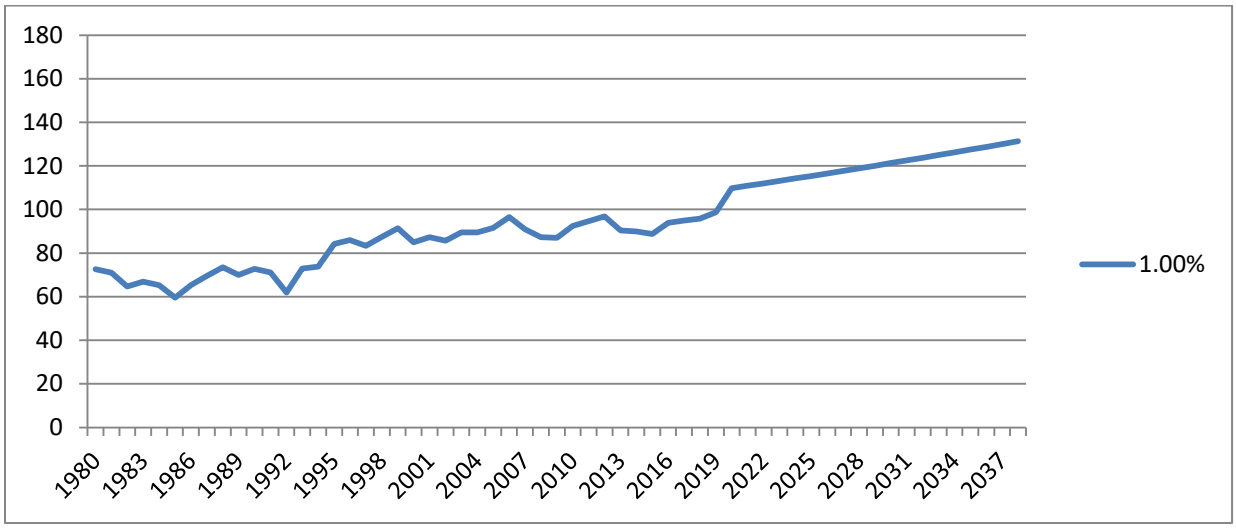


Chart 6 shows **winter** peak demand of 1% growth, 12 MW of new industrial load in 2020, and growth increases of 1%, 1.5%, 2% and 2.5%.

Chart 6

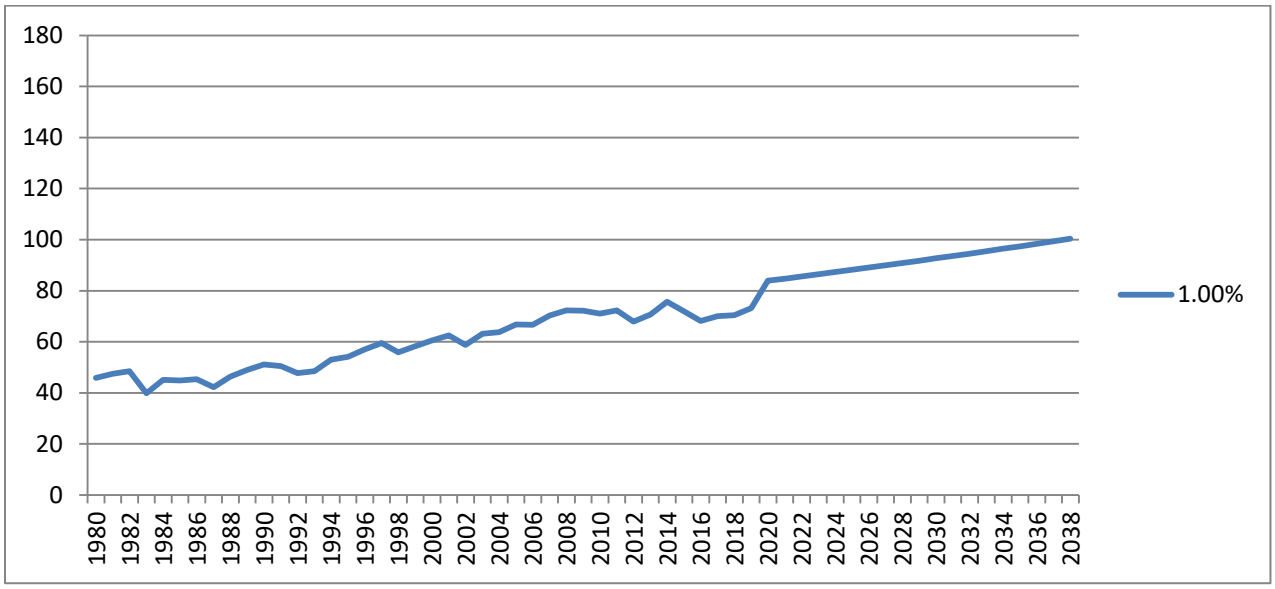


Chart 7 shows projected **summer** peak demands with and without the 12 MW of new industrial load in 2020.

Chart 7

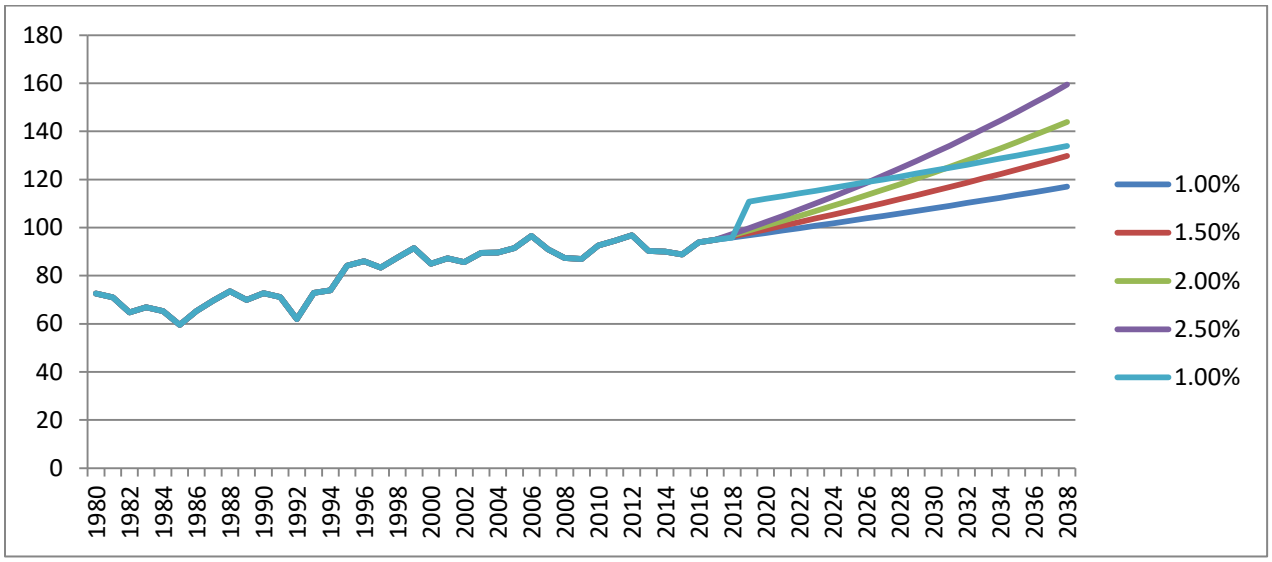
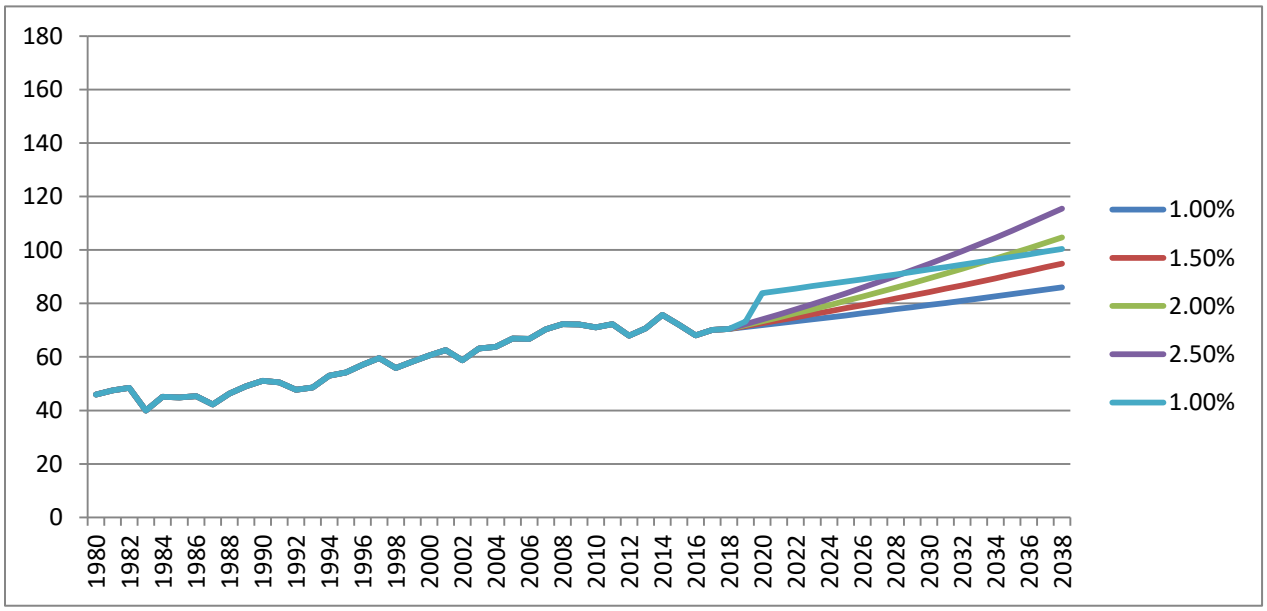


Chart 8 shows projected **winter** peak demands with and without the 12 MW of new industrial load in 2020.

Chart 8



10: Conservation and Demand Side Management

Nebraska consistently ranks in the top 10 of the lowest electric energy prices in the United States. Electric energy prices in the COF are equally low making it difficult to justify a demand side program. The COF has seen a reduction in electric demand from ten (10) years ago. This reduction has been attributed to increased efficiencies in residential, commercial and industrial loads. An example is the COF's efforts in changing out the streetlights in the City with LED lights to significantly reduce consumption.

The COF will continue to monitor the COF's demand and the available generation, and if necessary and economically feasible, the COF may adopt some form of Demand Side Management or energy conservation program.

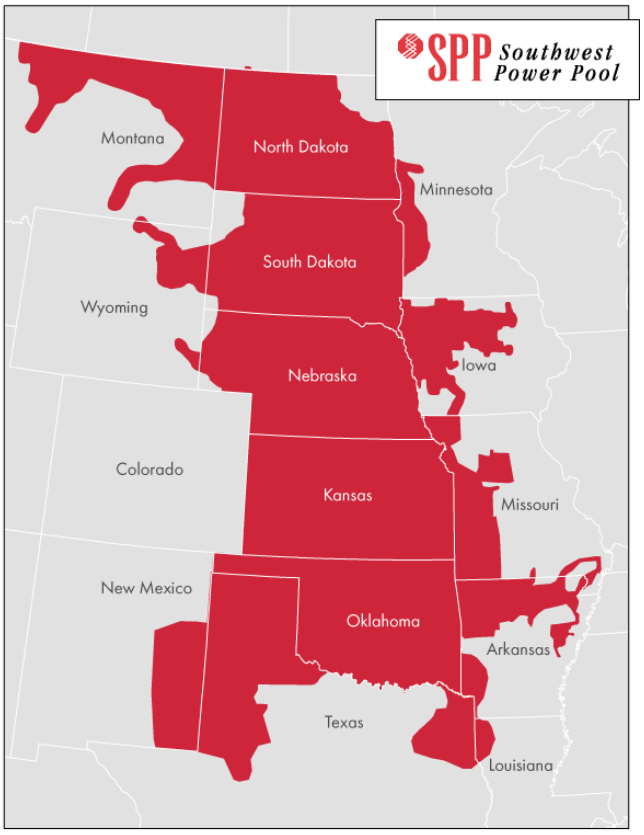
The COF is in the process of establishing an electric vehicle incentive program and has been working with multiple organizations to encourage the purchase of electric vehicles. The COF is also installing charging stations for public use. The charging stations will collect data to indicate usage patterns that can be used to promote electric vehicles in the future.

11: Excess Energy

The COF participates in the Southwest Power Pool (SPP) market (map below). The COF schedules estimated demand and generation resources on a daily basis. As shown on Table 9-2, the COF has generation available for "off system sales" and makes that energy available into the SPP market when it makes economic sense.

As COF's load increases or there are unforeseen regulatory constraints, the amount of energy that the COF has available to place into the SPP market may be reduced.

The COF monitors pricing and demand to determine which units that are placed into service. There are periods of the year and or conditions that warrant multiple unit operation due to reliability constraints. The COF manages the operation and loading of those units to provide a reliable source of energy, while being cognizant of the pricing per unit.

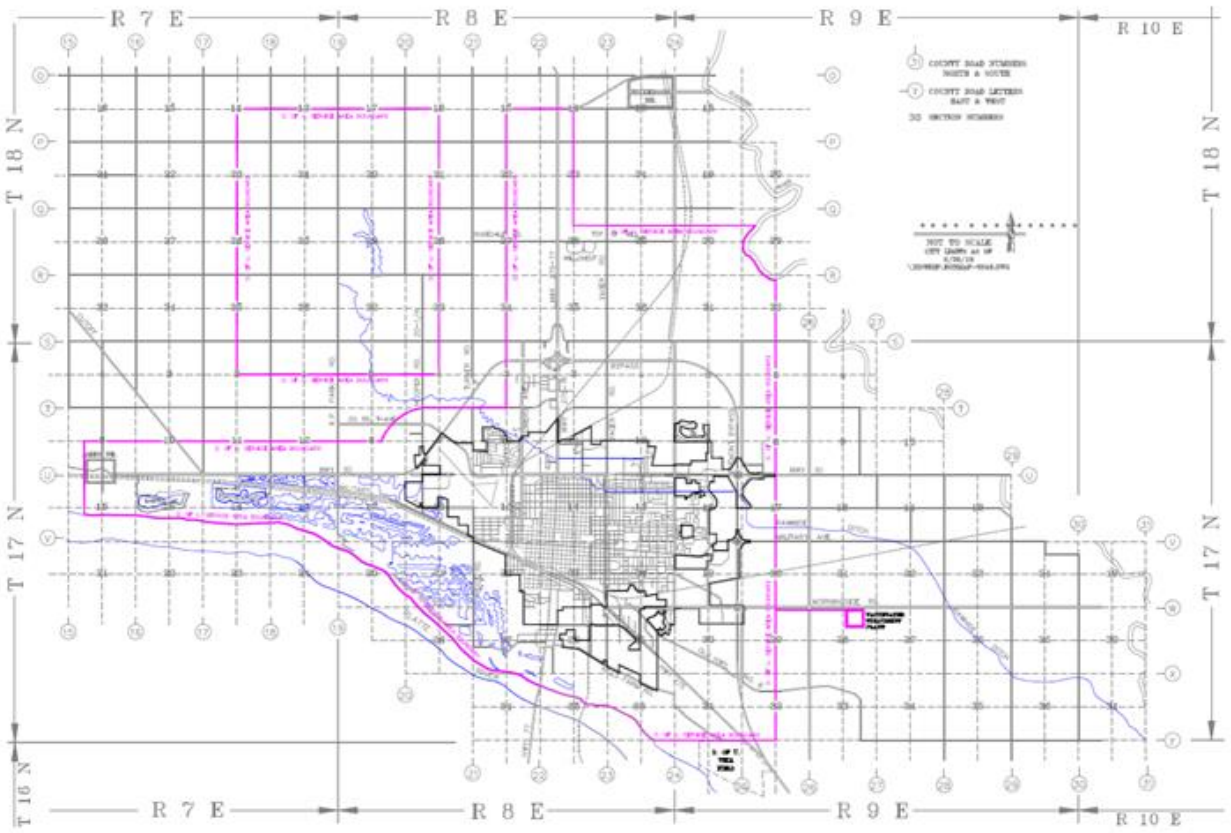


12: Summary:

- The COF will review that electric demand of the City and compare it against the forecasted demands in this report.
- The COF will monitor the regulatory agencies for impact to the existing fleet of generation sources.
- The COF will provide outreach to stakeholders in the City. This will provide the COF the opportunity to gauge the ratepayer's energy trends. This also provides the COF the opportunity for ratepayer input on existing and new generation sources.
- As illustrated in this report, the City's expected growth in demand, including the new industrial load, should not exceed available generation.
- The COF will monitor customer preferences in electric supply and resource mixes.

Appendix

City of Fremont service area map



COF net summer and winter peak demand historic from 1980 through 2017, and estimated from 2018 to 2038, as indicated by the yellow text.

Net Summer System Peak Demand		Net Winter System Peak Demand	
Year	Net System Demand	Year	Net System Demand
1980	72.60	1980	45.90
1981	71.00	1981	47.50
1982	64.70	1982	48.50
1983	66.90	1983	39.90
1984	65.32	1984	45.10
1985	59.48	1985	44.90
1986	65.23	1986	45.38
1987	69.60	1987	42.26
1988	73.45	1988	46.31
1989	69.94	1989	49.03
1990	72.69	1990	51.08
1991	71.15	1991	50.44
1992	61.92	1992	47.77

1993	72.88	1993	48.53
1994	73.86	1994	52.98
1995	84.22	1995	54.17
1996	85.97	1996	57.00
1997	83.39	1997	59.54
1998	87.44	1998	55.90
1999	91.44	1999	58.30
2000	84.90	2000	60.57
2001	87.23	2001	62.58
2002	85.68	2002	58.77
2003	89.54	2003	63.15
2004	89.55	2004	63.78
2005	91.49	2005	66.82
2006	96.52	2006	66.72
2007	90.91	2007	70.30
2008	87.34	2008	72.28
2009	86.93	2009	72.12
2010	92.49	2010	71.00
2011	94.58	2011	72.26
2012	96.77	2012	67.90
2013	90.31	2013	70.66
2014	89.99	2014	75.71
2015	88.76	2015	71.96
2016	93.87	2016	68.11
2017	94.91	2017	70.08
2018	95.86	2018	70.46
2019	98.82	2019	73.16
2020	109.81	2020	83.90
2021	110.90	2021	84.73
2022	112.01	2022	85.58
2023	113.13	2023	86.44
2024	114.26	2024	87.30
2025	115.41	2025	88.17
2026	116.56	2026	89.06
2027	117.73	2027	89.95
2028	118.90	2028	90.85
2029	120.09	2029	91.76
2030	121.29	2030	92.67
2031	122.51	2031	93.60
2032	123.73	2032	94.54
2033	124.97	2033	95.48
2034	126.22	2034	96.44
2035	127.48	2035	97.40

2036	128.76	2036	98.37
2037	130.04	2037	99.36
2038	131.34	2038	100.35