

Boulder City Electric Utility

2018 - 2022

Integrated Resource Plan

Adopted
July 10, 2018

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1. Background Information and Public Process

Integrated resource planning is a planning process for new energy resources that evaluates the full range of alternatives, including:

- supply-side resources - such as generation facilities or purchased power contracts
- demand-side resources that reduce the need to acquire supply-side resources - such as energy efficiency improvements to the utility distribution system, customer incentive programs for purchase of energy efficient appliances, and net metering programs

As a recipient of federal hydro-power, the City of Boulder City must comply with the requirements of the Energy Planning and Management Program (10 CFR Part 905), including:

- preparation of an IRP document conforming to the requirements of the Western Area Power Administration (WAPA) every five years
- public participation in the IRP process
- submittal of annual IRP updates to WAPA

The draft CY 2018 – 2022 IRP was presented at the Boulder City Council Meeting on June 26, 2018. Public and Council comments and City Staff responses were included in this document, which was posted on July 2, 2018 to the City's website at the following location:

<http://www.bcnv.org/283>

The City Council adopted this revised 2018 – 2022 IRP at its Public Meeting on Tuesday, July 10, 2018.

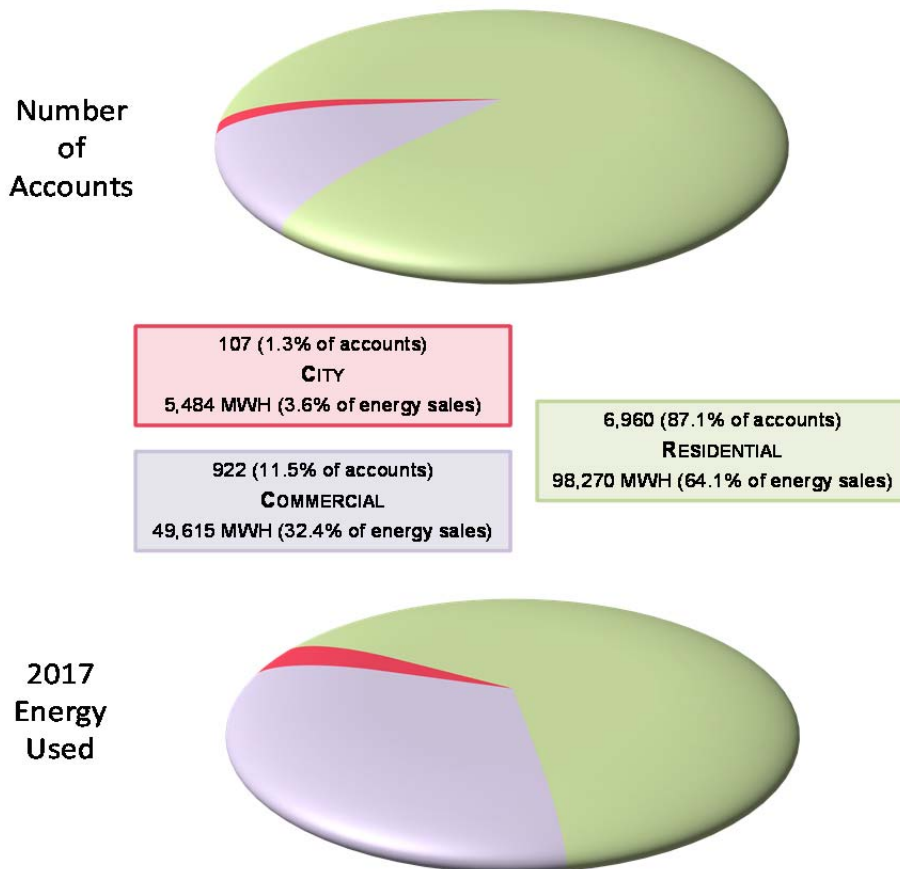
2. Utility/Customer Overview

The Municipal Electric Utility of the City of Boulder City (COBC) serves about 16,200 residents in the populated area of the City, about 35 of the 207 square miles of incorporated area. The unpopulated area southwest of the town site is served by NV Energy.

In accordance with Section 704.340 of the Nevada Revised Statutes, the Municipal Electric Utility is subject to the jurisdiction and approval of the Boulder City Council.

The Boulder City Electric Utility is a full-service provider (energy and delivery service) to ultimate customers. The Utility does not own or operate generation facilities.

Key Customers and Significant Loads



Notes

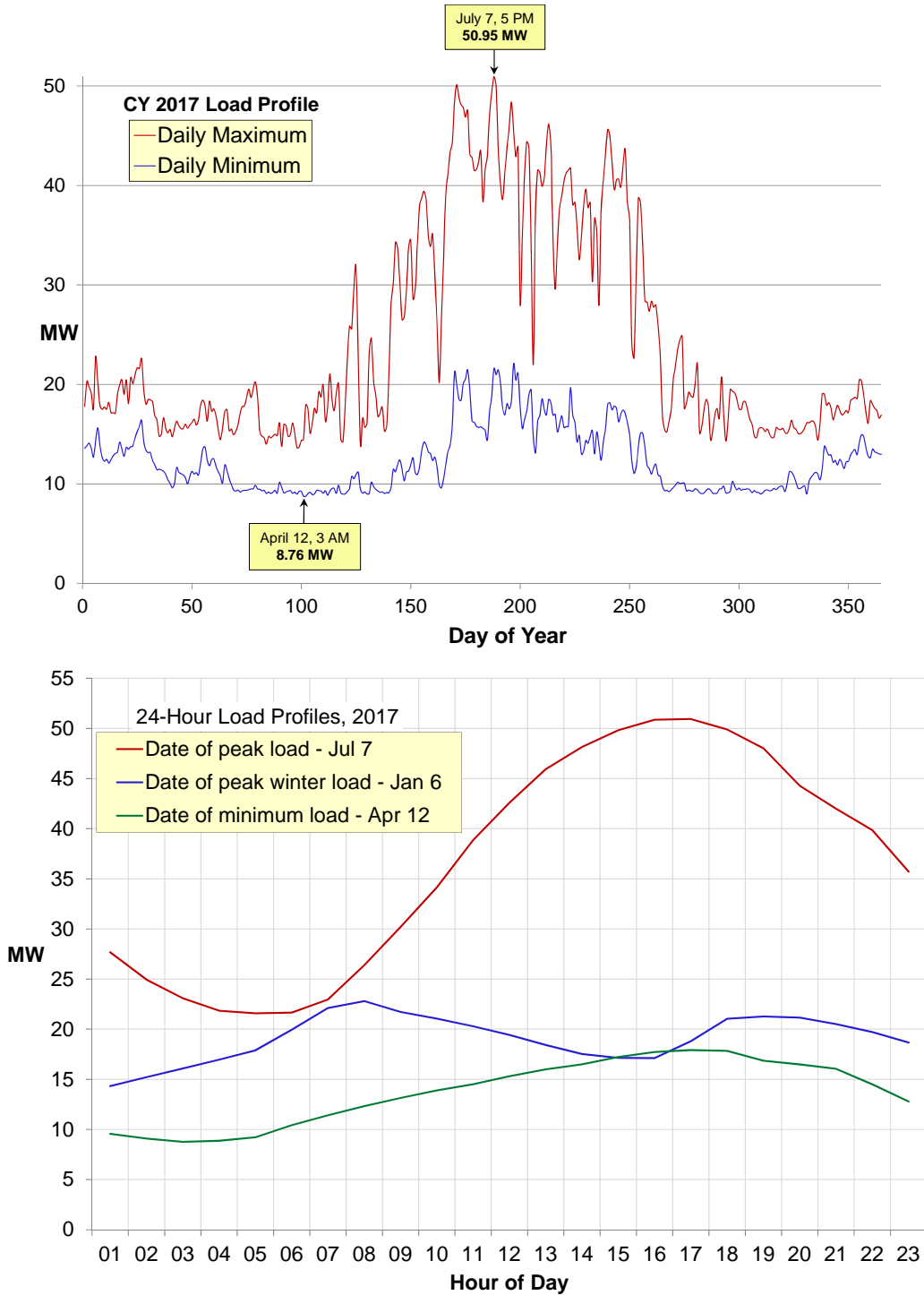
1. Calendar Year (CY) 2017 data.
2. The *Commercial* Service Class includes industrial, non-profit, and non-municipal government customers.

Customer Mix

% CY 2017 Energy Sold	Load Type
64.1%	Residential
46.4%	Detached homes
2.6%	Apartments
5.3%	Condominiums
0.8%	Duplex homes
4.6%	Mobile homes
4.3%	Manufactured homes
18.8%	Commercial
1.3%	Automotive sales, service, fuel
1.3%	General commercial
0.2%	Construction
1.9%	Food (retail and wholesale)
2.5%	Lodging
0.9%	Manufacturing
3.7%	Healthcare and assisted living
0.7%	Financial, real estate and other professional services
2.5%	General retail sales and services
3.8%	Eating and drinking establishments
6.4%	Government
2.0%	City (excluding airport, golf courses, utilities)
4.5%	County, State, Federal (excluding schools & research)
1.8%	Utility
0.8%	Municipal
1.0%	Non-municipal (including wireless)
3.1%	Golf courses
0.8%	City
2.3%	Private
4.2%	Schools and other mixed Government/Commercial
0.3%	Aviation
3.4%	Schools and daycare
0.5%	Research
1.5%	Non-profit
0.5%	Churches
1.0%	Charitable and social organizations
100.0%	Total Energy

Peak Drivers

Summer air conditioning load, especially residential, is the dominant driver of peak demand. The ratio of summer peak demand to yearly average demand is about 2.9 to 1 for feeders dominated by residential loads, and about 2.0 to 1 for feeders dominated by commercial loads.



Rates

Class	Description	Applies to	# Accts	Service Charge
RS	residential	single-family units	6,958	\$10.00 (2)
RM	residential master-metered	five or more units	2	\$50.00
GS	general service	service where no other schedule applies	914	\$15.00
LGS	large general service	over 300 kW demand in 3 of last 12 months	6	\$50.00
TOU	time-of-use	over 500 kW demand in 3 of last 12 months	2	\$200.00
BCH	Boulder City Hospital	Boulder City Hospital	1	\$25.00
MUN	municipal	City of Boulder City	107	\$10.00
SL	sports field lighting	pole-mounted HID fixtures, minimum 10 kW	1	\$50.00
AL	area lighting	all customers	70	\$8.77-\$17.55
LL	landscape lighting irrigation control	HOAs and PUDs	6	\$8.77-\$17.55

Class	Applies to	Energy Rate ¢ per kWh	% of kWh sales in class	Demand \$ per kW
RS	1st 2000 kWh	9.05	90.7%	n/a
	2001 - 4000 kWh	11.92	7.20%	
	kWh > 4000	13.15	2.10%	
RM	All kWh	11.10	100%	
GS	1st 3000 kWh	10.70	83.3%	3.05 (3)
	kWh > 3000	12.09	16.7%	
LGS	All kWh	13.58	100%	3.05
TOU (4)	Summer On-Peak	16.72	34.6%	14.33
	Summer Off-Peak	11.88	35.2%	4.78
	Non-Summer	13.43	30.2%	3.05
BCH	All kWh	9.13	100%	n/a
MUN	All kWh	4.00	100%	2.37 (3)
SL	All kWh	11.48	100%	n/a

Notes

1. Rates are effective for Fiscal Years 2018 and 2019 (July 1, 2017 – June 30, 2019).
2. Residential customers without AMR (radio-read) meters will be charged \$25.00 per month after June 2018. Less than 0.2% of residential customers have selected this option.
3. A demand meter will be installed when billed energy exceeds 4,000 kWh in three months of previous 12 months. The demand charge applies to each kW above 10 kW.
4. Summer rates apply May through September. On-peak rates apply noon through 10 PM.

After almost seven years of no adjustments, electric rates were increased by 15% (effective October 2016), then by 6% (effective July 2017), to account for increased operating costs, fund approximately \$45,000,000 of capital improvements over a ten-year period, and maintain adequate reserves.

The City provided four programs to reduce economic impact of electric increases on the City’s utility customers: tiered rates, low income energy assistance, energy efficient appliance rebates, and 12-month averaged billing.

Tiered rates – the impact of tiered rates on customer costs is described in Section 4.

Low income energy assistance (LIEA) – most electric sales in Nevada are subject to Universal Energy Charge (UEC) of 0.0039%, which helps to fund the state’s LIEA program. Over the last fiscal year, the State provided an average of \$533 per eligible household.

However, Boulder City has funded its own separate energy assistance program for 40 years. Providing a 35% discount on residential energy and monthly service charges, the BCEAP is the most generous utility-funded energy assistance program in Nevada.

The following table lists LIEA metrics for Nevada’s non-profit (NP) electric utilities in State Fiscal Year 2017. It shows that, although the City accounted for only 5% of NP energy sold, it provided 65% of the total NP LIEA assistance.

LIEA (Low Income Energy Assistance) Metrics – SFY17	Boulder City	Other NV non-profit utilities	Total	BC % Total
Total energy sales (Million \$)	\$14.408	\$262.161	\$276.569	5.2%
LIEA total provided (\$)	\$117,145	\$33,161	\$150,306	77.9%
LIEA customers assisted	298	163	461	64.6%

Energy Efficient Appliance Rebates are described in Section 4.

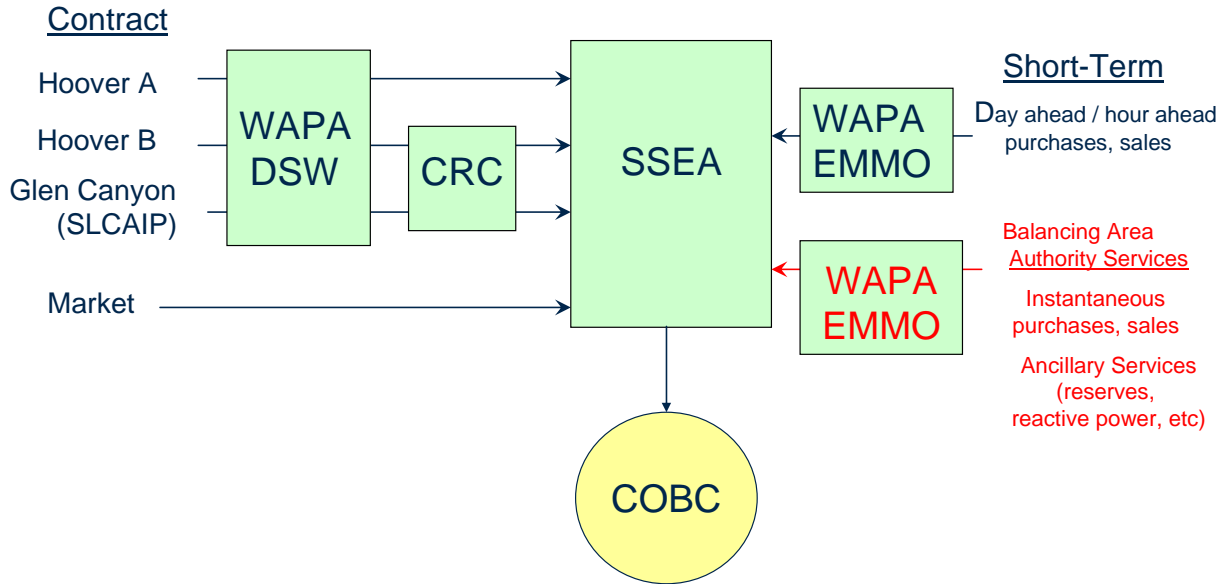
3. Existing Supply-Side Resources

Refer to Section 9 for descriptions of terms used in this section.

Purchased Power Contracts

Description	Capacity	Expiration
Hoover Schedule A	20.0 MW	2067
Hoover Schedule B	8.5 MW	2067
SLCAIP	5.5 MW (S) 7.3 MW (W)	2024
Market Energy (SSEA)	Varies	Varies

Business Relationships Related to Wholesale Power Services

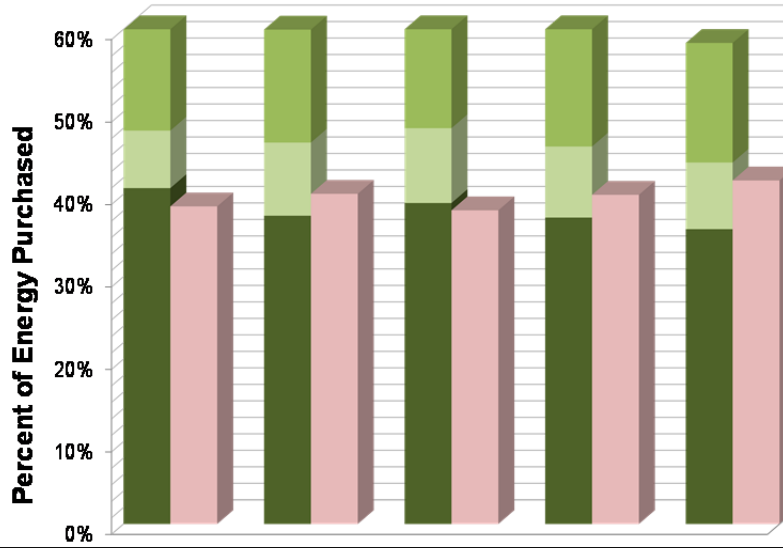


Energy Delivered by Resource

The charts on the following page illustrate the benefits of COBC’s hydro resources:

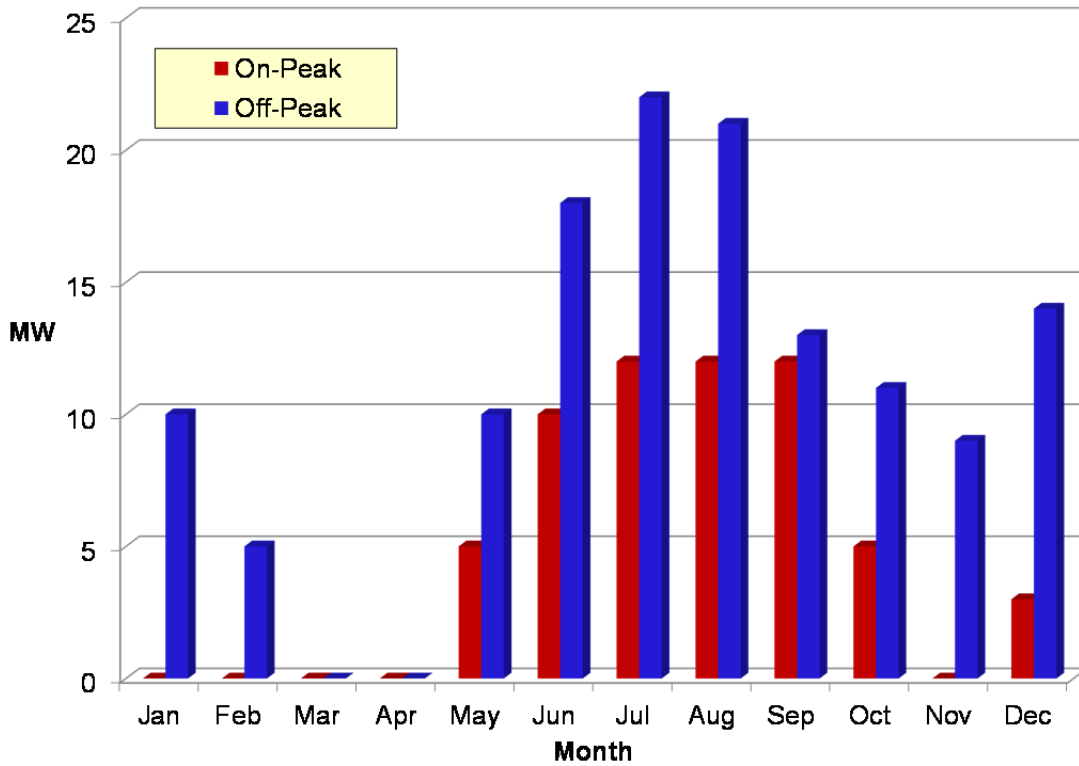
- Hydro provided over half (53% - 56%) of the City’s energy requirement in each year of the preceding five years.
- Hydro deliveries are sufficient to supply the City’s entire energy requirement during the spring months.
- Hydro deliveries can be scheduled such that most market purchases are made during off-peak periods. Zero net on-peak energy was purchased during five of 12 months in 2017.

Hydro & Market Energy Purchases CY 2013 - 2017



Energy Purchased (MWH)	Calendar Year				
	2013	2014	2015	2016	2017
Hoover A	67,980	62,739	64,119	59,757	58,241
Hoover B	11,632	14,889	14,947	13,860	13,150
SLCAIP	22,985	22,986	22,986	22,985	23,617
SSEA Market	64,275	67,199	62,659	64,196	67,850

SSEA Net Contracted MW Purchased & Sold - CY 2017



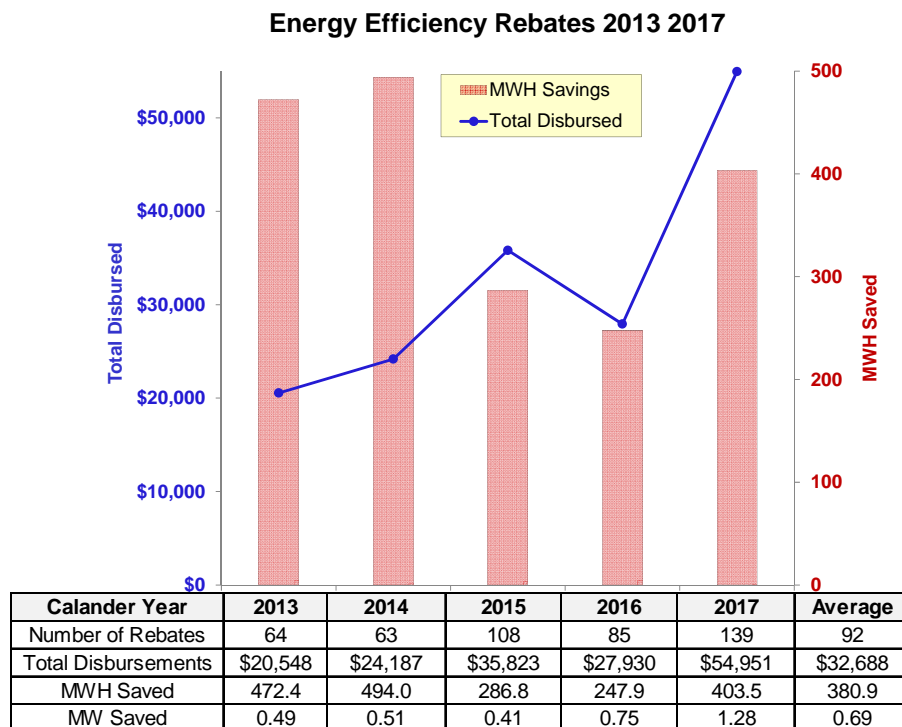
4. Existing Demand-Side Resources

Energy Efficiency Rebate Program

Boulder City has been providing energy efficiency rebates to residents for 27 years. All residents, regardless of income, qualify for rebates for installation of certain appliances, subject to the restrictions described below:

- Air Conditioners: \$70 per ton for installation of units with a S.E.E.R. rating between 14.0 and 14.9; \$125 per ton for units with a S.E.E.R. rating of 15.0 or higher.
- Window Treatments: \$0.50 per square foot for the installation on west-facing windows of solar screens, or window film (reflectivity not greater than 40%). The shading coefficient must not be greater than 0.4 for screens, or 0.45 for film.
- Water Heater: \$200 for the installation of a solar or natural gas domestic water heating system with a minimum storage of 40 gallons, to supplement an electric domestic water heating system.
- Evaporative Coolers: \$50 per 1,000 CFM for installation of units to supplement air conditioned living or serving spaces.
- Pool Pumps: \$100 for the installation of a two-speed pump; \$200 for the installation of a variable speed pump.

As indicated in the table below, the number of customer rebates and total rebate disbursements have increased significantly over the preceding five years.



Net Metering

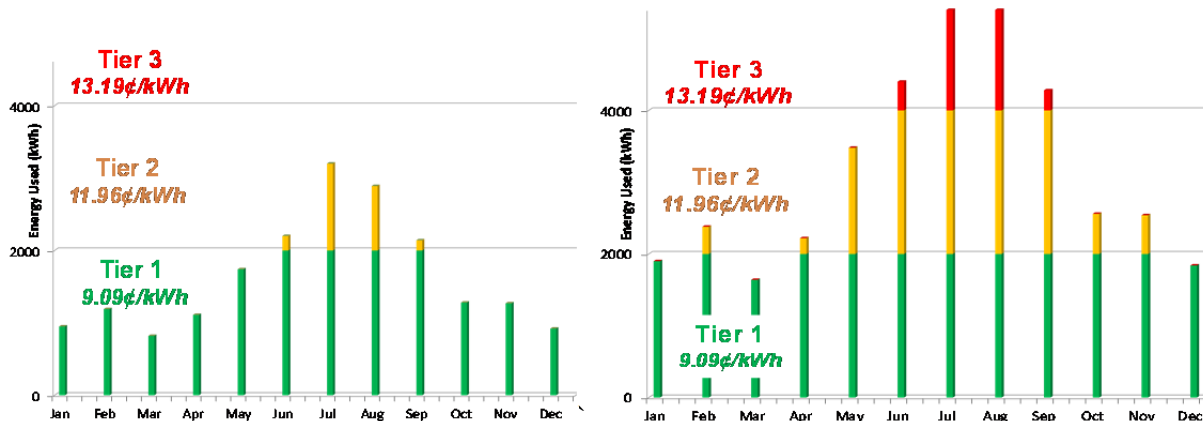
In 2010, COBC instituted a net metering program for residential and commercial solar and wind generators. At the end of CY 2017, a total of 394 kW (DC) of net metered generation was installed in the City, providing an estimated energy savings of 682 MWH in that year.

Net Meters	2013	2014	2015	2016	2017
Residential Meters	3	3	6	7	13
Commercial Meters	3	3	3	3	4
MWH Saved	587	587	607	618	682

Two of the four commercial net meter systems, totaling 13 kW (DC), are installed in COBC facilities.

Tiered Rates

Tiered rates provide a conservation incentive as shown below.



Typical consumption for 1,500 SF residence
(average Boulder City size)
19,710 kWh/Yr
Average cost: 10.05 ¢/kWh
including \$10 monthly service charge

2.0 x consumption of average residence
39,420 kWh/Yr
Average cost: 10.71 ¢/kWh
including \$10 monthly service charge

Time-of-Use (TOU) Metering

TOU metering in Boulder City is required for commercial customers having a monthly demand exceeding 500 kW. Only two commercial customers in the City qualify for TOU metering.

5. Load and Price Forecast

Key Trends Affecting Resource Needs

Boulder City's population trend-line indicates recovery from the 2008 recession by 2013; population growth in the preceding five years has been 0.61% average per year. System summer peak demand has increased by an average of 0.8% per year while total energy consumption has decreased an average of 1.2% per year over the preceding five years.

Calendar Year	Population		Peak Demand		Energy Consumed	
	Est. (1)	Change	MW	Change	MWH	Change
2008	16,684		50.3		182,940.0	
2009	16,064	-3.7%	50.8	+1.0%	177,602.0	-2.9%
2010	15,359	-4.4%	49.7	-2.2%	169,855.0	-4.4%
2011	15,335	-0.2%	48.1	-3.3%	167,038.0	-1.7%
2012	15,759	+2.8%	49.2	+2.4%	169,043.0	+1.2%
2013	15,635	-0.8%	49.9	+1.3%	165,374.3	-2.2%
2014	15,627	-0.1%	47.4	-5.0%	161,970.2	-2.1%
2015	15,813	+1.2%	46.3	-2.3%	166,220.0	+2.6%
2016	16,298	+3.1%	50.8	+9.7%	162,798.3	-2.1%
2017	16,121	-1.1%	50.9	+0.4%	159,389.2	-2.1%
5-yr avg. annual change		+0.5%		+0.8%		-1.2%

(1) Governor Certified Population Estimates of Nevada's Counties, Cities and Towns 2000-2017

Forecast Basis

The estimated change in the City's energy requirement of the five year period 2018 - 2022 is based on three scenarios for residential unit additions:

- Low growth: 192 homes in currently approved subdivisions, three homes per year built on privately-owned, pre-existing building lots
- Midrange growth: 192 homes in currently approved subdivisions, 50 homes in subdivisions not currently approved, five homes per year built on privately-owned, pre-existing building lots
- High growth: 192 homes in currently approved subdivisions, 100 homes in subdivisions not currently approved, seven homes per year built on privately-owned, pre-existing building lots

Assumptions:

- The average residential unit in currently approved subdivisions will be 2,064 SF (28.5 MWH annual energy consumption).
- The average residential unit for all other additions will be 3,000 SF (41.4 MWH annual energy consumption).
- Commercial load growth (load addition in per cent of existing load) matches residential load growth.
- The existing trend of conservation and efficiency improvements (1.2% per year) will continue over the forecast period.

Forecast Result

As shown in the following table, the City's energy consumption is expected to grow between 0.0% and +1.0% per year over the next five years. Barring an unforeseen large load addition, energy consumption in the City will be less in CY 2022 than it was in CY 2008, the year immediately preceding the recession.

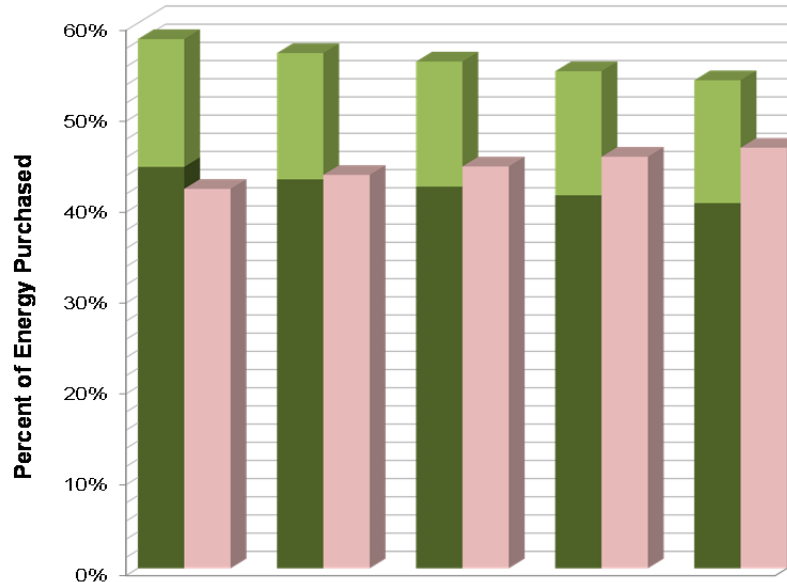
Growth assumption	Low	→	High
Base year (2017) energy	159,389	159,389	159,389
Load addition	9,173	12,912	17,524
Conservation/efficiency (1.2%/yr)	-9,563	-9,563	-9,563
Net load growth 2018-2022	-391	3,349	7,961
2022 Forecast	158,999	162,738	167,350
Annual growth rate % base year MWH	0.0%	0.4%	1.0%

6. Future Supply-Side and Demand-Side Resources

Supply-Side Resources

COBC has firm resource commitments throughout the 2018-2022 five-year planning period. All hydro-power contracts and market contracts that secure power for COBC extend through 2022.

**Hydro & Market Energy Purchase Forecast
FYs 2018-19 through 2022-23**



Forecast Energy Delivered (MWH)	Fiscal Year				
	2018 - 2019	2019 - 2020	2020 - 2021	2021 - 2022	2022 - 2023
Hoover	72,250,800	70,758,500	70,148,800	69,140,000	68,387,920
SLCAIP	23,002,410	22,964,970	22,985,920	22,986,640	22,998,340
SSEA Market	68,308,930	71,563,440	73,856,140	76,281,290	78,758,590

The forecasted price for each resource and the total energy budget for the planning period is shown in the following table.

Fiscal Year	Price per MWH			Energy Budget
	Hoover	SLCAIP	Market Contract	
2018 - 2019	\$24.51	\$38.62	\$45.48	\$5,765,947
2019 - 2020	\$24.97	\$39.23	\$42.03	\$5,676,241
2020 - 2021	\$26.26	\$39.71	\$36.31	\$5,436,769
2021 - 2022	\$26.39	\$39.72	\$38.42	\$5,668,512
2022 - 2023	\$25.68	\$40.35	\$40.49	\$5,873,386

There are currently no state or federal regulations that will impact COBC's resource requirements during the 2018-2022 planning period.

Based on the forecast described in the previous section, COBC is not anticipating that load growth will require the electric utility to obtain additional purchased power resources during the 2018-2022 planning period.

It is COBC policy that resource adequacy be evaluated if a commercial or residential load addition requires construction of a new distribution feeder.

Demand-Side Resources

The City plans to convert thirteen 4.16 kV feeders to 12.47 kV by 2026 in order to allow the retirement of two aged 4.16 kV substations.

This project requires the preliminary step of replacing all 4.16 kV distribution transformers with dual-voltage 4.16 kV/12.47 kV units. Approximately 330 4.16 kV transformers are pole-mounted units that are planned to be replaced during CY 2018 – CY 2021.

Almost all transformers to be replaced were manufactured in between 1930 and 1970, are significantly less efficient than the replacement transformers. The City estimates that system losses will be reduced 1,116 MWH per year after the pole-mount transformer replacement program is completed.

7. Environmental Considerations

Environmental evaluation is not required for supply-side resources, as none are planned to be acquired during the five-year planning period.

Environmental protection will be enhanced by COBC's:

- Existing and planned demand-side resources.
- Electric vehicles. Three vehicles in the Electric Utility fleet are electric. In 2017, these vehicles provided an estimated 1,837 gallons of fuel savings to the City.

8. Action Plan

- COBC's five-year goal is to maintain competitive rates, while providing reliable power to customers.
- Energy Efficient Appliance Program: the Boulder City Council has approved a rebate budget of \$40,000 FY 2018-2019. COBC's goal is to continue to make customer's aware of the rebate program through the City's web site and utility bill mail inserts.
- COBC will continue to measure the effectiveness of its demand-side programs by reporting expenditures and estimated peak demand and energy savings on an annual basis.
- COBC's goal for the overhead transformer replacement program is 100 replacements per year, with all transformers replaced by July, 2021.
- Per public comments subsequent to presentation of the draft IRP on June 26, 2018, COBC Staff will evaluate the feasibility of the following proposals, and make recommendations to Council:
 - Install solar PV panels on future parking shade structures, and adjust proposed project budgets accordingly.
 - LED-for-incandescent bulb exchange program:
 - COBC purchases LED bulbs in bulk quantities, in order to significantly reduce the cost per bulb.
 - Local retailers exchange LED bulbs with customer incandescent bulbs on a one-for-one basis.

9. Glossary of Terms

- CRC – Colorado River Commission of Nevada, a political subdivision of the State.
- SSEA – Silver State Energy Association (a joint action agency with members including COBC, Southern Nevada Water Authority (SNWA), Overton Power District, and Lincoln County Power District; also a political subdivision of the State.) SSEA provides complete load requirements service for COBC and SNWA.
- WAPA DSW – Western Area Power Administration, Desert Southwest Region. DSW is responsible for the marketing and transmission of hydro-power generated at US Bureau of Reclamation Colorado River dams.
- WAPA EMMO - Western Area Power Administration, Energy Management and Marketing Office. EMMO’s functions as COBC’s Balancing Area Authority (BAA) and Scheduling Entity (SE), as described below.
- Hoover – “Schedule A” is hydro-power from Hoover Dam as originally configured, and received by COBC through a direct contract with the United States (WAPA). “Schedule B” is additional power from Hoover Dam available after generator upgrades and scheduling entity improvements were made in the 1980s. COBC receives Hoover B power through a contract with CRC.
- SLCAIP – (Salt Lake City Area Integrated Projects) is power generated from several hydro projects, principally Glen Canyon Dam. COBC receives SLCAIP power through a contract with CRC.

- Market energy – energy purchased or sold through bilateral contracts between SSEA and any of several power trading entities. Contracts are for whole-month trades of On-Peak or Off-Peak energy. Peak hours are 7:00 AM to 11:00 PM Monday through Saturday, excluding holidays.

SSEA executes purchases up to five years in advance of delivery in order to enhance price stability. SSEA may execute additional purchases or sales prior to delivery due to revised weather or hydro delivery forecasts.

- Balancing Energy – Energy for the next hour or next day, bought or sold by the SE in order to match and market resources to the expected load. Balancing energy is required because hydro and market contract energy is scheduled to be delivered to the City at a constant rate, but the energy consumed by the City varies throughout the day.
- Balancing Area Authority (BAA) – The entity responsible for maintaining an instant-by-instant balance between power resources and power demand. WAPA EMMO (via a contract with SSEA) has been the City’s BAA since 2013.
- Imbalance Energy – Instant-by-instant energy supplied or taken by the BAA in order to match delivered energy to the City’s continuously varying load.
- Ancillary Services – Reserves, regulation, reactive power and other overhead charges required by the BAA.