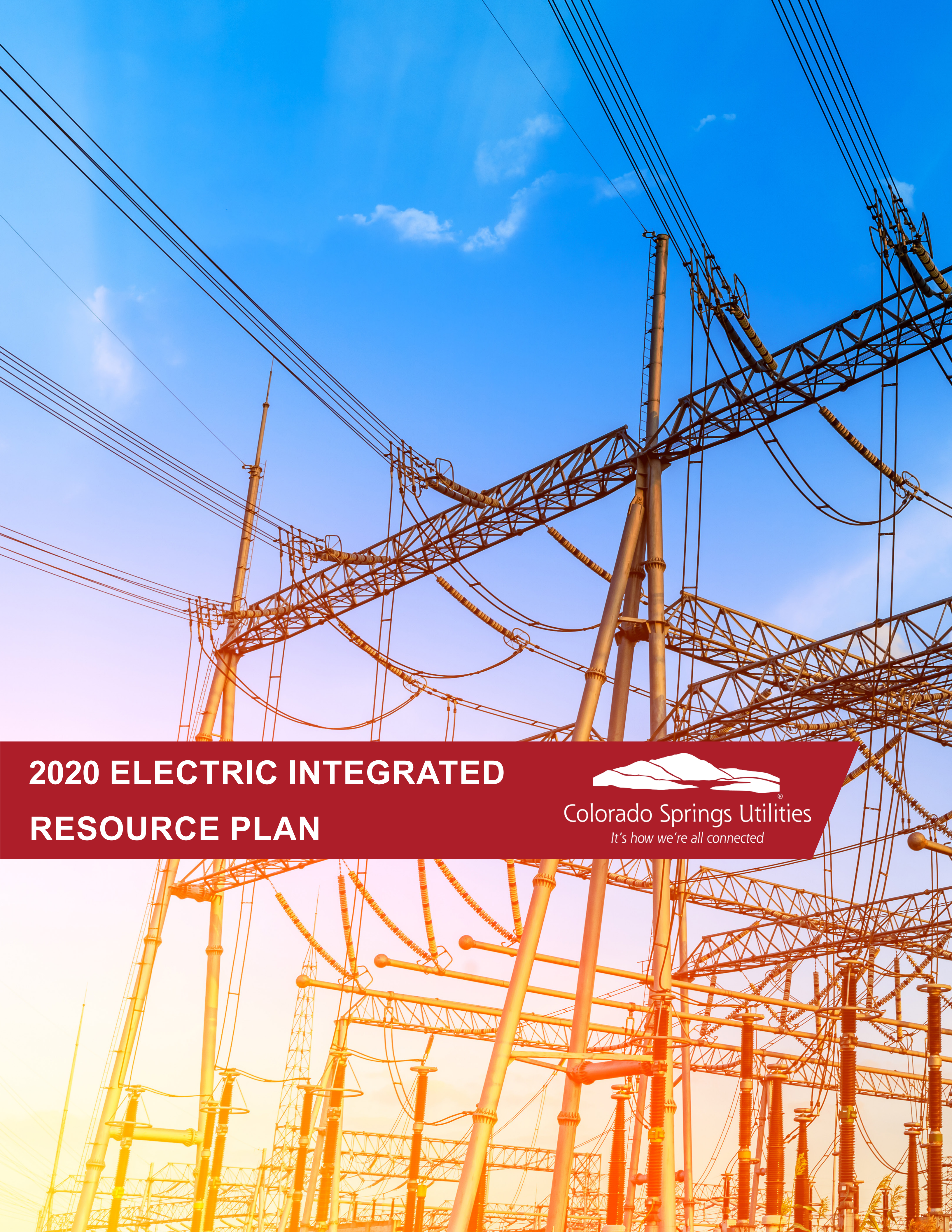


2020 ELECTRIC INTEGRATED RESOURCE PLAN

Colorado Springs Utilities

It's how we're all connected

Executive Summary

Introduction

Colorado Springs Utilities' ("Springs Utilities") 2020 Electric Integrated Resource Plan ("EIRP", "IRP") is a long-term strategic plan for providing cost effective, resilient, and reliable energy resources to meet the energy needs of Springs Utilities' customers from 2020 to 2050.

Utilities developed the EIRP using a three phased approach to electric resource planning that balances reliability, economic drivers, environmental sustainability, and carbon footprint reduction while incorporating proven state-of-the art technologies. During each phase of the EIRP study, shown in Figure ES1, Springs Utilities discussed various aspects of the plan with different stakeholders through a structured public process. The views, ideas and recommendations from stakeholders were incorporated in the plan for each deliverable. At the end of the process, Springs Utilities made a recommendation to the Utilities Board which was subsequently approved.

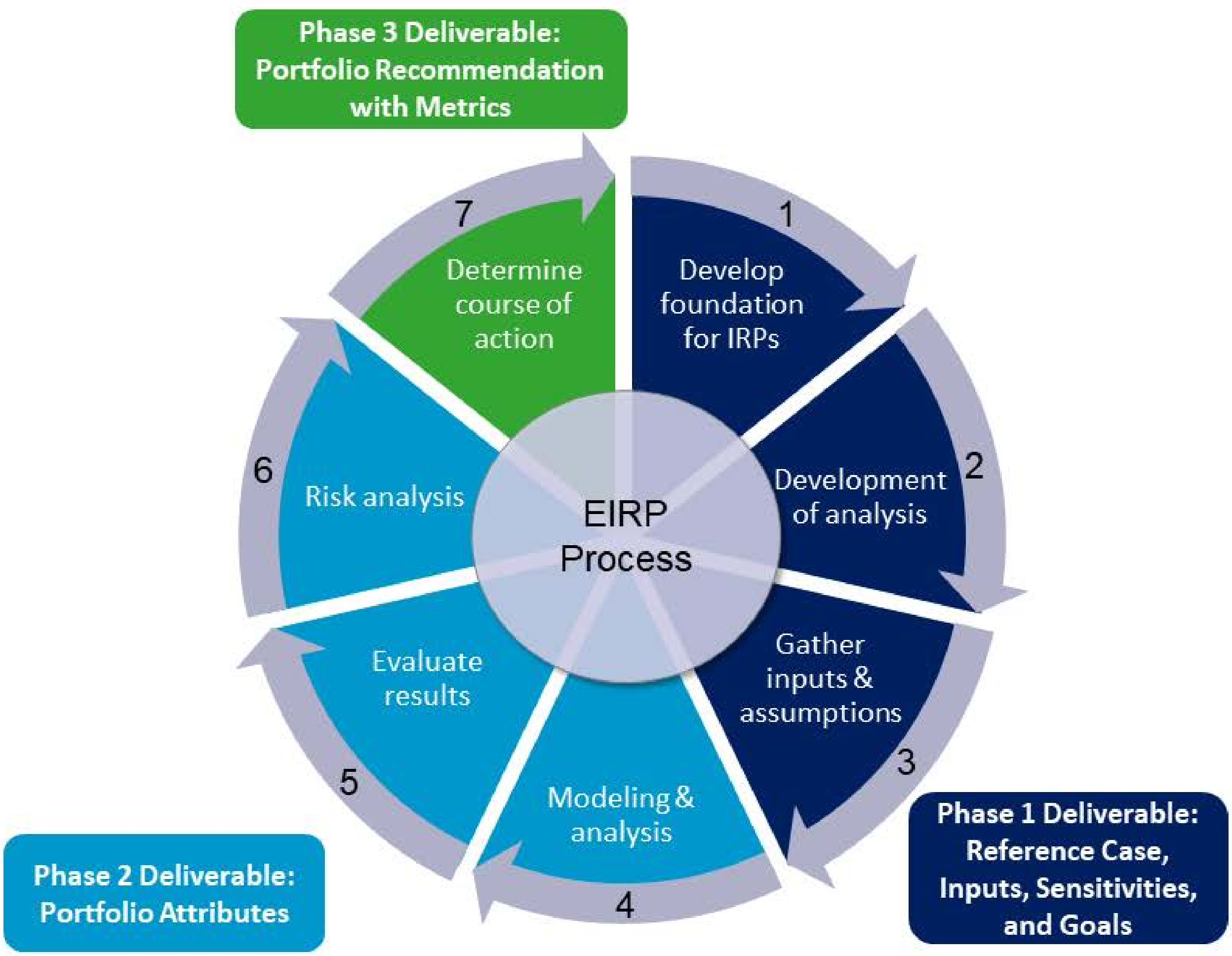


Figure ES1 EIRP Process

Our Mission	Our Vision	Energy Vision	Pillars of Energy Vision	IRP Goals
Provide safe, reliable, competitively-priced electric, natural gas, water, and wastewater services to the citizens and customers of Colorado Springs Utilities	Colorado Springs Utilities is a treasured community partner, well known for providing responsible and dependable services that are vital to the future of our region.	Provide resilient, reliable, and cost-effective energy that is environmentally sustainable, reduces our carbon footprint, and uses proven state-of-the-art technologies to enhance our quality of life for generations to come	**Economic -** Cost-effective and equitable initiative that drives a strong economy **Environment -** Sustainable solutions that complement our natural resources **Resiliency-** Reliably withstand and recover from disturbances in a dynamic environment **Innovation -** Proactively and responsibly evolve in a transforming landscape	**Resilient and reliable-** Industry leading reliability and resiliency while avoiding potential stranded assets and supporting economic growth of the region **Cost-effective energy-** Maintain competitive and affordable rates while advancing energy efficiency and demand response **Environmentally sustainable-** Grow renewable portfolio and establish timelines for decommissioning of assets **Reduces our carbon footprint-** Meet all environmental regulations with specific metrics that include reducing our carbon footprint and reducing reliance on fossil fuels **Uses proven state-of-the-art technologies** Proactively and responsibly integrate new technologies

Figure ES2: EIRP Guidance

EIRP Guidance

Springs Utilities followed its mission and vision statements, and developed an Energy Vision, pillars, and IRP goals with input from the Utilities Policy Advisory Committee (UPAC) and the public as shown in Figure ES2. The IRP goals were used as a foundation to dictate the planning approach, including development and analysis of inputs, sensitivities, and resource portfolios.

The EIRP also took into account the Colorado House Bill 19-1261 legislation that sets greenhouse gas emission target reductions relative to 2005 levels. The targets established statewide goals to reduce 2025 greenhouse gas emissions by at least 26 percent, 2030 greenhouse gas emissions by at least 50 percent, and 2050 greenhouse gas emissions by at least 90 percent. Further guidance from the State recommended municipally owned electric utility companies reduce their greenhouse gas emission by at least 80 percent by 2030 to help the State meet the targets above. The legislation and guidance helped provide the basis for developing an environmental metric to target throughout the EIRP process.

EIRP Process

The EIRP process consisted of three distinct phases. During each phase, Springs Utilities sought public input through surveys, public meetings, and workshops. At the end of each phase, Utilities Board approval was essential to move on to the subsequent phase.

Phase One – EIRP Development

During this phase, the activities of the IRP were broken down into the following three activities: the development of goals (Figure ES2) to provide a foundation for the EIRP, identification of analyses and sensitivities to be performed, and selection of necessary inputs and assumptions for analyses.

Phase One Deliverables

Phase one deliverables included identifying a reference case and sensitivities, load forecasts, demand side management potential, commodity price forecast, and planning reserve margin.

The electric load forecast for the long term horizon was modeled by ITRON, Inc. The model inputs included the Utilities Planning and Finance Department's peak demand and sales forecasts, historic electric peak trends, economic growth, energy efficiency, and electric vehicle adoption.

A demand side management potential study was completed by The Cadmus Group. The study included analysis of smart thermostats, critical peak pricing, and EV charging station load control for both residential and commercial customer.

A planning reserve margin study was completed by GE Energy Consulting. The study evaluated Springs Utilities' generation availability to serve the forecasted load including unplanned outages, import capability, size of resources, percent of renewables, and load reduction.

Sensitivities around available energy resources and the inputs above were developed for evaluation in the next phase of the EIRP process.

Phase Two: EIRP Analysis

Phase 2 was comprised of the following three activities: modeling and analysis of each portfolio identified in Phase one based upon five weighted attributes: Reliability, Cost/Implementation, Environment/Stewardship, Flexibility/Diversity and Innovation, evaluation of each portfolio considering the IRP goals, and analysis of the financial risk of each portfolio. IRP goals, attributes, and weights were vetted through the public process, UPAC, and the Utilities Board. and are shown in Figure ES2 and ES3.

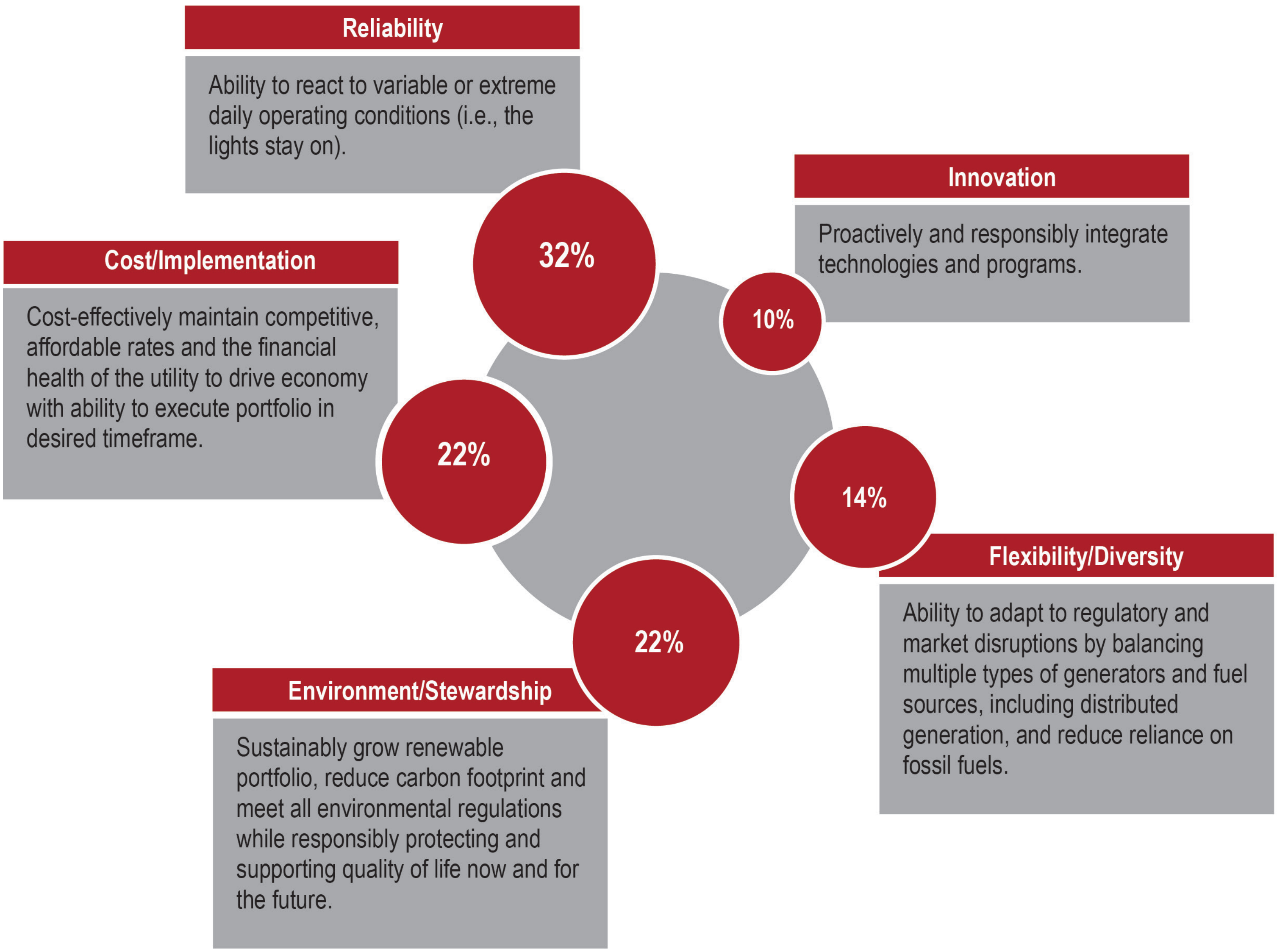


Figure ES3: EIRP Attribute Weighting

Phase Two Deliverables

At the end of Phase Two, Springs Utilities developed 20 different portfolios (numbered 1-20) and developed seven different pathways (labeled “A” through “F” as well as the “Reference Case”). Pathways are identified in Figure ES4 below. Each portfolio was then assigned to a pathway as shown in Figure ES5. The purpose for developing portfolios and pathways was to identify important considerations over the next 10 years, while keeping flexibility to meet long-term changes in subsequent EIRPs. Pathways act as a way to further summarize and group the portfolios based on common characteristics.

Figure ES4: EIRP Pathways

Pathway	Description	Portfolios Included
Reference Case	Drake Retired no later than 2035	R, 1
A	Drake Retired no later than 2030	2, 6
B	Drake Retired no later than 2026 and replaced by Gas & DSM	3, 4, 5, 13
C	Drake Retired no later than 2026 and replaced by Renewables, Storage & DSM	7, 8, 9, 10, 14
D	100% Carbon Free by 2050	11
E	Drake Retired no later than 2023, Nixon 1 Retired no later than 2030	12, 16, 17
F	100% Renewable by 2030, 2040 or 2050	15, 18, 19

Figure ES5: EIRP Pathways and Portfolios

	Port.	Carbon targets	2023	2026	2030	2035	2040	2050
Reference case	R					**Drake, Birdsall retire** Gas		
	1	2030 80% 2050 90%				**Drake & Birdsall retire** Gas/renewable/ storage		
Pathway A	2	2030 50% 2050 90%			**Drake retire** Gas & DSM	**Birdsall retire** Renewable/ storage/DSM		
	6				**Drake retire** Renewable/storage/ DSM			
Pathway B	3	2030 50% 2050 90%		**Drake retire** Gas & DSM		**Birdsall retire** Renewable/ storage/DSM		**Nixon 1 retire** Gas & DSM
	4						**Nixon 1 retire** Gas & DSM	
	5	2030 80% 2050 90%			**Nixon 1 retire** Gas & DSM			
	13*					**Birdsall retire** Gas & DSM		
Pathway C	7	2030 50% 2050 90%		**Drake retire** Renewable/ storage/DSM		**Birdsall retire** Renewable/ storage/DSM		**Nixon 1 retire** Renewable/ storage/DSM
	8						**Nixon 1 retire** Renewable/ storage/DSM	
	9	2030 80% 2050 90%			**Nixon 1 retire** Renewable/ storage/DSM			
	10	2030 80% 2050 100%						**Front Range, Nixon 2-3 retire** Renewable/ storage/DSM
	14*	2030 80% 2050 90%						
Pathway D	11	2030 80% 2050 100%		**Drake retire** Non-carbon & DSM	**Nixon 1 retire** Non-carbon & DSM	**Birdsall retire** Non-carbon & DSM		**Front Range/Nixon 2-3 retire** Non-carbon & DSM
Pathway E	12		**Drake retire** Small, mobile natural gas generator	**Nixon 1 retire** Gas/renewable/ storage/DSM		**Birdsall retire** Gas/renewable/ storage/DSM		
	16	2030 80% 2050 90%			**Nixon 1 retire** Gas/renewable/ storage/DSM			
	17				**Nixon 1 retire** Non-carbon & DSM	**Birdsall retire** Non-carbon & DSM		
Pathway F	15	2030 100%			**Drake, Nixon 1-3, Birdsall, Front Range retire** Renewable/ storage/DSM			
	18	2040 100%				**Drake & Birdsall retire** Renewable/ storage/DSM	**Nixon 1-3 & Front Range retire** Renewable/ storage/DSM	
	19	2050 100%						**Nixon 1-3 & Front Range retire** Renewable/ storage/DSM

*Regional market portfolios

Phase Three – EIRP Course of Action

Phase Three of the EIRP process consisted of the development of a course of action based on the analysis and results collected in the first two phases of the EIRP. The main activities of Phase Three included developing the weighted attribute scores of the top five portfolios selected in Phase Two. Based upon the weighted attribute score of the portfolios, public survey results and comments from public input discussions, the top two portfolios were identified. A final selection of the portfolio was done in discussions with UPAC and approved by the Utilities Board.

Phase Three Deliverables

Each portfolio (as identified in Figure ES5) was scored according to the attributes and weights identified in Phase Two. Figure ES6 shows the results of the top ten portfolios.

Additionally, a financial impact analysis was completed to evaluate each portfolio's 30 year average revenue requirements compared to the reference case. The top five results of the financial analysis can be seen in Figure ES7.

The final selection was based on attribute scoring and additional considerations including the retirement dates of non-renewable generation, the social cost of carbon, gas prices, carbon reduction, load forecasts, and risk.

Portfolio	Pathway	CO2 Target	Retirements	New Resources	Attribute Ranking	Total Score Normalized	Reliability	Cost / Implementation	Environment / Stewardship	Flexibility / Diversity	Innovation
17	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	1	100	100	46	69	88	70
16	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	2	98.7	93	63	72	75	50
12	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable/Storage/DSM	3	97.6	93	63	69	75	50
10	C	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM	4	97.5	80	30	81	100	100
11	D	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM	5	92.6	87	30	84	88	60
R	Ref	N/A	Drake 2035	Gas	6	88.4	80	88	38	75	30
5	B	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/Renewable/Storage/DSM	7	83.5	73	63	76	25	50
15	F	100% by 2030	Drake/Nixon/Front Range 2030	Renewable/Storage/DSM	8	82.8	73	21	100	50	60
9	C	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM	9	78.5	60	30	69	100	50
18	F	100% by 2040	Drake 2035 Nixon/Front Range 2040	Renewable/Storage/DSM	10	74.2	80	30	53	50	60
1	Ref	80% by 2030 90% by 2050	Drake 2035	Gas/Renewable/Storage	11	71.8	53	55	61	50	40
19	F	100% by 2050	Drake 2035 Nixon/Front Range 2050	Renewable/Storage/DSM	12	67.3	73	38	38	63	30

Green = Highest Score
Yellow = Lowest Score

Figure ES6: Portfolio Attribute Ranking

	Financial Rank	Average 30 Year Revenue Requirement	Average 30 Year Adjusted Debt Service Coverage	Average 30 Year Adjusted Days Cash on Hand
Portfolio 16	1	1,208,862	2.09	179
Portfolio 12	2	1,217,481	2.07	211
Portfolio 11	3	1,217,966	1.94	155
Portfolio 17	4	1,215,594	1.85	154
Portfolio 10	5	1,256,263	1.83	155

Figure ES7: Portfolio Financial Ranking

A significant amount of information was gathered to make an informed recommendation for the action plan to the Utilities Board. The public process was a critical component essential to incorporating the voice of Springs Utilities' customers into a portfolio recommendation. The various information that was considered and the stakeholder groups referenced in the development of the portfolio recommendation are highlighted in Figure ES8.

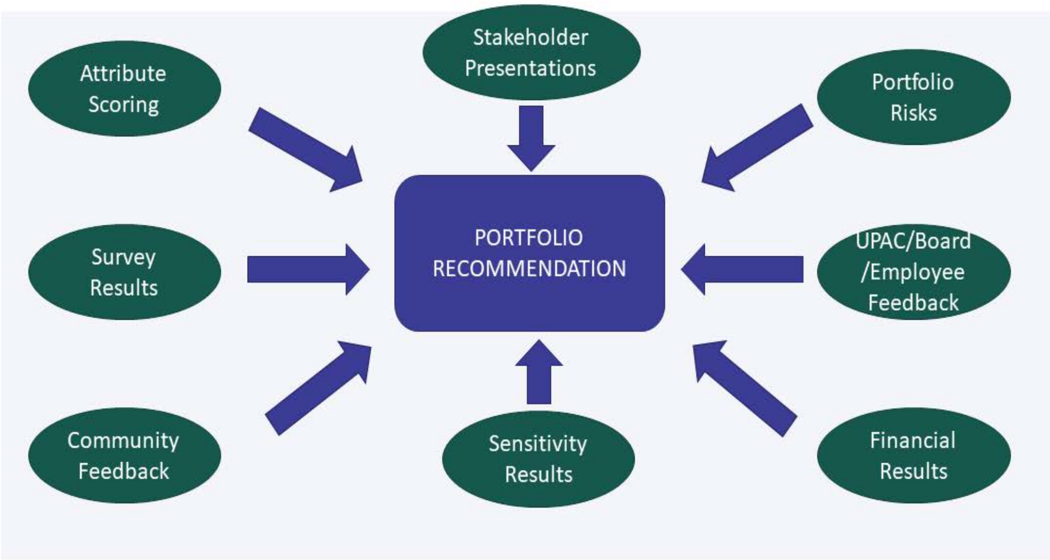


Figure ES8: Portfolio Recommendation Process

Preferred Portfolio

After evaluating the attribute scoring and risk analysis, Portfolio 16 and Portfolio 17 were selected as the top two portfolios. Both portfolios earned the highest attribute ranking and met an 80 percent GHG reduction by 2030 and decommissioned the remaining coal generation in the same time frame. The critical difference between the portfolios is that Portfolio 17 provides guidance that any new generation beyond Drake's replacement in 2023 must be a non-carbon resource. Portfolio 16 primarily consisted of utilizing new gas generation to meet future demand while Portfolio 17 leaned on renewable generation and battery storage.

Each portfolio resulted in a higher revenue requirement when compared to the reference case, largely because the reference case did not have carbon reduction goals that impacted the economical dispatch of the generation resources. The portfolio descriptions and attribute ranking scores are summarized in the Figure ES9.

Figure ES9: Final Portfolio Comparison

<table>
<tr><th></th><th>Portfolio 17</th><th>Portfolio 16</th></tr>
<tr><td>Pathway</td><td colspan="2">E-Early Decommissioning</td></tr>
<tr><td>CO2 Target</td><td colspan="2">80% by 2030
90% by 2050</td></tr>
<tr><td>Retirements (Next 10 Years)</td><td colspan="2">Drake 2023
Nixon 1 2030</td></tr>
<tr><td>New Resources</td><td>Aeroderivative/
Non-Carbon/DSM</td><td>Aeroderivative/Gas
Renwable/Storage/
DSM</td></tr>
<tr><td>Attribute Ranking</td><td>1</td><td>2</td></tr>
<tr><td>Total Score Normalized</td><td>100</td><td>98.7</td></tr>
<tr><td>Financial Ranking</td><td>4</td><td>1</td></tr>
<tr><td>NPVRR ($B)</td><td>$36.47</td><td>$36.27</td></tr>
<tr><td>% Increase from Portfolio R</td><td>2.10%</td><td>1.53%</td></tr>
<tr><td>% Increase from Portfolio 1</td><td>-0.21%</td><td>-0.76%</td></tr>
</table>

Approved Portfolio

After careful consideration of all results, Springs Utilities recommended Portfolio 17 as a path of action to the Utilities Board, which was subsequently approved on June 26, 2020. Portfolio 17 accomplishes the following: carbon reduction of 80% by 2030 and 90% by 2050, Martin Drake Power Plant retirement no later than 2023, Nixon Power Plant retirement no later than 2030, Birdsall Power Plant retirement no later than 2035, and new resource replacement from Gas, Demand Response, Solar, Gas, Storage, Wind, Geothermal/Biomass, and Energy Efficiency as described in Figure ES10.

Figure ES11 shows portfolio 17's generation capacity versus load for the long term planning horizon. The reasons for Springs Utilities recommendation of Portfolio 17 include: enhanced reliability and resilience, investment in infrastructure to support advancing renewable energy and future technologies (e.g. microgrids, electric storage, electric vehicles, advanced metering infrastructure, distributed resources, etc.), promotion of innovation, utility transformation, and agility, consideration of gas resources for Nixon Power Plant replacement only as a contingency/back-up plan, and no investment in new fossil fuel technologies after 2023.

Figure ES10: Electric Resource Acquisition Plan

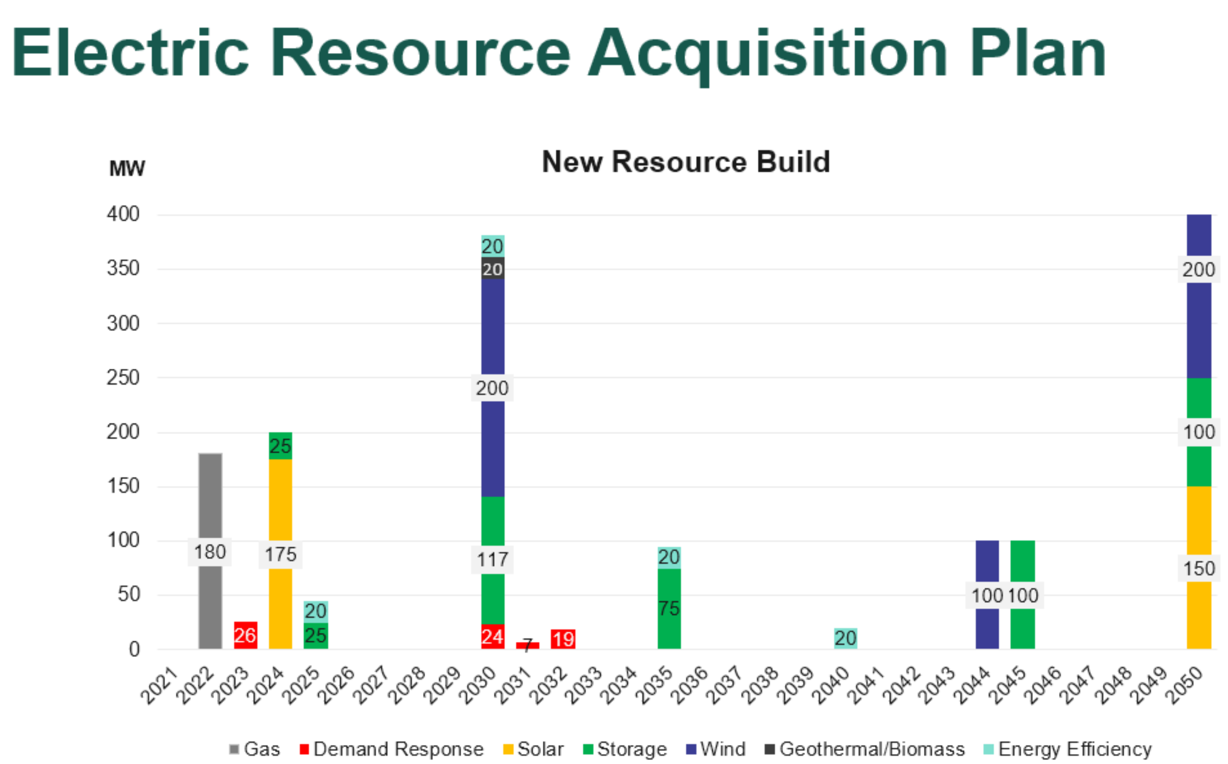
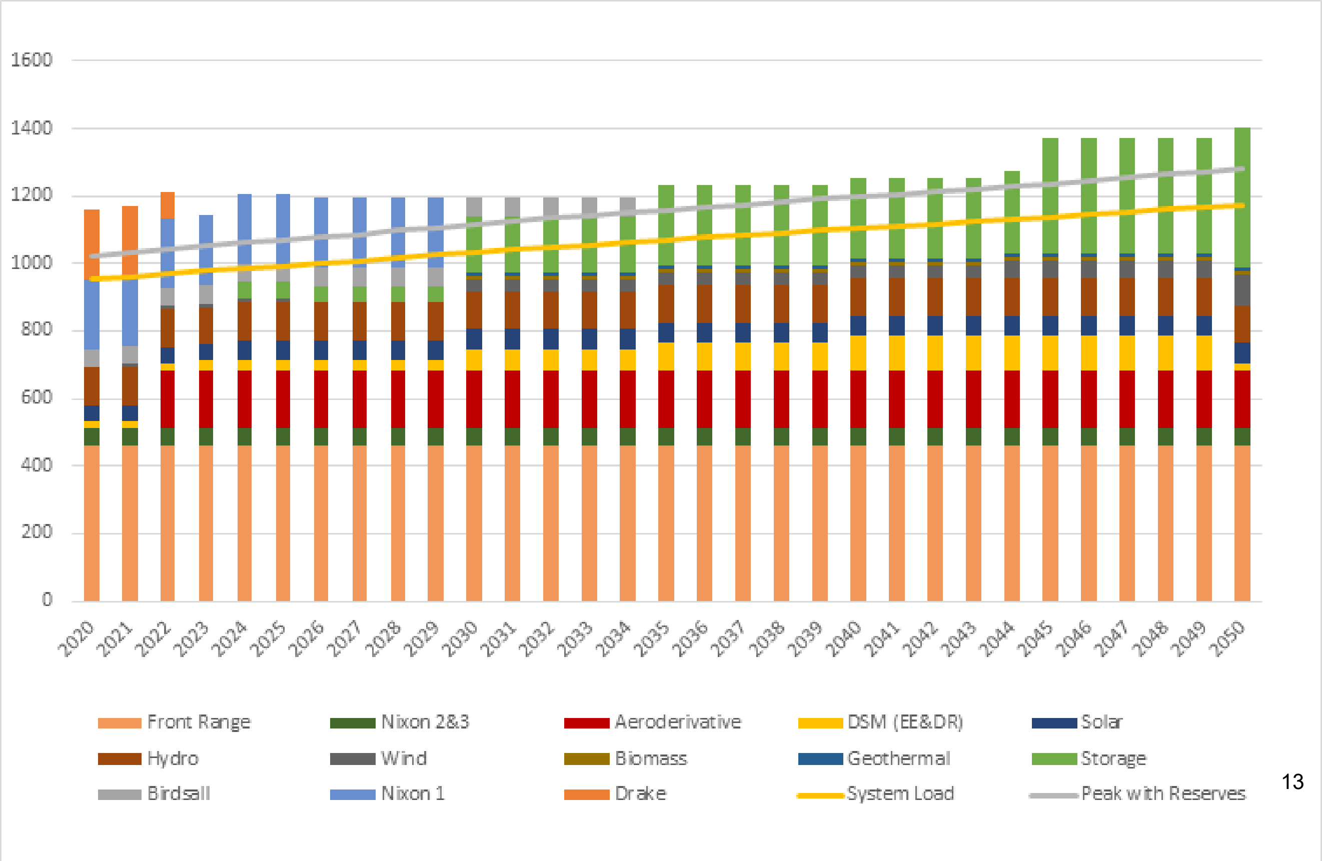


Figure ES11: Portfolio 17 2020-2050 Capacity in MW



2020 ELECTRIC INTEGRATED RESOURCE PLAN

Colorado Springs Utilities
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TABLE OF CONTENTS **Page No.**

LIST OF FIGURES

LIST OF TABLES

Page No.

Abbreviation	**Term/Phrase/Name**
AC	Air Conditioning
ATB	Annual Technology Baseline
ATC	Available Transfer Capability
BA	Balancing Authority
BESS	Battery Energy Storage System
Birdsall	Birdsall Power Plant
BYOT	Bring-Your-Own-Thermostat
C&I	Commercial and Industrial
CC	Combined Cycle
CDD	Cooling Degree Days
Clear Springs Ranch	Clear Springs Ranch Solar Facility
CO_2	Carbon Dioxide
CONE	Cost of New Entry
CPP	Critical Peak Pricing
CSG	Community Solar Garden
CT	Combustion Turbine
DLC	Direct Load Control
DR	Demand Response
Drake	Martin Drake Power Plant
DSM	Demand Side Management
Duke Energy	Duke Energy Renewables
EE	Energy Efficiency
EIA	Energy Information Administration
EIM	Energy Imbalance Market
EIRP, IRP	Electric Integrated Resource Plan
ELCC	Effective Load Carrying Capability
EV	Electric Vehicle
Front Range	Front Range Power Plant

Abbreviation	Term/Phrase/Name
GE	General Electric
Grazing Yak	Grazing Yak Solar Facility
GWh	Gigawatt-hour
HB -19-1261	Colorado House Bill 19-1261
HDD	Heating Degree Days
HRSG	Heat Recovery Steam Generator
ITC	Investment Tax Credit
Itron	Itron Inc.
JDA	Joint Dispatch Agreement
kW-yr.	Kilowatt-year
LAP	Loveland Area Projects
LCOC	Levelized Cost of Capacity
LCOE	Levelized Cost of Energy
LFG	Landfill Gas
LOLE	Loss of Load Expectation
NextEra	NextEra Energy Resources, LLC
Nixon	Ray Nixon Power Plant
NPVRR	Net Present Value of Revenue Requirements
NREL	National Renewable Energy Laboratory
MARS	Multi-Area Reliability Simulation
MW	Megawatts
MWh	Megawatt-hours
O&M	Operating and Maintenance
Palmer	Palmer Solar Facility
PO	Portfolio Optimization
PRM	Planning Reserve Margin
PRPA	Platte River Power Authority
PSCo	Public Service Company of Colorado

Abbreviation	**Term/Phrase/Name**
PTC	Production Tax Credit
PV	Photovoltaic
REC	Renewable Energy Certificate
RFP	Request for Proposal
RICE	Reciprocating Internal Combustion Engine
RMRG	Rocky Mountain Resource Group
RTO	Regional Transmission Organization
SCR	Selective Catalytic Reduction
SLC/IP	Salt Lake City Integrated Area Projects
SPP	Southwest Power Pool
Springs Utilities	Colorado Springs Utilities
STEP	Short Term Energy Plan
TOU	Time of Use
UCCS	University of Colorado – Colorado Springs
UPAC	Utilities Policy Advisory Committee
USAFA	United States Air Force Academy
WAPA, Western	Western Area Power Administration
ZEV	Zero Emission Vehicle

1.0 INTRODUCTION

Colorado Springs Utilities' ("Springs Utilities") 2020 Electric Integrated Resource Plan ("EIRP", "IRP") is a long-term (2020-2050) strategic plan supported by the City of Colorado Springs Utilities Board. The EIRP is developed every five (5) years. The purpose of the EIRP is to establish long-term planning goals and principles which enable Springs Utilities to consider varied long-term decisions affecting electric service under a framework that allows short term decisions and progress toward the chosen or preferred path. The main goal of this EIRP is to provide Springs Utilities' customers with resilient and reliable energy that is cost-effective and environmentally sustainable while reducing the carbon footprint and incorporating public input into Springs Utilities' future.

1.1 ABOUT COLORADO SPRING UTILITIES

Colorado Springs is the second largest city in the state of Colorado with a population of approximately 473,000. Colorado Springs voted to establish a four-service public utility in 1924, and the city owns and operates its electric system. Springs Utilities is responsible for the operation and maintenance of the system, and currently serves over 220,000 electric service points within its 475 square mile electric service territory. In 2020, Springs Utilities had energy requirements of 4,941,000 Megawatt-hours ("MWh"), with an annual peak daily demand of 946 Megawatts ("MW"), and an electric system reliability of over 99 percent. To serve customer load and energy requirements, Springs Utilities currently owns nine activethermal generation facilities and six hydroelectric generation facilities with a max capacity of 1,018 MWduring the summer season. Springs Utilities owns and operates 51 active transmission and distribution substations, 1,050 miles of overhead lines and 2,789 miles of underground lines.

Springs Utilities is a customer of Western Area Power Administration ("Western", "WAPA"). In order to enter long-term purchase agreements with Western, Springs Utilities must meet a specific set of requirements including conducting an IRP that evaluates a full range of supply-side and demand-side alternatives in order to provide adequate and reliable service to Springs Utilities' electric consumers. The IRP must include load forecasting, the identification of resource options, specified measurement strategies, public participation, a determined action plan, and the environmental impacts of various action plans.

1.2 EIRP GUIDANCE

A public engagement strategy was adopted to gather community guidance and support in the development of the EIRP. A three phased approach was formed to integrate public input with Utilities' technical analyses for key deliverables in the process, see Figure 1-1. Recommendations were provided to the Utility Board for approval before progressing to the next phase. In the first phase of the EIRP, the foundation of the plan was fully vetted. This included defining the electric mission, vision, and strategic pillars of the EIRP. Input was garnered through public surveys, Utilities Policy Advisory Committee ("UPAC") meetings, and Springs Utilities Board meetings. Throughout the entirety of the EIRP, Spring Utilities' mission and vision statements, energy vision, and the pillars of the energy vision provided guidance to establishing the best path forward. Springs Utilities' mission and vision statement, energy vision, strategic pillars and EIRP goals are presented in Figure 1-2 and 1-3.

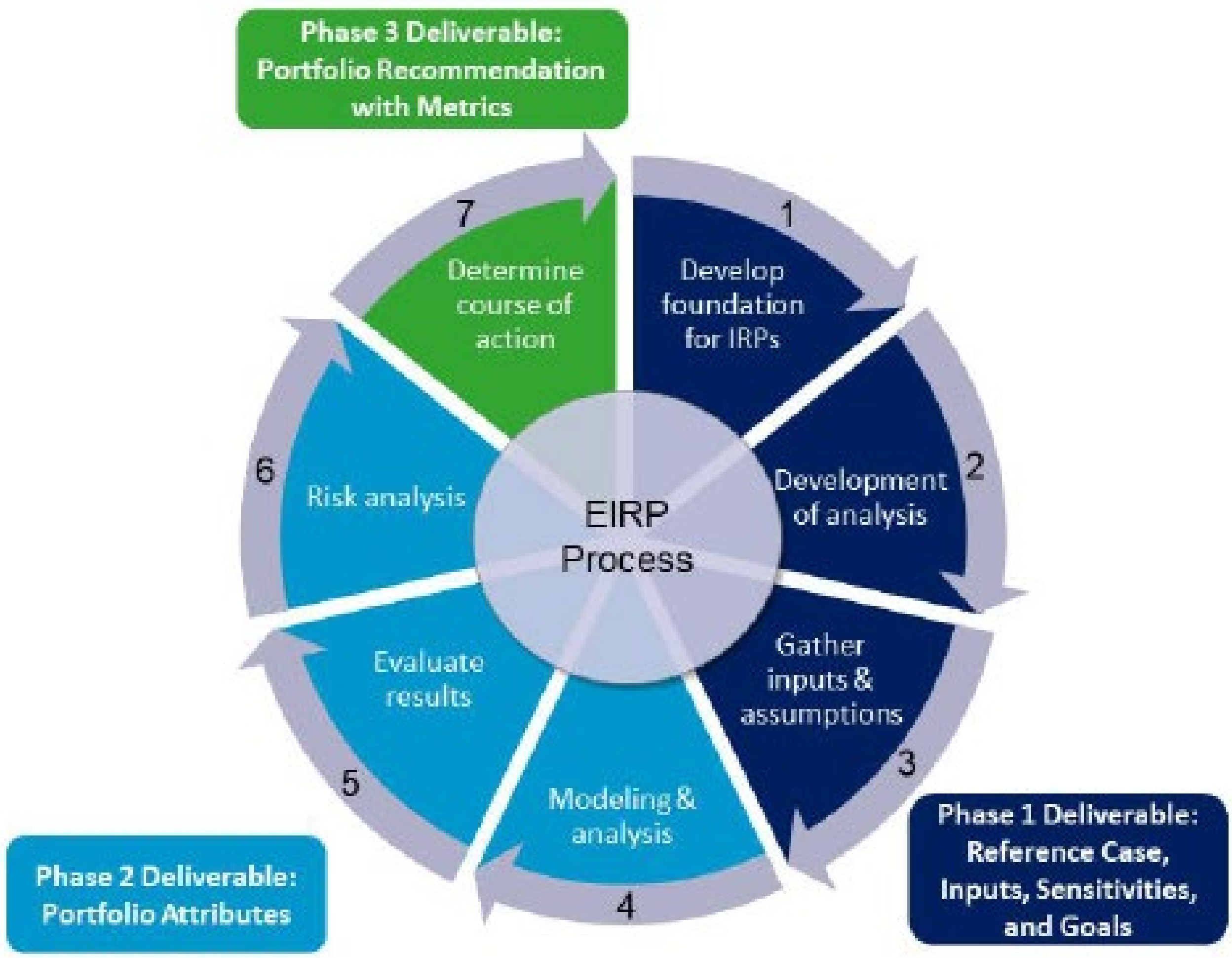


Figure 1-1 EIRP Three Phase Process

Figure 1-2 The Pillars of the Energy Vision

Figure 1-3: EIRP Guidance

Our Mission	Our Vision	Energy Vision	Pillars of Energy Vision	IRP Goals
Provide safe, reliable, competitively-priced electric, natural gas, water, and wastewater services to the citizens and customers of Colorado Springs Utilities	Colorado Springs Utilities is a treasured community partner, well known for providing responsible and dependable services that are vital to the future of our region.	Provide resilient, reliable, and cost-effective energy that is environmentally sustainable, reduces our carbon footprint, and uses proven state-of-the-art technologies to enhance our quality of life for generations to come	**Economic -** Cost-effective and equitable initiative that drives a strong economy **Environment -** Sustainable solutions that complement our natural resources **Resiliency-** Reliably withstand and recover from disturbances in a dynamic environment **Innovation -** Proactively and responsibly evolve in a transforming landscape	**Resilient and reliable-** Industry leading reliability and resiliency while avoiding potential stranded assets and supporting economic growth of the region **Cost-effective energy-** Maintain competitive and affordable rates while advancing energy efficiency and demand response **Environmentally sustainable-** Grow renewable portfolio and establish timelines for decommissioning of assets **Reduces our carbon footprint-** Meet all environmental regulations with specific metrics that include reducing our carbon footprint and reducing reliance on fossil fuels **Uses proven state-of-the-art technologies** Proactively and responsibly integrate new technologies

1.3 EIRP GOALS

The primary objective of an electric IRP is to provide an economic evaluation of a utility's power supply portfolio over both short-term and long-term planning horizons, with a specific focus on short-term decisions that will position a utility for long-term success. To support this objective, Springs Utilities, through the public process, developed five main goals summarized below:

1.1.0 Resilient and Reliable
- Industry leading reliability and resiliency while avoiding potential stranded assets
- Support economic growth of the region

1.1.1 Cost-effective Energy
- Maintain competitive and affordable rates
- Further advance energy efficiency and demand response

1.1.2 Environmental Sustainability
- Grow renewable portfolio
- Establish timelines for decommissioning of assets

1.1.3 Reduce Carbon Footprint
- Meet all environmental regulations with specific metrics that include reducing the carbon footprint
- Reduce reliance on fossil fuels

1.1.4 Use Proven State-of-the-art Technologies
- Proactively and responsibly integrate new technologies

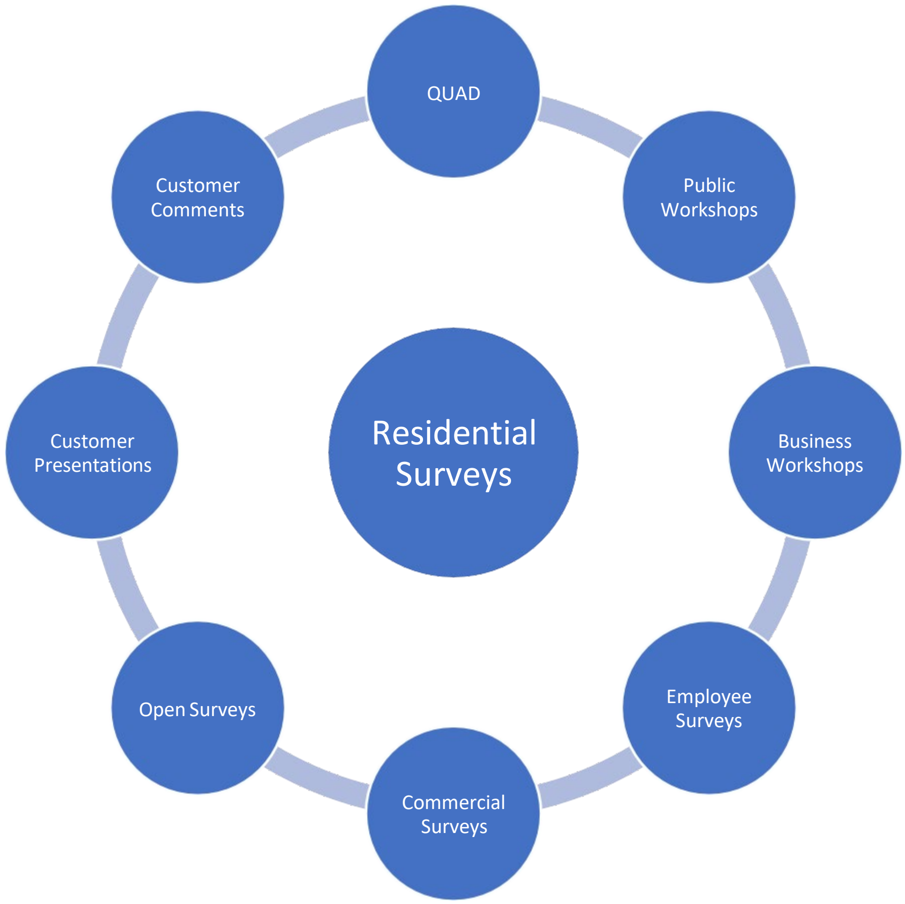
1.1.5 Public Input Goals
- Engage with customers in the development of the EIRP and planning for future energy resources for Colorado Springs.
- Provide customer inputs to UPAC and the Springs Utilities Board regularly.

The EIRP also considered the Colorado House Bill 19-1261 legislation that sets greenhouse gas emission target reductions relative to 2005 levels. The targets established statewide goals to reduce 2025 greenhouse gas emissions by at least 26 percent, 2030 greenhouse gas emissions by at least 50 percent, and 2050 greenhouse gas emissions by at least 90 percent. Further guidance from the State recommended municipally owned electric utility companies reduce their greenhouse gas emission by at least 80 percent by 2030 to help the State meet the targets above. The legislation and guidance helped provide the basis for developing an environmental metric to target throughout the EIRP process.

1.4 STAKEHOLDER ENGAGEMENT

The Springs Utilities Board designated UPAC to provide public oversight throughout the EIRP process. UPAC members are volunteers with diverse backgrounds who provided input into public outreach planning, feedback for portfolio options, and recommendations to the Springs Utilities Board. Additionally, Springs Utilities sought public input through surveys, public meetings, and workshops, EIRP email accounts, paid media, social media, newsletters, public comments and UPAC and Springs Utilities Board meetings, and community groups. Figure 1-4 highlights the different activities Springs Utilities provided to incorporatestakeholder engagement in the EIRP Process. The stakeholder process was essential in determining a course of action for the EIRP.

Figure 1-4: Stakeholder Engagement Summary



Input from stakeholders was gathered during each phase of the EIRP process. It was critical to achieve consensus and input for each phase of the EIRP. Using a phased approach for stakeholder engagement allowed each discussion to be focused on each specific phase. For example, when a final portfolio recommendation was sought, the discussion was focused primarily on Phase 3 and did not require conversation around topics approved in the previous phases. Figure 1-5 and Table 1-1 summarize the stakeholder engagement process in each phase, and the total survey responses by customer group.

Figure 1-5: Stakeholder Engagement by Phase

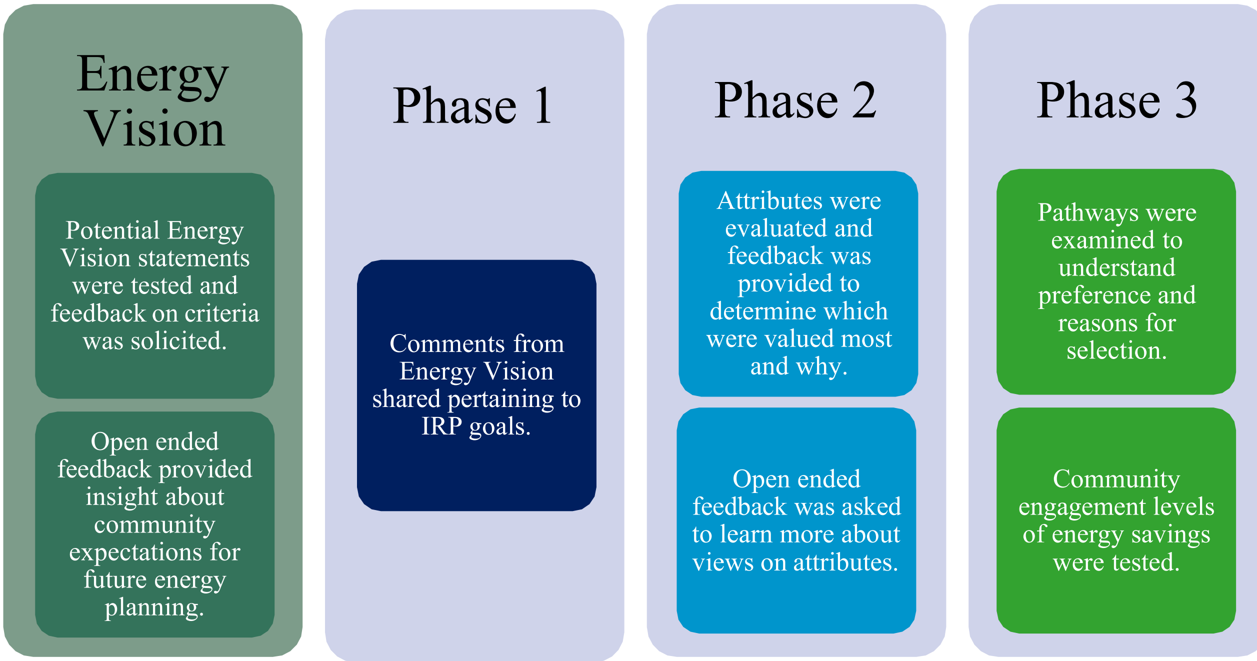


Table 1-1: Stakeholder Survey Engagement

Survey Responses	Energy Vision	Phase 2	Phase 3
Residential	563	619	608
Commercial	143	136	234
Employee	183	350	253
Open	652	851	2,019
Total	**1,541**	**1,956**	**3,116**

1.5 EIRP PROCESS

During the EIRP, Springs Utilities followed a very detailed procedure as is explained in detail in Section 6 of this report. During each Phase of the EIRP study, Springs Utilities took a proactive approach to discuss various aspects of the study with different stakeholders through a structured public stakeholder process. The views, ideas, and recommendations from stakeholders were incorporated in the study as applicable.

At the end of the EIRP study, Springs Utilities made a recommendation to its Board which was subsequently approved.

2.0 SYSTEM LOAD FORECAST

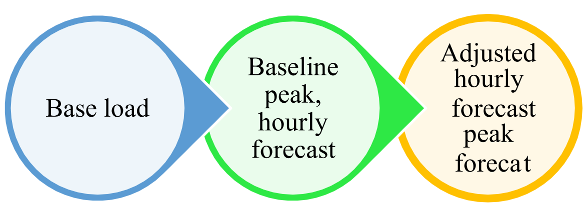
The load forecasting study for the EIRP was performed by Itron Inc. (“Itron”), a 3rd party consultant and was performed for a period 2020 through 2038. As the EIRP study timeline was through 2050, the load forecast for the period beyond 2038was developed by using the same cumulative average annual load growth rate for the period 2025-2038. As per the forecast individual customer usage is projected to decline due to energy efficiency programs and improved efficiency standards. However, the total number of customers is projected to increase during this time period. The total energy and power consumed by the total projected customers outweighsthe impacts of declines in customer usage. Therefore, the overall load forecast is projected to increase over the next twenty years.

Since the completion of the load forecast, Colorado passed a state law that established minimum zero emission standards for vehicles. In August 2019, Colorado became the tenth state to adopt a Zero Emission Vehicle (“ZEV”) standard. The Colorado rule was approved by the Air Quality Control Commission and supported by automobile manufacturers representing over 99 percent of the US automobiles market. The standard requires automakers to sell more than five percent ZEVs by 2023 and more than six percent ZEVs by 2025. The impacts of this law are not reflected in the 2020 EIRP’s load forecast and will be incorporated into the next EIRP study.

2.1 FORECAST APPROACH

The load forecasting approach consisted of three steps, each responsible for studying specific inputs to the load forecast. A general overview of the load forecast process is shown in Figure 2-1. The first step received the general inputs such as monthly temperature to define a baseline level of load. More details defining the hourly forecast were considered in the second step, and details of the hourly forecast were added in the third step to adjust the second step's results.

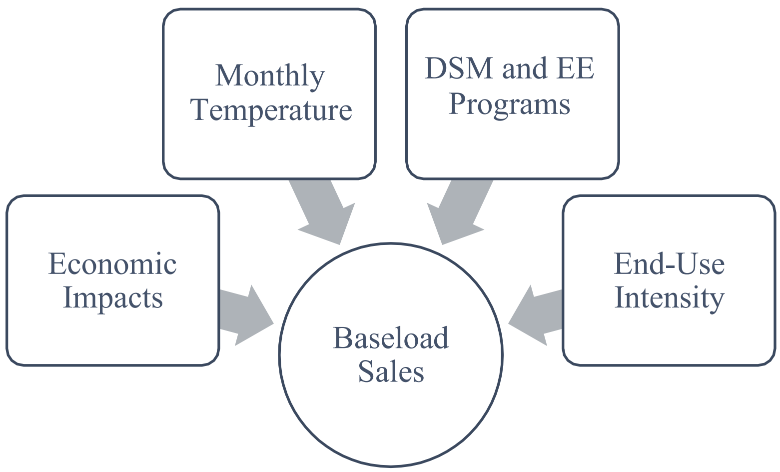
Figure 2-1: Baseload Forecasting Steps



2.1.1 Baseload Models

Defining the baseload is the first of three steps in the load forecast. Economic growth is associated with increase in the baseload. Another factor is the average monthly temperature that defines the baseline use of air conditioning ("AC") units or heat pumps. The impact of Energy Efficiency ("EE") and Demand Side Management ("DSM") programs, along with end-use intensity, are additional factors that influence the baseload forecast. A summary of these inputs used in the first step of the load forecast isshown in Figure 2-2. A more detailed discussion of DSM and EE programs is provided in Section 5.0 of this EIRP report.

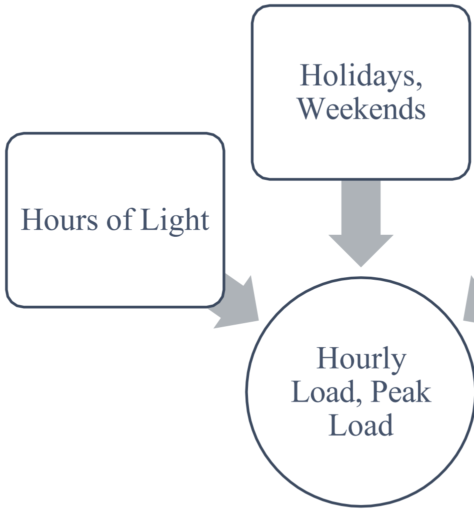
Figure 2-2: Step 1 – Base Load Forecast



2.1.2 Baseline Peak and Hourly Load Forecast

After the base load forecast was established, additional variables were added to determine the hourly and peak load forecast. These factors are illustrated in the figure below. Seasonal variations in energy consumption, including how often interior lights are being used in the afternoon and evening hours, effect the load shape and peak. Additionally, certain holidays have a unique load shape that were factored into the load forecast. Lastly, extreme weather conditions are evaluated to determine impacts to the peak load forecast.

Figure 2-3: Step 2 - Hourly and Peak Forecast Inputs

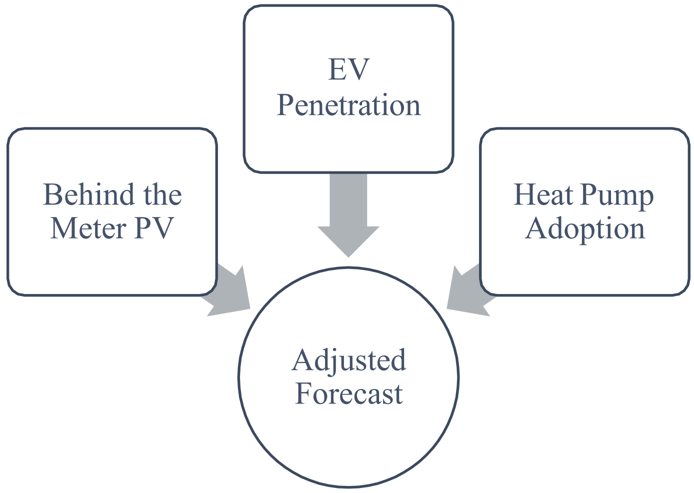


2.1.3 Adjusted Hourly Peak and Hourly Load Forecast

The hourly forecast was further modified to incorporate additional parameters not considered in step 2. The additional parameters considered included the number of customers adopting heat pumps, the level of electric vehicle penetration, and the number of customers with behind-the-meter generation as shown in Figure 2-4.

Behind-the-meter generation represents customers that maintain some form of electric generation on-site to serve some or all their electricity requirements. Common examples include backup generators at hospitals, cogeneration plants at industrial facilities, and Solar Photovoltaic ("PV") systems on residential rooftops. Customer interest in PV systems has grown in recent years, and cost reductions have made PV systems more cost competitive. With the increased adoption of PV systems, adjustments to the hourly load shape, particularly for the morning and afternoon hours, were required.

Figure 2-4: Step 3 - Adjusted Hourly and Peak Load Forecast



Adoption of electric vehicles ("EV") has dramatically increased over the past decade. Improvements in battery technology, cost reductions, and environmental factors have all accelerated the adoption of EVs within the United States. Electric load, energy consumption, and timing patterns of EV charging are expected to dramatically impact peak and hourly loads. The EIA EV forecast from 2019 was the basis for the EV penetration assumption in the baseline forecast.

Technological improvements, environmental factors, and efficiency goals have increased customer adoption of electric, air-source heat pumps for residential heating and cooling requirements. Heat pumps cool homes during warm weather and heat homes during cold weather. The addition of electric heating loads in winter months is particularly important to peak and hourly load forecasts.

2.2 TOTAL ENERGY FORECAST

Based on the above approach, the baseline forecast of energy sales and peak demand was established as shown in Table 2-1. The baseline energy and peak forecasts are both projected to grow through the study period with energy demand growing at an average rate of 0.49 percent and peak demand growing at an average rate of 0.74 percent during the first five study years.

Table 2-1: System Energy and Peak Demand Forecast

Year	Baseline Energy (MWh)	Change (%)	Peak (MW)	Change (%)
2020	5,148,507		975	
2021	5,163,324	0.29%	981	0.61%
2022	5,185,448	0.43%	987	0.63%
2023	5,209,052	0.46%	994	0.64%
2024	5,247,208	0.73%	1,002	0.85%
2025	5,261,945	0.28%	1,008	0.55%
2026	5,289,009	0.51%	1,015	0.74%
2027	5,317,857	0.55%	1,023	0.77%
2028	5,360,305	0.80%	1,033	0.95%
2029	5,378,612	0.34%	1,039	0.66%
2030	5,400,531	0.41%	1,047	0.77%
2031	5,423,755	0.43%	1,055	0.73%
2032	5,460,559	0.68%	1,064	0.83%
2033	5,473,137	0.23%	1,069	0.49%
2034	5,500,480	0.50%	1,076	0.64%
2035	5,529,517	0.53%	1,083	0.67%
2036	5,572,212	0.77%	1,092	0.82%
2037	5,589,255	0.31%	1,098	0.51%
2038	5,618,537	0.52%	1,105	0.64%
2019-24		0.49%		0.74%
2025-38		0.49%		0.70%

2.3 SENSITIVITY ANALYSIS

Sensitivity analysis of the load forecast was performed as part of the load forecast study. While developing the sensitivities, focus was placed on changing as few variables as possible to determine the direction and magnitude of a specific change. If numerous variables are changed, it would be difficult to understand the impact of a sensitivity on a single variable. For the load forecast, electric load growth rates have experienced large volatility over the past decade. Because of this, high and low load forecasts were utilized to capture a wide range of uncertainties. The high and low forecasts also act as bounds with the likely future being somewhere in between both forecasts. Additionally, sensitivities around EV adoption and extreme weather impacts were also developed as discussed in the next few sections.

2.3.1 High Load

The high load forecast represents an electrification scenario and is largely driven by an increase in electric vehicle penetration. The EV penetration assumption for the high load forecast scenario utilizes Bloomberg's Electric Vehicle growth forecast from 2019. The growth in EV as projected by EIA, (base forecast) and that projected by Bloomberg are shown in Figure 2-5. As can be seen from the figure, the projected EV growth begins to diverge around 2025 in the two forecasts.

Figure 2-5: Different Electric Vehicle Growth Forecast

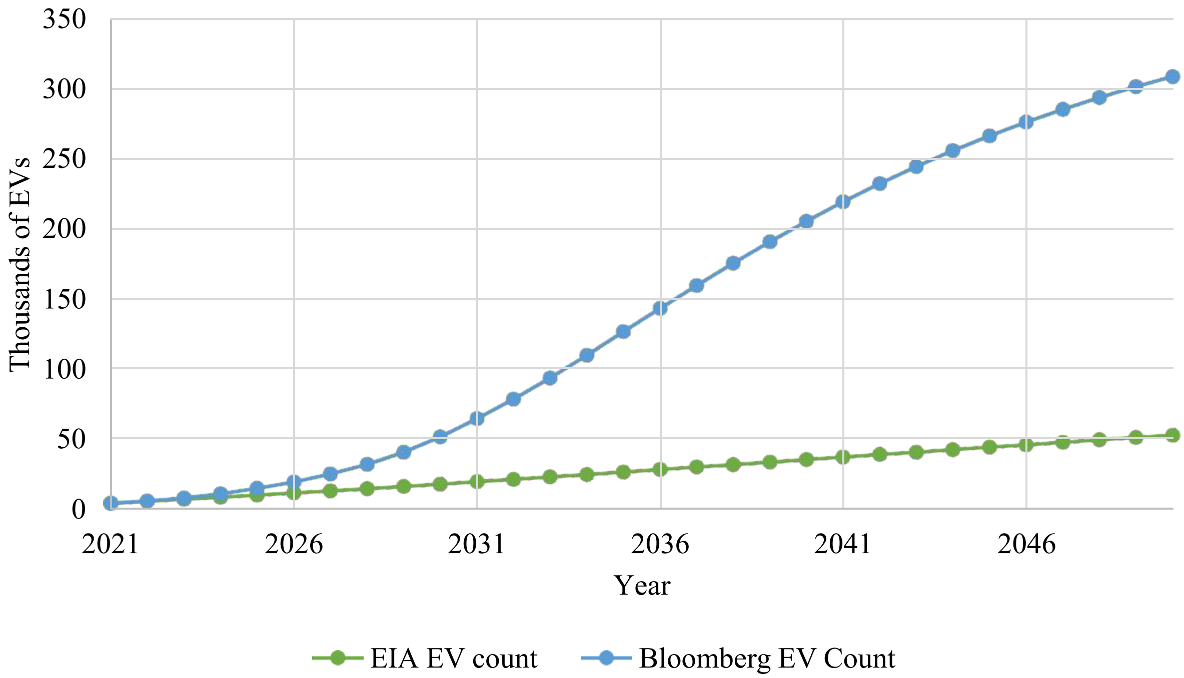
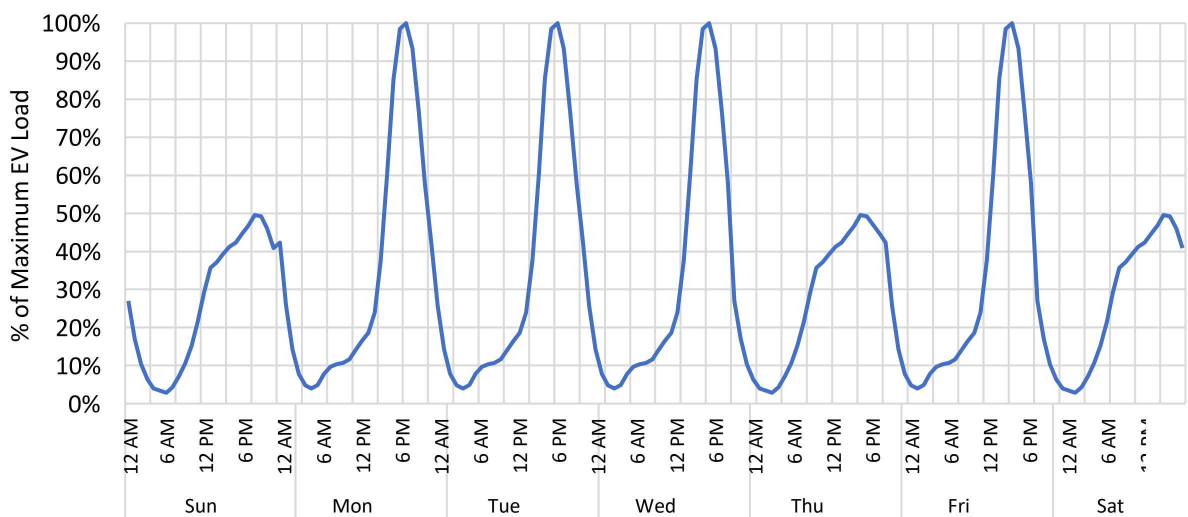


Figure 2-6: Per-Unit EV Charging Profile



The assumption for average energy usage for charging an EV was based on the top five most popular electric and plug-in hybrid vehicles. The EV charging profile for a typical week is included above in Figure 2-6. The profile is expressed as a percentage of the peak EV load and was applied to the base load forecast. Starting in 2036, the peak load hour in the high load forecast will shift until after 6pm. The risk of EV's shifting the peak load to hours where solar generation is unavailable could be mitigated through a restructuring of rates to incentivize charging EV's during off-peak periods.

The Colorado ZEV requirement was passed after the development of this scenario, and thus, its impacts are not reflected in the high and baseline EV penetration assumptions. The full impacts of the ZEV standard are unknown at this point but will likely result in higher EV adoption than the baseline EV forecast.

2.3.2 Low Load

The low load forecast represents the lower bound of a 90% confidence interval. By 2030, the low load forecast is consistently 43 MW lower than the reference case forecast.

2.3.3 Extreme Weather Impacts

As part of the load forecasts, extreme summer and winter scenarios were modeled. To assess the weatherimpacts of extreme weather, increases in the number of Cooling Degree Days ("CDD") and Heating Degree Days ("HDD") were analyzed.

The impact of these scenarios on consumption was based on their difference to the traditional weather normal. A larger difference from the traditional scenario translates to a larger difference in the peak load forecast. Figure 2-7, Figure 2-8, Figure 2-9, and Figure 2-10 illustrate various impacts to the baseline forecast for the extreme weather scenario.

Figure 2-7: CDD Adjustment in Extreme Summer Scenario

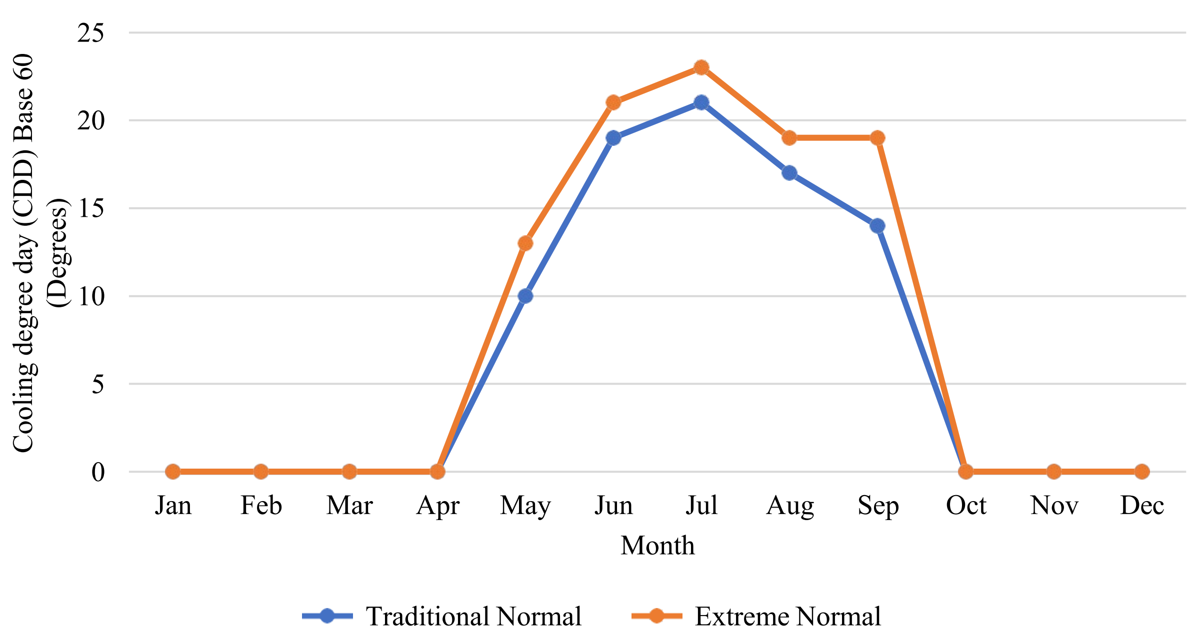


Figure 2-8: Extreme Cooling Load Peak Impacts

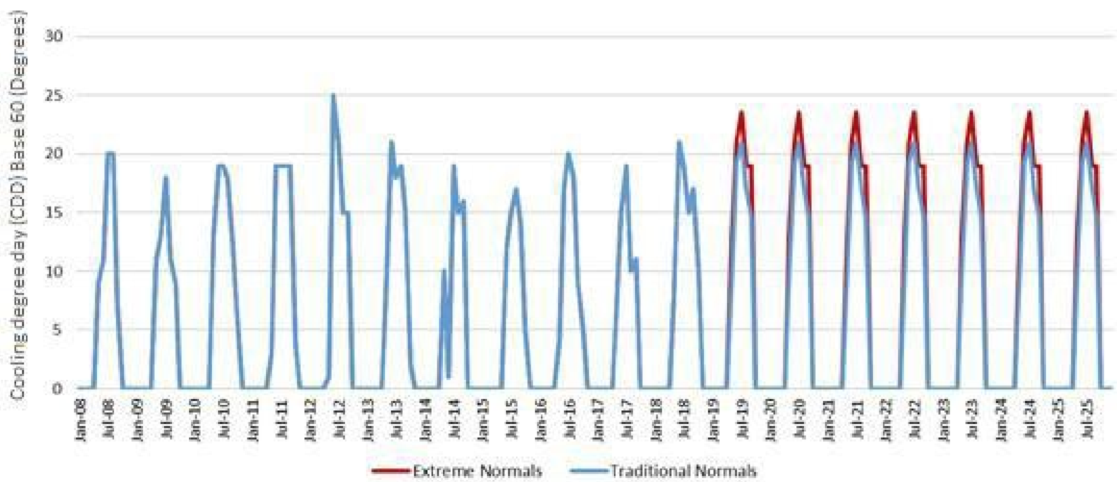


Figure 2-9: HDD Adjustment to Extreme Winter Scenario

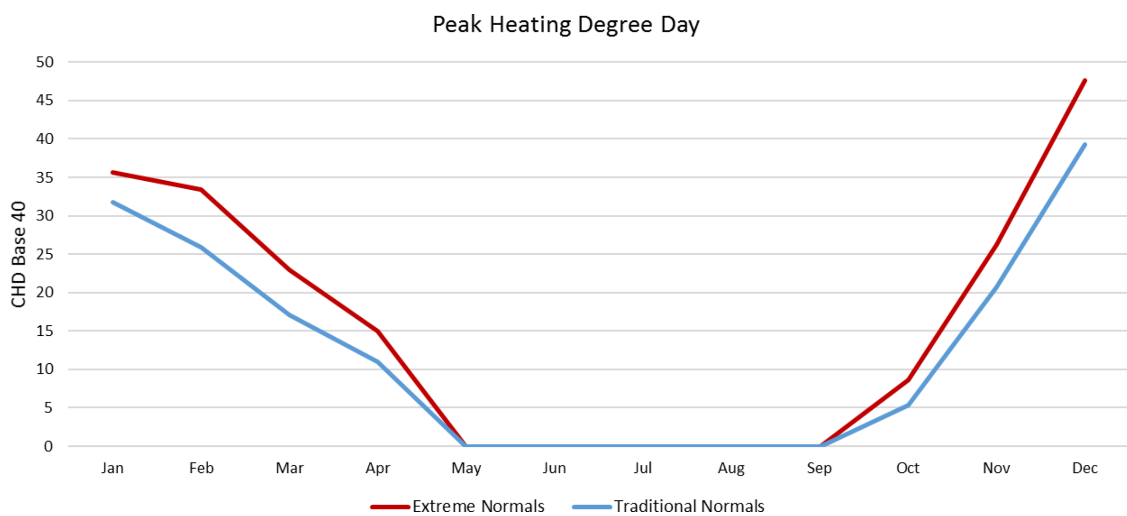
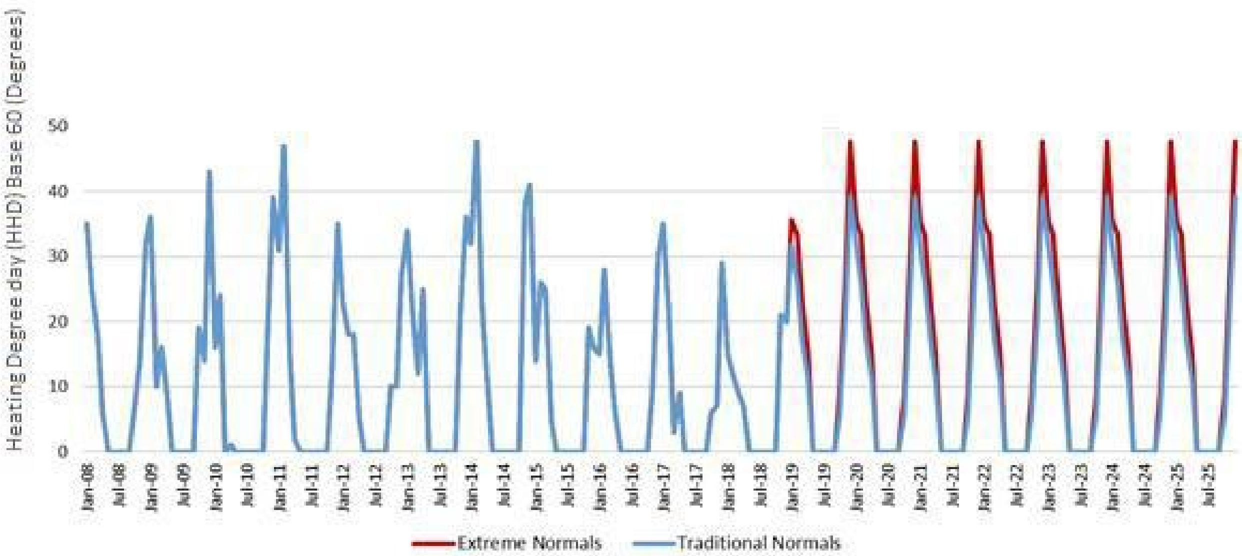
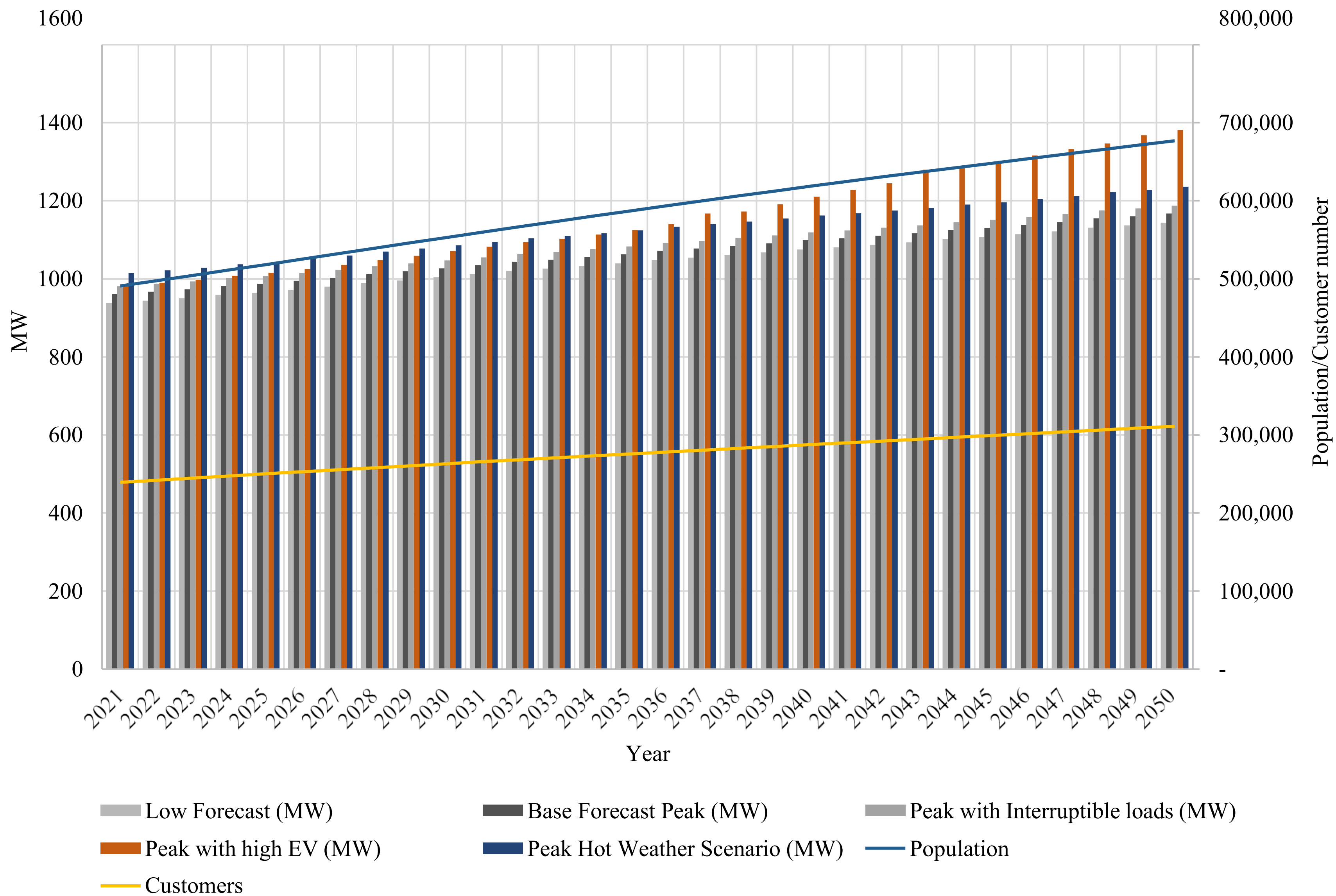


Figure 2-10: Extreme Heating Load Peak Impacts



The peak demand for the baseline case and the other sensitivity scenarios are shown in Figure 2-11. As previously mentioned, load is forecasted to increase in all scenarios driven by the projected growth in population and Springs Utilities' customers. The increase in the number of electric customers will outweigh the expected lower per capita consumption of electric by Springs Utilities' customers.

Figure 2-11: Peak Load Forecast Comparison



3.0 EXISTING LOAD AND RESOURCES

Springs Utilities' existing resource mix consists of nine thermal generating units and six hydroelectric units totaling 1,018 MW of generation capacity. Capacity ratings differ slightly between winter and summer. Most of Springs Utilities' energy requirement is generated from 462 MW of coal-fired capacity and the natural gas-fired 460 MW Front Range Power Plant. Coal units are typically operated as base load (e.g., 24 hours per day, 7 days per week) power facilities, while natural gas and hydro units are typically used to meet intermediate and peaking loads.

Springs Utilities' electric resources are supplemented with long-term power purchase contracts. Springs Utilities has currently executed five long-term power purchase contracts totaling 190 MW. When economical, Springs Utilities also purchases market power from the regional spot power market as needed to supplement existing generation resources. In early 2020, Springs Utilities entered into a joint dispatch agreement ("JDA") with surrounding utilities which include Public Service Company of Colorado ("PSCo"), Black Hills Colorado Electric, and Platte River Power Authority ("PRPA"). The purpose of the JDA is to efficiently dispatch the generation for individual utilities based on a system-wide marginal price. Reliability is maintained as each JDA participant is required to maintain operating reserves and have sufficient generation to serve the load.

3.1 RESOURCES

A summary of Springs Utilities' generation resources is represented in Table 3-1 .

Table 3-1: Colorado Springs Existing Generation Resources

Unit Name	Capacity (MW)	Unit Type	Primary Fuel
Drake Unit 6	77	Steam Turbine	Coal
Drake Unit 7	131	Steam Turbine	Coal
Nixon Unit 1	207	Steam Turbine	Coal
Nixon Unit 2	27	Combustion Turbine	Natural Gas
Nixon Unit 3	27	Combustion Turbine	Natural Gas
Birdsall Unit 1	16	Steam Turbine	Natural Gas
Birdsall Unit 2	16	Steam Turbine	Natural Gas
Birdsall Unit 3	22	Steam Turbine	Natural Gas
Front Range Power	460	Combined Cycle	Natural Gas
Manitou Hydro Unit 1	2.5	Conventional Hydro	
Manitou Hydro Unit 2	2.5	Conventional Hydro	
Manitou Hydro Unit 3	0.5	Conventional Hydro	
Tesla Hydro	28	Ponded Hydro	
Cascade Hydro	1	Conventional Hydro	
Ruxton Hydro	1	Conventional Hydro	
Total Generation	1,018		

3.1.1 Martin Drake Power Plant

Martin Drake Power Plant ("Drake") is a coal-fired generating facility located in Colorado Springs, Coloradothat began commercial operation between 1962 and 1974. It consists of two active units with a total of208 MW of capacity. Drake Unit 6 has a total capacity of 77 MW and Unit 7 has a capacity of 131 MW. Drake Unit 5 was retired in 2016. The fuel for the units is supplied from the Powder River Basin region.

Figure 3-1: Martin Drake Power Plant

3.1.2 Ray Nixon Power Plant

Ray Nixon Power Plant ("Nixon") is a coal-fired generating facility located in El Paso County, Colorado that began commercial operation in 1980. It consists of one active coal-fired unit with a total of 207 MW of capacity. The fuel for the units is supplied from the Powder River Basin region. Two additional natural gas-fired combustion turbines were added at the Ray Nixon Power Plant in 1999. Both units have 27 MW of capacity for a total of an additional 54 MW at the plant.

Figure 3-2: Ray Nixon Power Plant

3.1.3 Birdsall Power Plant

Birdsall Power Plant ("Birdsall") is a natural gas-fired steam turbine generating facility located in Colorado Springs, Colorado that began commercial operation in 1953. The plant consists of three steam turbine units. Birdsall Unit 1 and Unit 2 are both rated at 16 MW and Birdsall Unit 3 has a total of 22 MW of capacity.

3.1.4 Front Range Power Plant

Front Range Power Plant ("Front Range") is a natural gas-fired combined cycle generating facility located in El Paso County, Colorado that began commercial operation in 2003. The plant consists of two combustion turbines and steam turbine that combine for a total of 460 MW of summer capacity. Both combustion turbines are rated at 135 MW of capacity and the steam turbine is rated at 190 MW. Springs Utilities originally owned half of the generating facility and in December 2010 fully acquired the additional half of the Front Range Power Plant that it did not already own.

Figure 3-3: Front Range Power Plant

3.1.5 Tesla Hydroelectric Plant

Tesla Hydroelectric Power Plant ("Tesla Hydro") was built in 1997 and is in El Paso County, Colorado. The Teslaplant has a capacity of 28 MW and the water to drive the unit is supplied from the Rampart Reservoir through an underground tunnel. Electrical load on the unit varies hour to hour to help meets electrical andwater consumption needs.

3.1.6 Manitou Hydroelectric Plant

Manitou Springs Hydroelectric Plant ("Manitou Hydro") was built in 1905 and is in Manitou Springs, Colorado. The power plant consists of three hydraulic turbines that combine for a total of 5.5 MW of capacity. Manitou Unit 1and Unit 2 both are rated at 2.5 MW of capacity and Manitou Unit 3 is rated at 0.5 MW of capacity. Thewater to drive the unit is supplied from bodies of water fed from Pike's Peak.

3.1.7 Ruxton Hydroelectric Plant

Ruxton Hydroelectric Plant ("Ruxton Hydro") was built in 1925 and is in Manitou Springs, Colorado. The power plant consists of one hydraulic turbine with a capacity of 1 MW. The plant is utilized to supply power to homesin Ruxton Park as well as to slow down the flow of water in Ruxton Creek as it flows off the mountain.

The water that drives the unit is supplied from bodies of water fed from Pike's Peak similar to the Manitou Springs Hydroelectric Plant.

3.1.8 Cascade Hydroelectric Plant

Cascade Hydroelectric Plant ("Cascade Hydro") was built in 2010 and is in Cascade, Colorado. The power plant consists of one hydraulic turbine with a capacity of 0.75 MW. The water to drive the plant is supplied from the NorthSlope Reservoirs of Pike's Peak.

3.2 LONG-TERM POWER PURCHASE CONTRACTS

Springs Utilities' electric resources are supplemented with long-term power purchase agreements. Springs Utilities' current long-term purchase agreements are summarized in Table 3-2. The purchases consist of multiple agreements with WAPA, the United States Air Force Academy ("USAFA"), community solar offerings through a Community Solar Garden ("CSG") Bill Credit Tariff, and solar power purchase agreements with NextEra Energy Resources, LLC ("NextEra") and Duke Energy Renewables ("Duke Energy"). The solar purchase agreements with NextEra and Duke Energy assist Springs Utilities in meeting its Energy Vision renewable energy goal for 20 percent of its energy generation portfolio to be renewable resources. Capacity ratings in Table 3-2 represent summer capacity ratings.

Table 3-2: Colorado Springs Existing Power Purchase Agreements

Purchase Agreement	Capacity (MW)	Commission Year
Western – SLCA/IP	15	
Western – LAP	61	
USAFA Solar	5.25	2011
CSG Pilots	2	2011
CSG Tariff	2	2015
Clear Springs Ranch Solar	10	2016
Palmer Solar	60	2020
Grazing Yak Solar	35	2019
Total Power Purchase Agreements	190	

3.2.1 Western Area Power Administration Purchases

Springs Utilities receives allocations of federal hydropower under contracts with Western's Salt Lake City Integrated Area Projects ("SLCA/IP"), and Loveland Area Projects ("LAP"). The SLCA/IP contract provides 15 MW in the summer and 60 MW in the winter. The LAP contract provides 61 MW in the summer and 57 MW in the winter. Both contracts also provide some Renewable Energy Certificates ("RECs") for energy provided from Western's small hydro facilities. These contracts currently extend to

September 30, 2024. In the summer of 2015, the Springs Utilities Board approved a renewal for the next LAP contract term of 2024 to 2054. Western is working on the extension of the SLCA/IP contract.

3.2.2 United States Air Force Academy Solar Generating Station Purchase

The 5.25 MW solar contract from the USAFA Solar Project began commercial operation on July 1, 2011. SunPower owns and operates the facility, and Springs Utilities has the option to purchase the project after 10 years. Its 18,888 solar panels cover 43 acres.

3.2.3 Community Solar Gardens

In October 2011, Springs Utilities received approval from the Springs Utilities Board to offer a CSG Bill Credit (Pilot Program) Tariff for up to 2 MW total. The pilot program sold out almost immediately with four separate 500 kW installations. The Community Solar Garden Program provides an opportunity for electric customers to own a solar PV system without it being installed on their home or business. In 2014, a new CSG tariff was created, and an additional 2 MW was completed in July of 2015.

3.2.4 Clear Spring Ranch Solar

The 10 MW solar contract with NextEra for the Clear Spring Ranch Solar Facility ("Clear Spring Ranch") began commercial operation in 2016 and is in El Paso County, Colorado. NextEra built the solararray and will operate and maintain the facility throughout the 25-year power purchase agreement. Clear Spring Ranch Solar was the first utility-scale solar array for Springs Utilities.

3.2.5 Palmer Solar

The 60 MW solar contract with Duke Energy for the Palmer Solar Facility ("Palmer") began commercial operation in 2020 and is located on land south of Colorado Springs, Colorado. Palmer Solar is currently the largest solar project contracted with Springs Utilities and is the first solar array to interconnect directly with Springs Utilities' transmission system. Duke will operate and maintain the facility throughout the 20-year power purchase agreement.

Figure 3-4: Palmer Solar

3.2.6 Grazing Yak Solar

The 35 MW solar contract with NextEra for the Grazing Yak Solar Facility ("Grazing Yak") began commercial operation in 2019 and is located near Calhan, Colorado. NextEra built the solar array and will operate and maintain the facility throughout the 25-year power purchase agreement.

Figure 3-5: Grazing Yak Solar

3.3 RESERVE MARGIN

The planning reserve margin ("PRM") is the percent of total capacity of a system above the projected peak load. It is necessary to determine the additional reserves needed due to unavailable generation resulting from planned outages, unplanned outages, and intermittent generation. NERC standard BAL-502-RFC-02 recommends utilizing a 50/50 load forecast for determining the PRM. A 50/50 load forecasting methodology was utilized for the reference case load forecast. A PRM study was performed for Springs Utilities by Ventyx in 2013. Based on the results of that study, an 18 percent PRM was implemented in the Resource Planning process.

In 2018, Springs Utilities contracted for a new PRM study with General Electric ("GE"). This study was completed at the end of 2018. Springs Utilities made an addendum to the GE contract for a more refined analysis around access to purchase power during scheduled outages versus forced outages. GE used their Multi-Area Reliability Simulation ("MARS") software to perform the analysis. Generator outages are simulated by MARS. MARS determines Reserve Margin = Capacity – Load for each hour. Capacity includes purchase power. MARS summarizes the results into Loss of Load Expectation ("LOLE") metrics. LOLE is measured in days/year and the LOLE reliability target used for planning purposes is one day in ten years.

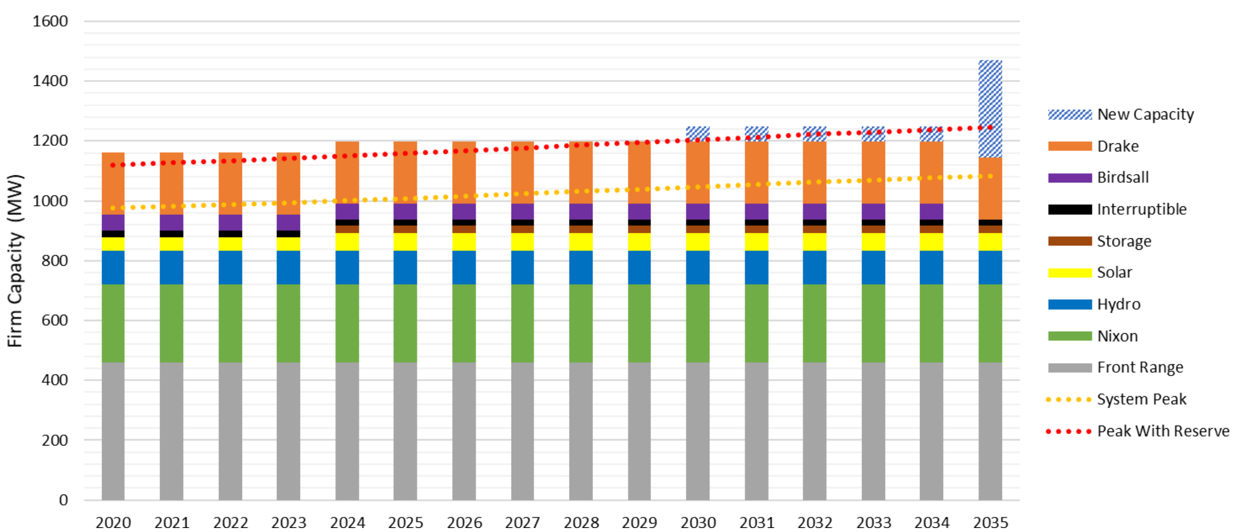
Runs were made with a wide range of values for access to purchase power. The lower the available purchase power was, the higher the reserve margin would be needed to maintain the one day in ten years target. Results were highly dependent on purchase power availability.

After the initial results were received from GE at the end of 2018, Springs Utilities began discussions in-house to achieve consensus on what level of purchase power availability should be assumed to determine the reserve margin value that would be implemented. During these discussions, the Portfolio Management group indicated that it is possible to secure purchases ahead of time for scheduled outages but more difficult in real-time for forced outages. It was decided to assume access to 200 MW plus the amount of capacity on scheduled maintenance not to exceed 530 MW. GE reran the models with these assumed purchase power availabilities and delivered results in April of 2019. The results of the study determined that a 16.5 percent reserve margin would be adequate to maintain a one day in ten years reliability target.

3.4 BALANCE OF LOADS AND RESOURCES

Figure 3-6 shows a balance of loads and resources for the Springs Utilities system using the previously described load forecast and existing Springs Utilities generation resources. The balance of loads and resources includes the addition of a new solar and storage contract in 2024.

Figure 3-6: Springs Utilities Balance of Loads and Resources Reference Case



Additional capacity would be needed in 2030 to serve load growth. If an existing resource were to be decommissioned on a date earlier than what is assumed in the reference case, additional capacity would be required earlier than 2030.

4.0 SUPPLY SIDE ANALYSIS

4.1 GENERAL ASSUMPTIONS

Natural gas, coal, and the regional market power price assumptions for the years 2020 through 2050 were derived from a combination of a five-year forecast from the Fuels and Purchase Power Group and ABB's 25-year forecast. The Fuels and Purchase Power Group forecasts were provided in nominal dollars and were adjusted to real dollars assuming a 2.0 percent inflation rate. ABB's forecasts were provided in real dollars. The average of the natural gas and market forecasts from the Fuels and Purchase Power Group and ABB forecast were used as inputs from 2020 to 2024. The ABB forecast was used from 2025 to 2043. The average growth rate of each respective forecasts was additionally used to project the ABB forecast from 2043 through 2050. ABB's natural gas and market forecasts were provided as monthly forecasts, and its coal forecasts were annual forecasts.

4.2 GENERAL FORECASTS

4.2.1 Coal Forecast

The ABB and Fuels and Purchase Power Group coal forecasts were utilized to forecast the coal price at Drake and Nixon from 2020 to 2050. The ABB base coal forecast was used from 2020 to 2050 and the transportation adders from the Fuels and Purchase Power Group's forecast were used from 2020 to 2024. The average transportation adder cost from 2020 to 2024 was used from 2025 to 2050 to complete the coal price forecast. ABB does not provide a high and low forecast for coal pricing. To perform a high and low coal price forecast, the percent differences of the annual average natural gas price of ABB's high and low natural gas forecasts from the medium forecast were applied to the commodity portion of ABB's coal forecast. The transportation portion of the forecast remained the same across the low, medium, and high forecasts. The high, medium, and low coal forecasts for the Drake and Nixon plants are presented in Figure 4-1 and Figure 4-2.

Figure 4-1: Drake Coal Price Forecast

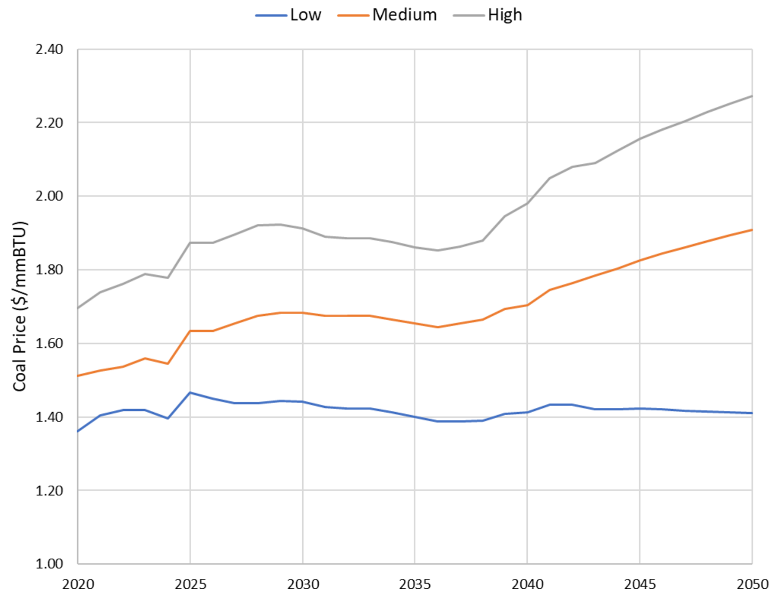
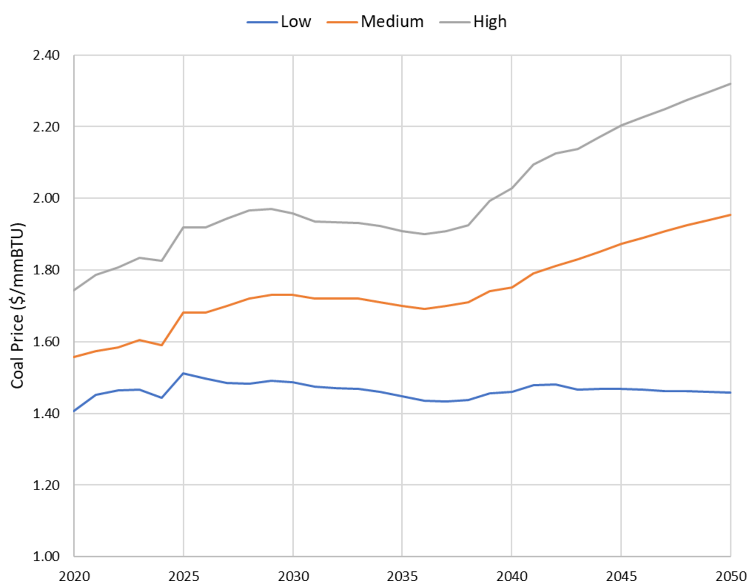


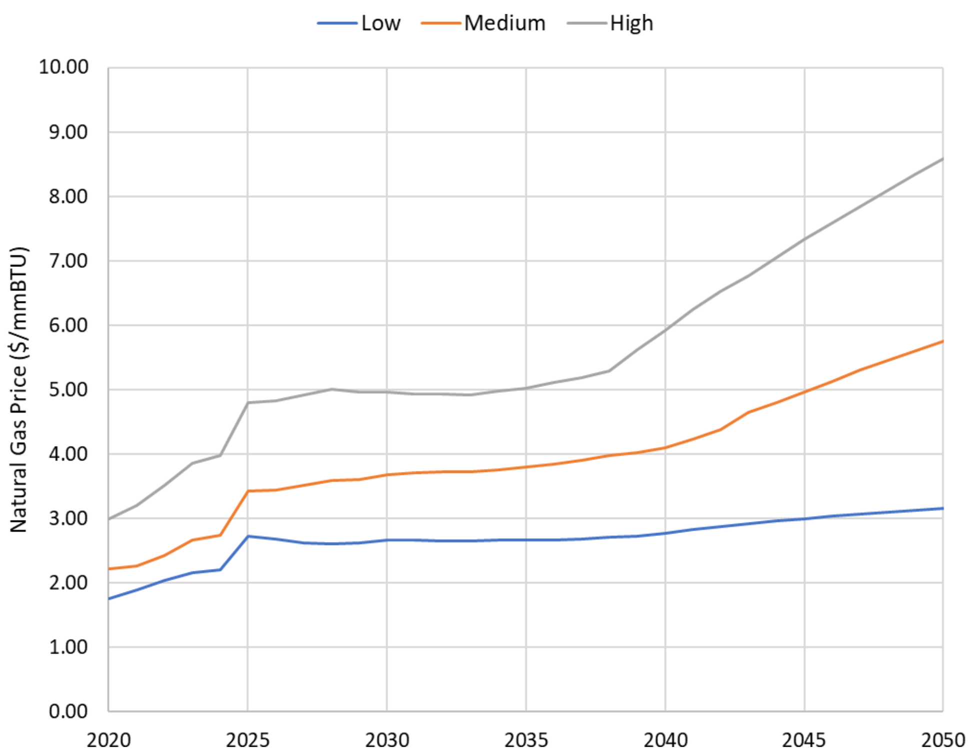
Figure 4-2: Nixon Coal Price Forecast



4.2.2 Natural Gas Forecast

ABB provides high, medium, and low natural gas forecasts. For EIRP inputs from 2020 to 2024, the percentage differences of ABB's high and low forecasts from the medium forecast were applied to the average medium forecast of the ABB and Fuels and Purchase Power Group forecasts. From 2025 to 2043, ABB's high, medium, and low forecasts were used and, beyond 2043, the 5-year average growth rate of the ABB forecasts were used to project the prices through the end of the study period. The high, medium, and low natural gas forecasts are presented in Figure 4-3.

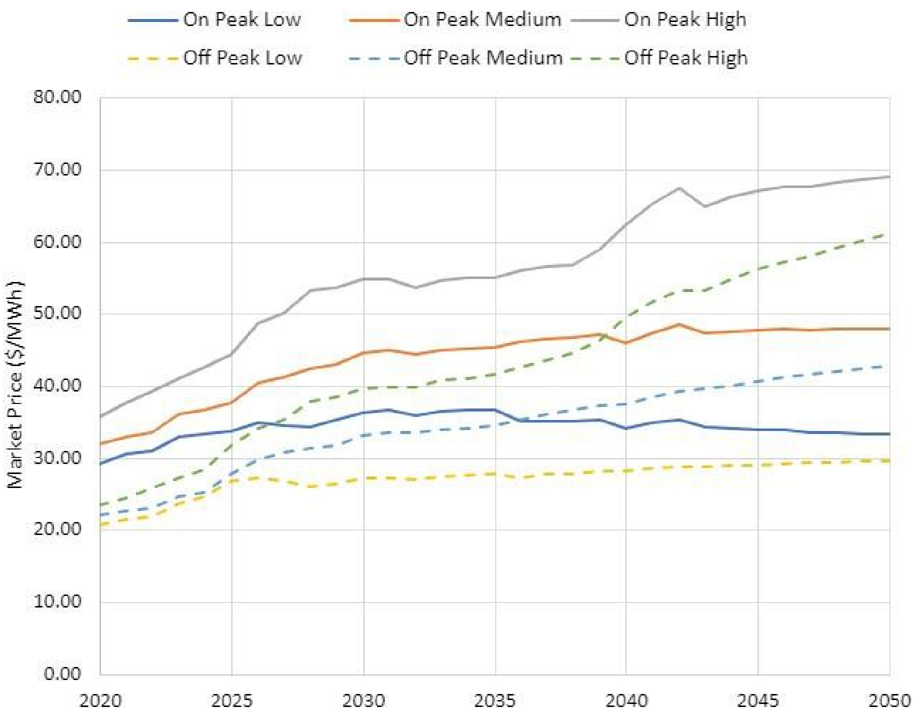
Figure 4-3: Natural Gas Forecast



4.2.3 Market Forecast

ABB provides high, medium, and low market forecasts. For EIRP inputs from 2020 to 2024, the percentage differences of ABB's high and low forecasts from the medium market forecast were applied to the average medium forecast of the ABB and Fuels and Purchase Power Group forecasts. From 2025 to 2043, ABB's high, medium, and low forecasts were used and beyond 2043, the 5-year average growth rate of the ABB forecasts were used to project the prices through the end of the study period. The high, medium, and low market forecasts are presented in Figure 4-4.

Figure 4-4: Market Price Forecast



4.3 EFFECTIVE LOAD CARRYING CHARGE ASSUMPTIONS

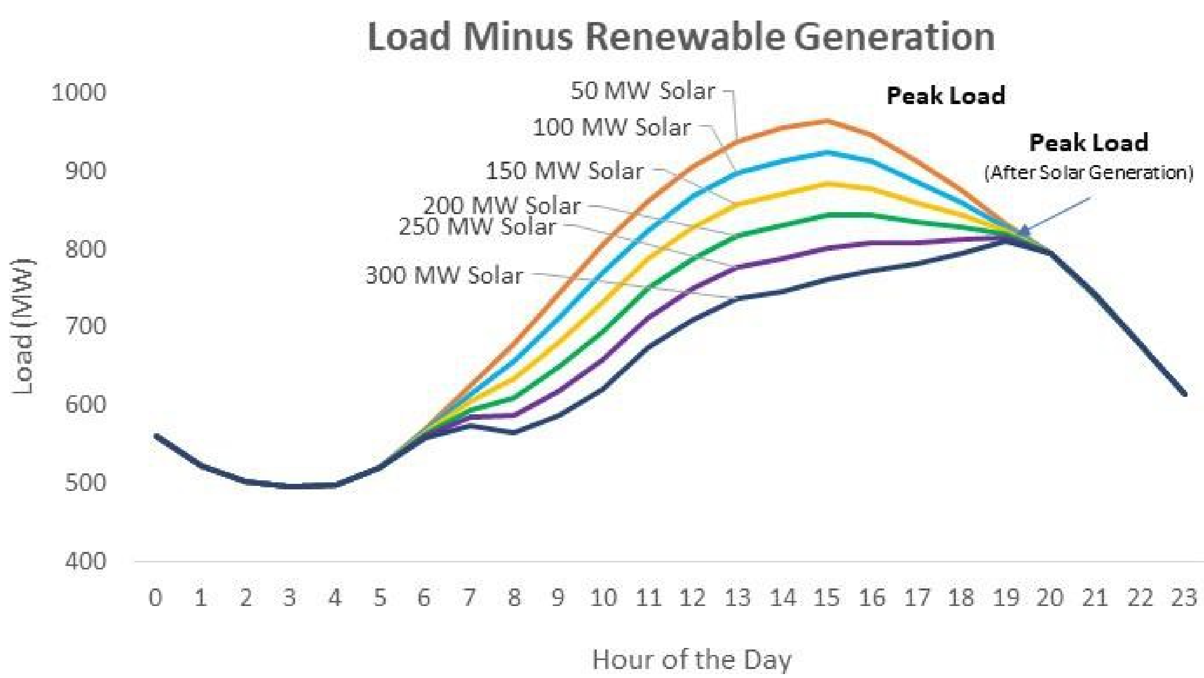
The effective load carrying capability ("ELCC") is a measure of additional load that the system can supply by adding a specific generation technology with no net change in reliability. Thermal resources are dependable or available at high-capacity factors while the fuel supply is sustained. This is not the case with wind and solar supply. As the penetration of a singular type of renewable generation increases, the capacity contribution towards peak load will reduce. Springs Utilities commissioned a renewable integration study in 2017 that provided the projected ELCC for solar generation at different levels of penetration. As the installation of solar approaches 200 MW, the capacity contribution towards peak load approached 0 MW. Increasing solar capacity from 150 MW to 200 MW on Springs Utilities' system contributes 6.5 MW towards the reserve margin requirement. In the EIRP, the reference case assumes that 264 MW of solar will be online by 2024. Based on the renewable integration study, any additional solar generation beyond that amount will not contribute to the reserve margin requirement. For additional solar to count toward the reserve margin requirement, it would have to be paired with a battery resource option. A solar plus battery storage was modeled as a resource option in the EIRP. A summary of the results from the renewable integration study is summarized in Table 4-1.

Table 4-1: Capacity Contribution from Solar

Definition	50 MW Solar	100 MW Solar	150 MW Solar	200 MW Solar
Installed Solar Capacity (MW)	50	100	150	200
Capacity Value (MW)	26.4	42.6	52.8	59.3
Capacity Credit (%)	52.7	42.6	35.2	29.7
Incremental Capacity Credit (%)	52.7	32.6	20.4	13.0

The declining capacity contribution from an increase in solar penetration is illustrated in Figure 4-5 The illustration shows that increased amounts of solar generation on the system shifts the net peak hour later in the evening towards the sunset. With no solar, the peak load occurs in hour 15. After 250 MW of solar is added to the system, the new net peak hour occurs in hour 19. As the net peak load hour shifts later in the evening, solar contributes less toward meeting peak load.

Figure 4-5: Solar Impact on Net Peak Load

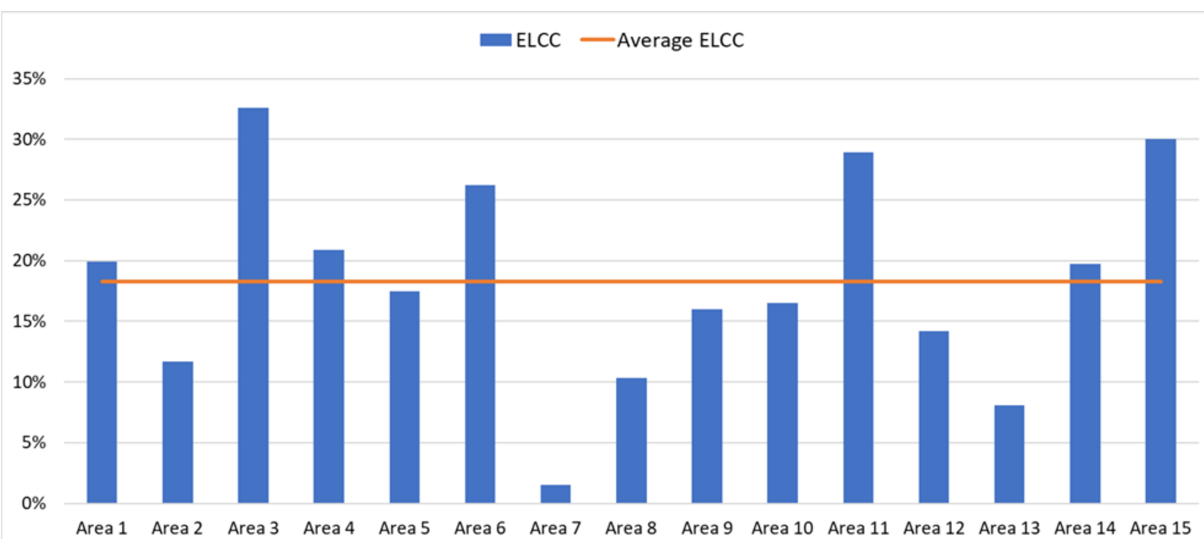


Springs Utilities employed Southwest Power Pool's ("SPP") 2018 Wind and Solar Report that calculates the ELCC for wind resources based on historical generation. An internal study was not performed because wind is an intermittent resource and will likely be imported from outside of Springs Utilities' service territory. The methodology used by SPP to determine the capacity contribution from wind is as follows:

1. Resources with at least three years of operational data were included in the analysis. For example,the resource must have data for the 2014 summer season to be included. Also, output data dating back to 2011 was used where available. This resulted in approximately 7,350 MW of nameplate capacity of wind resources being analyzed for this report, which is less than half of the total windresources in the SPP footprint today.
2. Next, the resources are associated to a legacy BA:
    a. Starting with the Market Participant, some are easily mapped to the legacy.
    b. Others can be attributed based on other factors such as naming convention, etc.
    c. Finally, the remaining resources were assigned based on location.
3. Identify the top three percent of peak load hours in the month of the annual of the annual peak foreach legacy BA during the summer and winter months from 2011-2017. Repeat this for the SPP BA load as well.
4. Resource output data was linked to the applicable legacy BA peak load hours as a percent of theirnameplate capacities. This step was also repeated for the SPP BA.

A marginal 18 percent ELCC contribution for wind resources was used in the EIRP. The basis for this assumption was based on Figure 4-6, which highlights the volatility of wind generation during peak load conditions. If Springs Utilities were to enter a Regional Transmission Organization ("RTO") like SPP, a class average ELCC will be applied to renewable resources which is similar to the methodology used to quantify the ELCC for new wind resources.

Figure 4-6: Average Peak Hour Generation at a 60 Percent Confidence Factor



Source: https://www.spp.org/documents/53721/sawg%20approved_wind%20and%20solar%20report.pdf

4.4 TRADITIONAL SUPPLY SIDE OPTIONS

Springs Utilities sourced inputs and assumptions from publicly available references where applicable. Fine tuning of assumptions and technology specifications will be performed once a technology type is selected and a request for proposal ("RFP") is submitted. The scope of the EIRP is to perform a broad stroke analysis that incorporates sensitivities, public input, and regulatory requirements into a path forward. The implementation of a selected EIRP portfolio will be refined once a decision is made. Forward price trends were primarily derived from NREL's 2019 Annual Technology Baseline ("ATB") report. A summary of the supply side resources evaluated in the EIRP are highlighted in Table 4-2.

Table 4-2: New Resource Summary

Potential Resources - EIRP	Fuel Type	Heat Rate (Btu/kWh)	Capital Cost ($/kW)	Source[1]
Advanced Combined Cycle ("CC")	Gas	6,200	971	EIA
Advanced Combustion Turbine ("CT")	Gas	8,550	993	EIA
Reciprocating Internal Combustion Engine ("RICE")	Gas/Oil	8,160	1,328	EIA
Wind	N/A	N/A	1,539	EIA
Battery Storage Lithium-Ion	N/A	N/A	1,559	Lazard[2]
Battery Storage – Flow	N/A	N/A	1,715	Lazard
Solar (Single-Axis Tracking)[4]	N/A	N/A	1,915	EIA
Pump Storage	N/A	N/A	2,352	Lazard
CC with Carbon Capture	Gas	7,493	2,477	EIA
Geothermal	N/A	N/A	2,787	EIA
Conventional Hydropower	N/A	N/A	3,520	EIA
Biomass/Biogas	Biomass	13,500	3,650	EIA
Solar (Thermal)	N/A	N/A	3,952	EIA
Modular Nuclear	Uranium	10,461	5,078	APPA[3]
Fuel Cells	Hydrogen	6,960	6,895	EIA
Landfill Gas ("LFG")	LFG	18,000	8,423	EIA
Energy Purchase	N/A	N/A	N/A	Forward Pricing
Demand Side Management Programs	N/A	N/A	N/A	CADMUS
Energy Purchase	N/A	N/A	N/A	Forward Pricing

4.2.1Pricing details provided by region. Forward pricing trends where sourced from NREL 2019 ATB
4.2.2Lazard has both Lithium and Flow batteries, as well as growth rate.
4.2.3Article from American Public Power Association.
4.2.4Does not include Tax Credits.

Additional details can be found: https://www.eia.gov/outlooks/archive/aeo19/pdf/electricity_generation.pdf

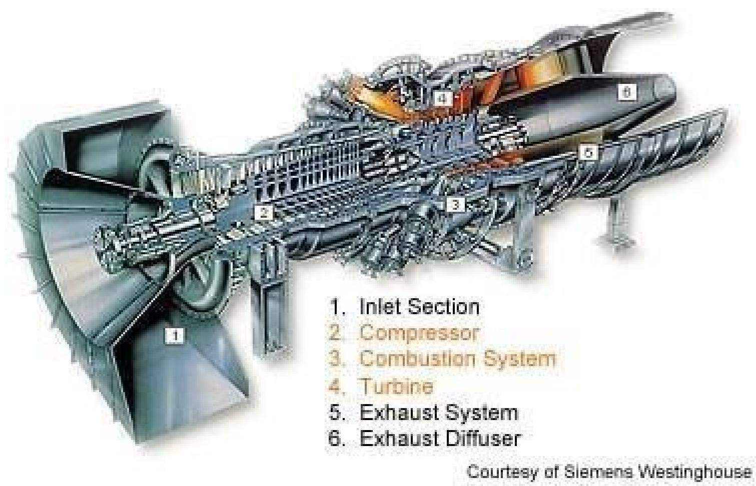
Advanced combustion turbines, combined cycle, aeroderivative, and reciprocating engine technologies were considered as resource options in the EIRP. Of the options considered, a combined cycle was considered a base load generating resource. CSU currently operates Front Range combined cycle power plant and can generate power approaching 50 percent of CSU's peak load. An additional large, combined cycle unit may not be justified as a substantial amount of CSU's capacity would be tied to a select few units.

Aeroderivative, simple cycle combustion turbines, and reciprocating engines act as peaking generation and can provide the capacity needed to backstop intermittent renewable generation. Aeroderivative and RICE units are small and could be sited strategically to accommodate increased distributed generation on the grid. These generators can burn multiple fuel types (e.g., natural gas, diesel) and in the event of a natural gas supply interruption, a backup fuel can be utilized to provide an additional level of resiliency.

4.4.1 Combustion Turbine

The three primary components of the gas turbine are the compressor, combustion system, and turbine. The compressor pressurizes the air and delivers it to the combustion chamber. The combustion system mixes the pressurized air with fuel to create a high-pressure, high-temperature gas mixture that is then transported to the turbine. Gas expands inside the turbine, spinning the rotating blades that connect to a generator to produce electricity.

Figure 4-7: Cutaway of Combustion Gas Turbine



Source: Department of Energy ("How Gas Turbine Power Plants Work")

4.4.2 Combined Cycle

A combined cycle configuration improves the efficiency of a simple cycle combustion turbine by utilizing the gas exhaust from a combustion turbine. A heat recovery steam generator ("HRSG") captures the waste heat and uses a boiler to produce high-pressure steam to power through a steam turbine. The efficiency improvement will lead to a lower dispatch cost for a combined cycle than a simple cycle combustion turbine.

Figure 4-8: Combined Cycle Power Plant Layout

Source: https://electrical-engineering-portal.com/an-overview-of-combined-cycle-power-plant

4.4.3 Aeroderivative

An aeroderivative gas turbine evolves from a jet engine. These turbines run at a higher compressor ratio and tend to be more compact than a standard heavy frame combustion turbine. This technology requires a small footprint and could be portable, thus having the ability to place at sites with specific generation needs.

4.4.4 Reciprocating Internal Combustion Engine

A Reciprocating Internal Combustion Engine ("RICE") drives the standard automobile. The expansion of gas moves a piston within a cylinder which rotates a shaft to produce electricity. RICE units are similar to aeroderivative units and require a small footprint that enables them to be sited near strategic load and transmission locations.

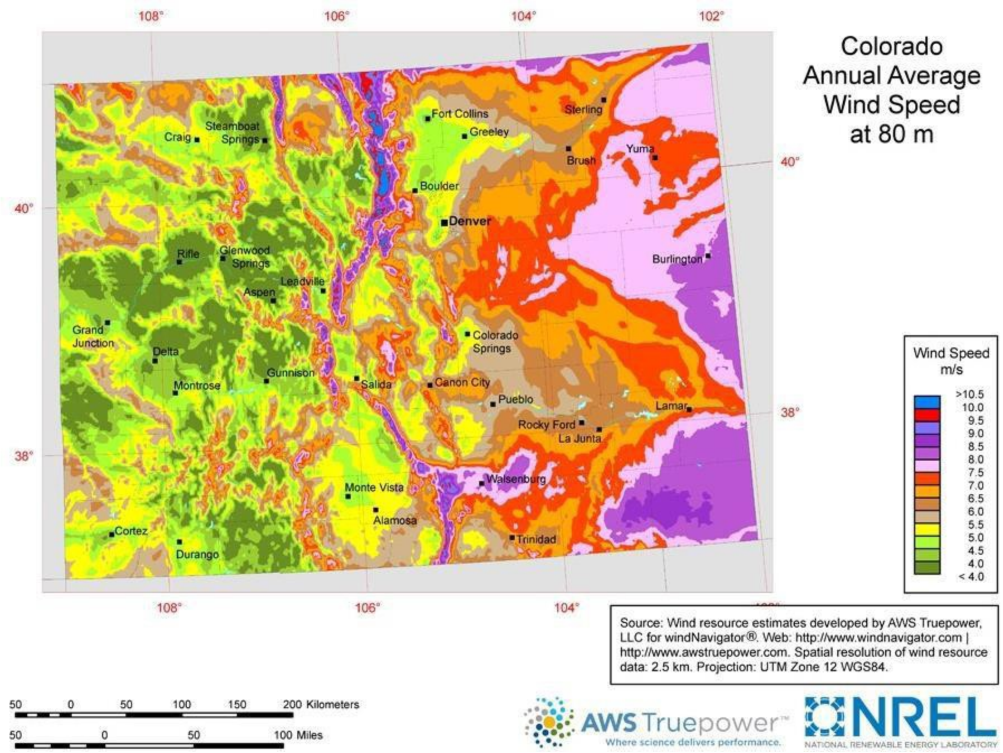
4.5 RENEWABLE SUPPLY SIDE OPTIONS

On-shore wind, single-axis tracking solar, solar thermal, hydroelectric, and geothermal were considered as options in the EIRP. Renewable resources such as wind and solar typically have intermittent generation dependent on weather profiles associated with the location of the resource. Energy storage paired with renewable generation allows renewable facilities to store electricity and alter the facility's generation profile.

4.5.1 On-Shore Wind

Wind acts as a complimentary resource to solar generation as it has a different generation profile. The challenge with increasing wind generation is largely due to limited access to optimum wind speeds in the Colorado Springs area. As seen in Figure 4-9, high wind speeds can be accessed north and east of Colorado Springs. For Springs Utilities to ramp up wind generation, a transmission strategy must be developed to interconnect to sites with high wind speeds. A $7.50 per MWh adder was applied to new wind resources due to the assumption that new wind resources would be located outside of Springs Utilities' service territory. The adder is indicative of possible transmission costs that would be incurred to deliver power from the wind resource to the Springs Utilities' system.

Figure 4-9: Colorado Wind Heat Map



4.5.2 Solar Photovoltaic (Single-Axis Tracking)

Through 2024, Springs Utilities will have installed 264 MW of solar capacity. As part of the installed capacity, Pike Solar is expected to contribute 150 MW to 175 MW. It is expected that any new solar will not contribute toward the reserve margin requirement and will need to be paired with battery storage to meet planning reserve margin obligations.

4.5.3 Solar (Thermal)

Solar thermal facilities convert sunlight into heat that could be stored and converted to electricity during times with no sunlight. This results in a different generation profile than a typical solar photovoltaic array. Currently, solar thermal plants are more expensive than a solar PV array paired with battery storage which serves a similar purpose.

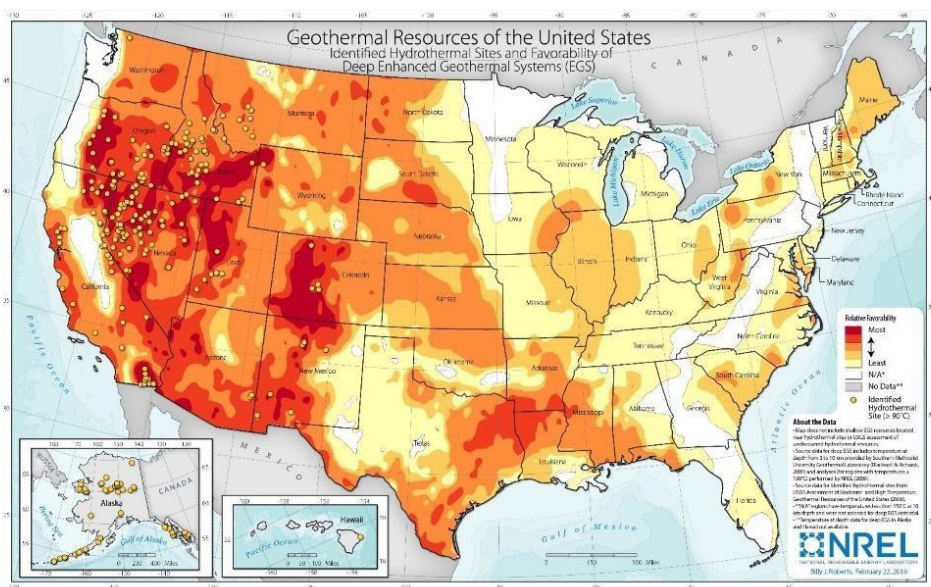
4.5.4 Hydroelectric ("Hydro")

Base loaded renewable generation such as hydro will be a valuable resource in the future. Through the Integrated Water Resource Plan, Springs Utilities will further evaluate opportunities for hydro generation.

4.5.5 Geothermal

Geothermal generation has potential to be a valuable, renewable, base load resource in the future.There is geothermal potential in the state of Colorado however, ideal geothermal sites may not be in the Colorado Springs area. An additional challenge with a geothermal project is the capital expenditure for test wells to verify the viability of a specific site. This testing process provides no guarantee that the site evaluated will lead to a viable geothermal project. Figure 4-10 displays a heatmap of geothermal resources in the United States.

Figure 4-10: United States Geothermal Heat Map



4.6 ENERGY STORAGE SUPPLY SIDE OPTIONS

Lithium-Ion batteries, flow batteries, and pumped storage options were considered as options in the EIRP. Battery technology is quickly maturing, and costs are expected to continue to decline over the next decade. Battery storage will provide needed capacity and ancillary services that will help integrate renewable resources.

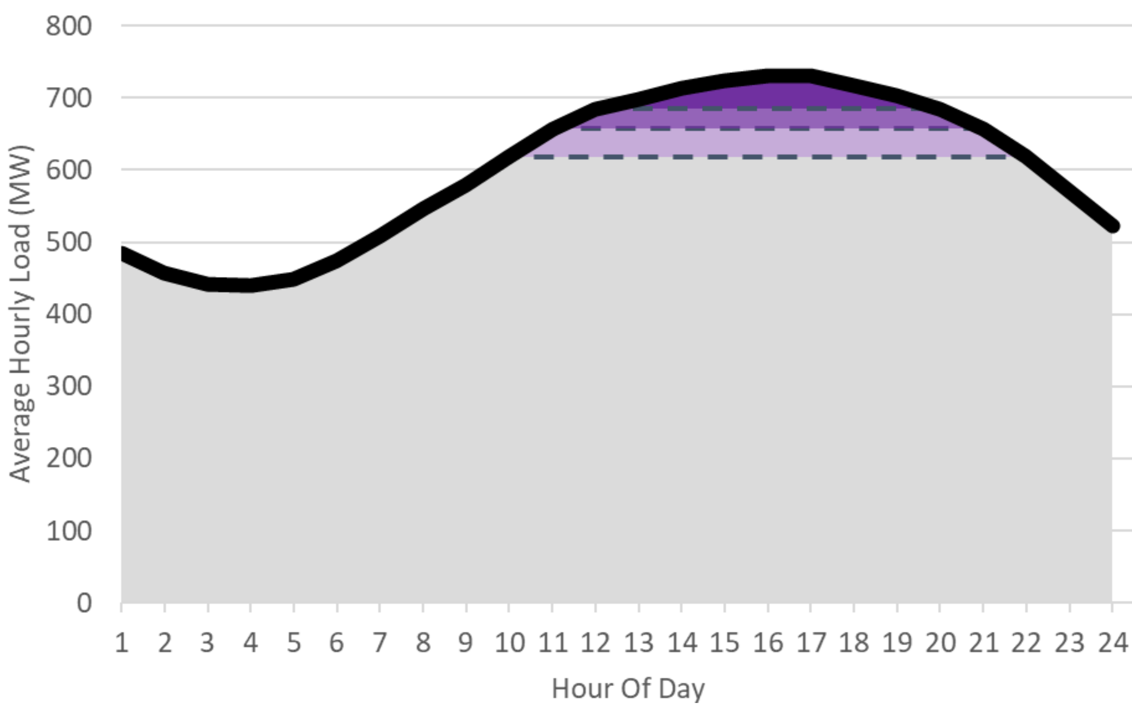
4.6.1 Lithium-Ion Battery

A 4-hour duration lithium-ion battery was assumed for the EIRP. It was also assumed that the entire capacity would count toward the reserve margin requirement.

4.6.2 Flow Battery

Flow batteries use chemical components that dissolve in a liquid solution. Flow batteries are less mature than lithium-ion batteries. They have specific advantages, such as having a long discharge duration (greater than 4-hours) and a long operation life. A 6-hour duration was assumed in the EIRP for flow batteries. The impact of increased battery penetration is presented in Figure 4-11.

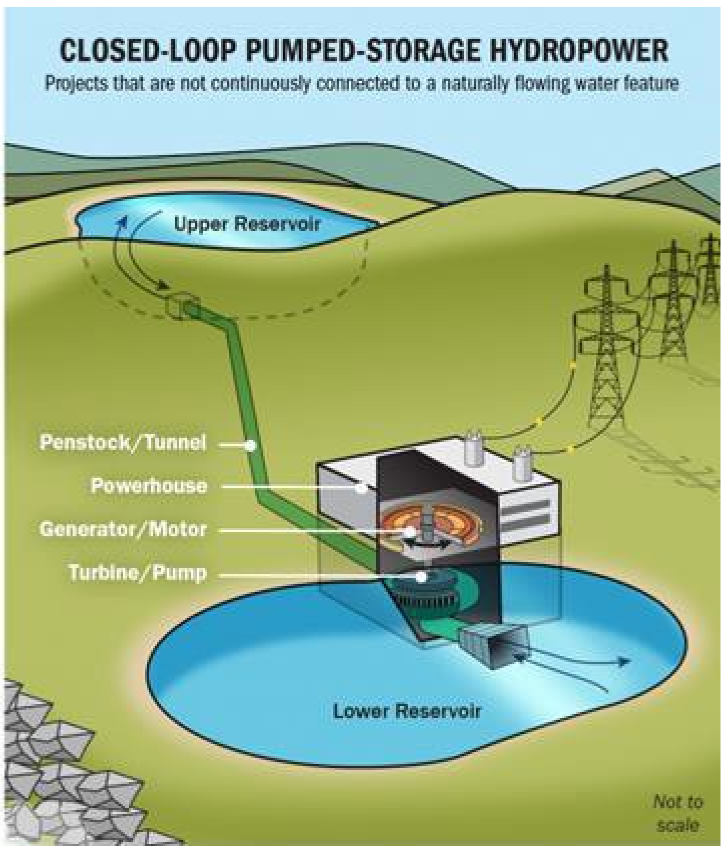
Figure 4-11: Impact of Increased Battery Penetration



4.6.3 Hydroelectric Pumped Storage

A hydroelectric pumped storage system pumps water into an upper reservoir during periods of low energy prices. On-peak, when power prices tend to be higher, water will flow from an upper reservoir through a turbine to produce electricity. Pumped storage operates similarly to a battery but currently is not as cost-effective. Springs Utilities will evaluate the impacts and opportunities of pumped storage in the next Integrated Water Resource Plan to determine specific projects that could utilize pumped storage technologies. There may be an opportunity to leverage existing infrastructure to lower the total cost of a pumped storage project to make it competitive with battery storage. An example of a pumped storage system is presented in Figure 4-12.

Figure 4-12: Pumped Storage System Diagram



Source: *https://www.energy.gov/eere/water/pumped-storage-hydropower*

4.7 CARBON-FREE SUPPLY SIDE OPTIONS

In addition to the thermal and renewable resources listed in this section, a combined cycle with carbon capture, modular nuclear reactors, and fuel cell options were considered as options in the EIRP.

4.7.1 Combined Cycle with Carbon Capture

Combined cycle with carbon capture generates electricity with natural gas and captures and store carbon dioxide (“CO_2”) post combustion. This technology will continue to be considered as a resource option in future EIRPs but is not under consideration as a near-term resource since Springs Utilities still has headroom to increase solar, wind, DSM, battery storage, and other renewable resources before needing to invest in carbon capture technology.

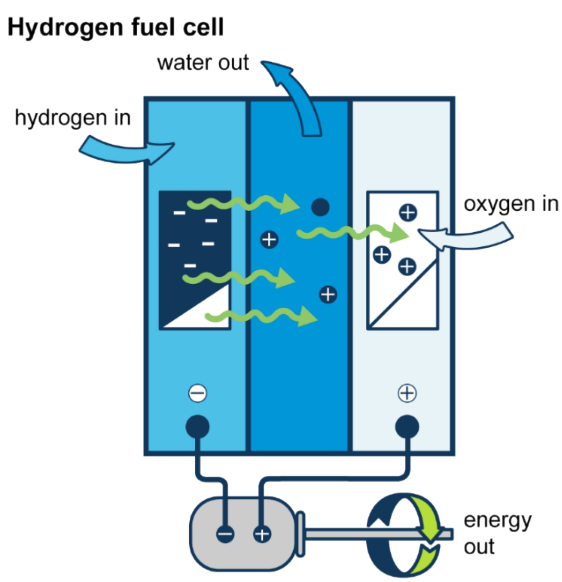
4.7.2 Modular Nuclear Reactor

Modular nuclear reactors are a developing nascent technology. Modular nuclear reactors are considered a potential non-carbon resource that would not be a viable near-term resource but could have a place in future EIRPs as the technology matures.

4.7.3 Fuel Cells

Fuel cells generate electricity through a chemical reaction. Hydrogen is assumed to be the primary fuel source and could qualify as a renewable resource if the hydrogen is derived from an eligible renewable energy source. Multiple types of fuel cells are available for different applications, but currently the technology is relatively new and must mature to become competitive as a generating resource. A representation of hydrogen fuel cell technology is highlighted in Figure 4-13.

Figure 4-13: Hydrogen Fuel Cell Diagram



Source: *https://www.eia.gov/energyexplained/hydrogen/use-of-hydrogen.php*

4.7.4 Biomass and Biogas

Biomass combustion technology converts waste to heat to produce steam. The steam is then expanded through a conventional turbine to produce electricity. Direct combustion is the most common method for converting biomass to useful energy. This involves burning biomass fuels directly, converting the energy from the biomass into heat to produce steam and electricity. Biogas differs from biomass as it involves heating organic materials with injections of controlled amount of oxygen or steam to produce carbon monoxide and hydrogen rich gases called syngas. The syngas can then be used to for generating electricity in gas turbines. Biomass sources for energy include wood and wood processing waste, agricultural crops and waste materials, biogenic materials in municipal solid waste, and animal manure and human sewage.

4.7.5 Landfill Gas

Landfill gas systems supply fuel from landfills to an associated power plant. Landfill gas is a mixture of methane and carbon dioxide and landfill gas systems. The landfill gas is typically allowed to escape into the atmosphere and so by using the gas for power generation, one can effectively use the gas instead of allowing it to escape in the air. The landfill gas can be captured from the landfill, processed through facilities, and utilized in reciprocating engines to produce electricity.

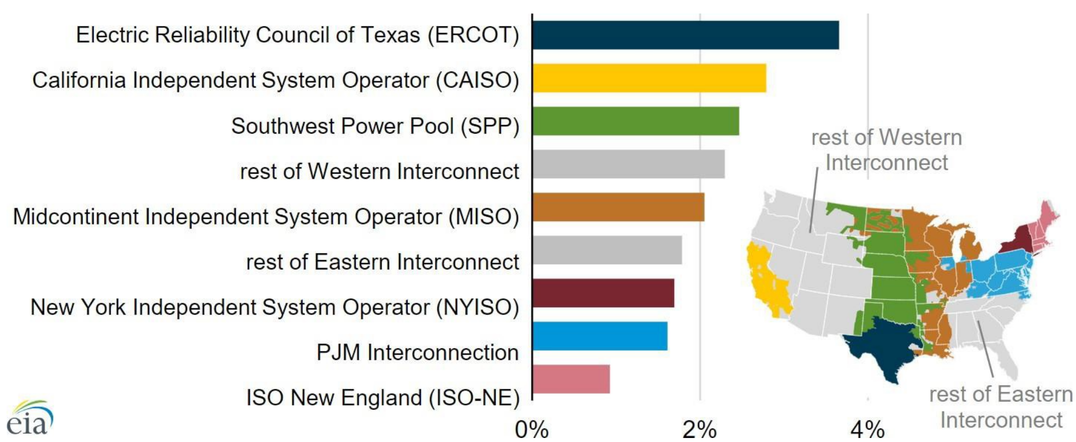
5.0 DEMAND SIDE MANAGEMENT

The growing integration of renewable resources and retirements of conventional energy resources have caused a drop in flexibility on the supply side of bulk power systems. Conversely, flexibility has increased on the demand side through newly adapted behind the meter resources such as electric vehicles and roof-top solar with small scale battery storage, and Wi-Fi-enabled controllers such as Nest. The flexibility gained through demand side management programs can, in turn, enhance the flexibility of the system.

DSM programs are targeted to be beneficial for both customers and utilities. Customers are motivated by monetary incentives such as tax breaks, a reduction on their electricity bills, or an enhancement in their comfort. Electric utilities, such as Springs Utilities, also benefit from these programs by reducing peak demand as shown in Figure 5-1. Additionally, DSM programs may potentially allow for energy arbitrage in competitive electricity markets.

Lowering electricity peak demand can reduce the overall cost of energy by preventing or deferring the need to add more capacity and infrastructure. Therefore, DSM programs have the potential to reduce the overall cost of energy.

Figure 5-1: 2017 Peak Demand Savings from Demand Response by Balancing Authority



Source: https://www.eia.gov/todayinenergy/detail.php?id=38872

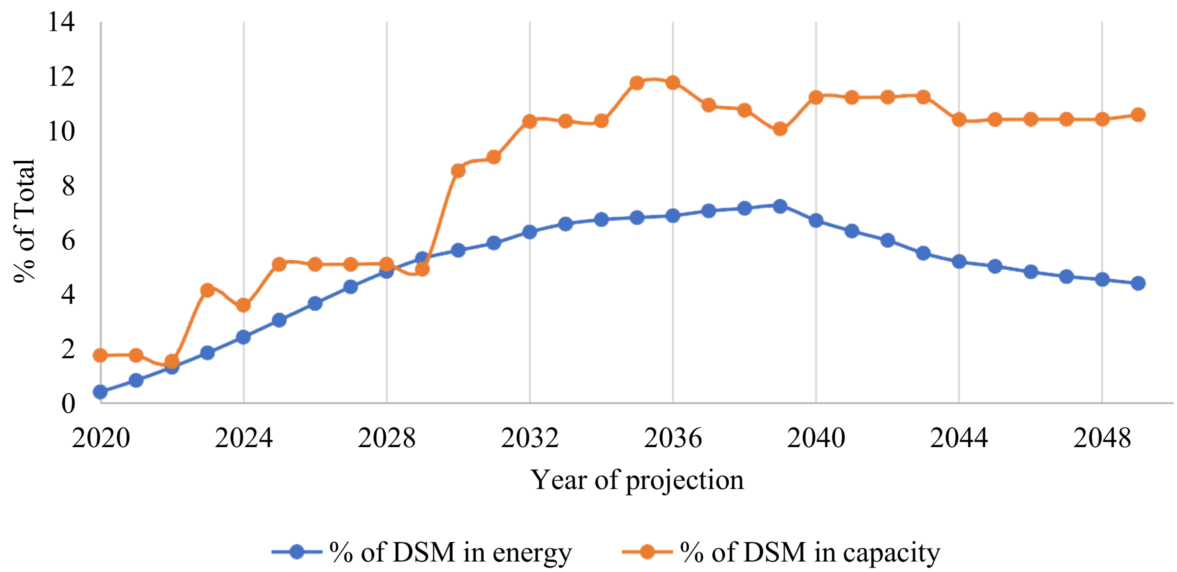
The following sections provide an overall view of activities taken by Springs Utilities to evaluate DSM programs within the EIRP process.

5.1 STUDY APPROACH

Springs Utilities commissioned The Cadmus Group (Cadmus), a 3rd party consultant, to study the potential amount of DSM related energy reduction that can be attained throughout Springs Utilities' electric service territory (DSM study). An illustration of the total DSM share in Springs Utilities' generation portfolio is shown in Figure 5-2. The following study builds on previous DSM potential assessments in Springs Utilities' service territory, most recently the 2016 Demand Side Management Potential Study (2016 DSM Study). Study updates include the addition of natural gas energy efficiency and natural gas demand response ("DR"), customer-sited renewables, and electric vehicles. DSM studies principally seek to develop reliable estimates of the magnitude, cost, and timing of resources available over the planning horizon. They do not provide guidance regarding how identified resources might be acquired. For example, electrical equipment or building shell DSM measures might be attained through utility incentives, legislative action (instituting more stringent efficiency codes and standards), or other socio-economic measures.

The methods used to evaluate the technical and achievable technical potential drew upon best utility industry practices and remained consistent with the methodology used in the previous study.

Figure 5-2: DSM Share of Resource Requirements



5.1.1 Data Collection

The data needed for the DSM programs was acquired through different sources summarized in Table 5-1.

Table 5-1: Data Sources for DSM Study

Data Item	Residential Source	Non-Residential (C&I) Source
Baseline Sales and Customers	Springs Utilities customer count and usage history	Springs Utilities customer count and usage history
Forecasted Sales and Customers	Springs Utilities	Springs Utilities
Percentage of Sales by Building Type	County Assessor's data	Springs Utilities' Non-residential customer database
End-Use Energy Consumption	Springs' Utilities Load Forecasts, 2015 Primary Research, EIA Residential Energy Consumption Survey (RECS), ENERGY STAR, XCEL (CO) TRM	Springs' Utilities Load Forecasts, 2015 Primary Research, EIA Commercial Building Energy Consumption Survey (CBECS), EIA Manufacturing Energy Consumption Survey (MECS), ENERGY STAR, XCEL (CO) TRM
Saturations & Z Fuel Shares	2015 Primary Data Collection Phone Surveys, EIA RECS	2015 Primary Data Collection Phone Survey and Site Visit, EIA's CBECS and MECS
Efficiency Shares	2015 Primary Data Collection Phone Survey and Site Visit EIA's RECS, ENERGY STAR unit shipment reports	2015 Primary Data Collection Phone Survey and Site Visit, EIA's CBECS and MECS

5.2 DEMAND RESPONSE

DR programs strive to reduce peak demand during system emergencies or periods of extreme market prices and promote improved system reliability. The DSM study focused on DR options that included residential and nonresidential direct load control ("DLC") and nonresidential load curtailment for Springs Utilities' electric customers. These DR strategies included price and incentive-based options for all major customer segments and end uses within Springs Utilities' electric service territory. The DSM study applied a hybrid, top-down, and bottom-up approach to estimate DR potentials, beginning by using Springs Utilities' system loads disaggregated into sectors, segments, and applicable end uses. For each program, the potential impacts at the end-use level were investigated and then aggregated to obtain estimates of technical potential. The DSM study evaluated program technical potentials and applied market factors (such as likely program and event participation) to develop estimates for market adoption. Various sources of DR in Springs Utilities' electric service territory are as follows:

5.2.1 Option 1: Residential Smart Thermostat – Direct Installation

The Residential DLC Smart Thermostat Direct Install program allows for Springs Utilities to provide and install a smart thermostat at the customer's premise for those customers who sign on to this program. The potential study assumes equipment or installation costs for smart thermostats and provides an annual incentive of $25.

5.2.2 Option 2: Residential Smart Thermostat – Bring-your-own-thermostat

The Residential Smart Thermostat Bring-your-own-thermostat ("BYOT") is identical to the Residential Smart Thermostat Direct Install program, except that it requires that participants have already installed a smart thermostat. Thus, the potential study assumes no equipment or installation costs for smart thermostats, but pays participants a $50, one-time incentive in addition to the $25 annual incentive.

5.2.3 Option 3: Residential – EV Charging Station Direct Load Control

During peak events, Springs Utilities may communicate with connected, Level 2, EV chargers to reduce EV charging demand. Connected Level 2 chargers predominantly communicate via Wi-Fi or cellular service and can reduce power consumption by up to 100 percent in response to a DR event. As with other DLC products, the potential study assumes that events last up to four hours, for about 10 events during June, July, and August.

5.2.4 Option 4: Residential Critical Peak Pricing Opt-in

Under Residential Critical Peak Pricing ("CPP") Opt-in, customers voluntarily opt in to receive a discount on their normal retail rates during noncritical peak periods in exchange for paying predetermined, premium prices during critical peak events. The basic rate structure is a time of use ("TOU") tariff, with the rate using fixed pricing during different time periods (typically on/off peak, and mid-peak prices by season). This study assumes that Springs Utilities may call critical peak events lasting four hours for up to 10 events in June, July, and August. During these events, the normal peak price under a TOU rate structure is increased to a much higher price to incentivize participants to shift energy use out of the event period.

5.2.5 Option 5: Commercial Smart Thermostat – Bring-your-own-thermostat

Commercial customers receive incentives to allow Springs Utilities to control their central cooling equipment during summer peak events. This study assumes a four-hour event duration, with up to 10 events in the summer. Participants receive an annual incentive of $50 in addition to a one-time incentive of $75 upon signing up.

5.2.6 Option 6: Commercial Load Shedding (Peak Savings)

A commercial load curtailment program would establish contractual arrangements between Springs Utilities, a third-party aggregator that implements the program, and Springs Utilities' commercial customers that agree to curtail their operations (in whole or part) for a predetermined period when requested by the utility. This product represents a firm peak demand curtailment resource as it assumes customers would be penalized per breaching the curtailment agreement. The study hypothetically assumes that participating customers would curtail load when requested by Springs Utilities. Participating customers would receive payments to remain ready for curtailment, even though actual curtailment requests may not occur. The study assumed customers would appropriately respond to curtailment signals 9 out of 10 times. This assumption was used to determine the expected level of peak demand reduction possible through this category of demand response.

5.2.7 Option 7: Commercial and Industrial Critical Peak Pricing Opt-in

The Commercial and Industrial ("C&I") CPP program is similar to its residential counterpart. C&I customers would voluntarily participate in the program and receive a discount on their normal rates during noncritical peak periods in exchange for paying predetermined, premium prices during critical peak events. The basic rate structure is a TOU tariff, with the rate using fixed pricing during different time periods (typically on/off peak, and mid-peak prices by season). This study hypothetically assumes that Springs Utilities could initiate critical peak events lasting four hours up to 10 times in June, July, and August. During these events, the C&I electric rates for program participants are increased to a much higher price to incentivize participants to shift energy use out of the event period. CPP programs intended for C&I customers typically have lower participation rates than the residential ones and higher marketing costs.

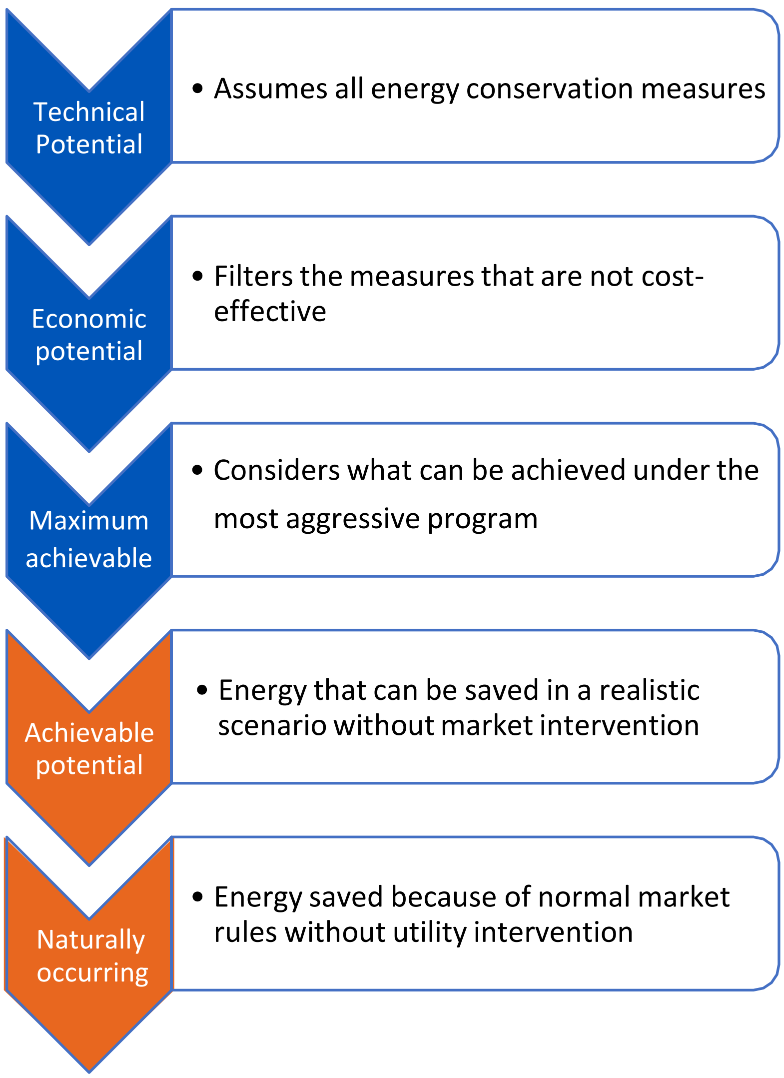
5.3 ENERGY EFFICIENCY

The EE analysis consisted of assessing over 300 unique electric energy efficiency measures. Data was gathered from Springs Utilities' existing program data, Xcel Energy's (CO) 2019-2020 Demand-Side Management Plan, and other databases to determine savings, costs, and applicability for each measure. The study prepared a peak demand and energy consumption estimate for the period 2020-2038 for each EE program considered. Each EE program was assigned a life span of approximately ten years after which no further savings were possible from that particular program. This assumption was used as the forecast was extended from 2038 through 2050. Since EE savings potential declined over time as the effects of the various programs declined, the total annual savings from EE also declined beyond 2038.

The approach used for estimating the energy efficiency potentials drew upon standard industry practices and proved consistent with EE potentials in Springs Utilities' 2016 Demand-Side Management Potential Assessment. Steps used when evaluating EE programs are illustrated in Figure 5-3. The general approach, shown in Figure 5-4, illustrates the use of baseline and energy efficiency data to develop estimates of EE potential for use in Springs Utilities' EIRP process.

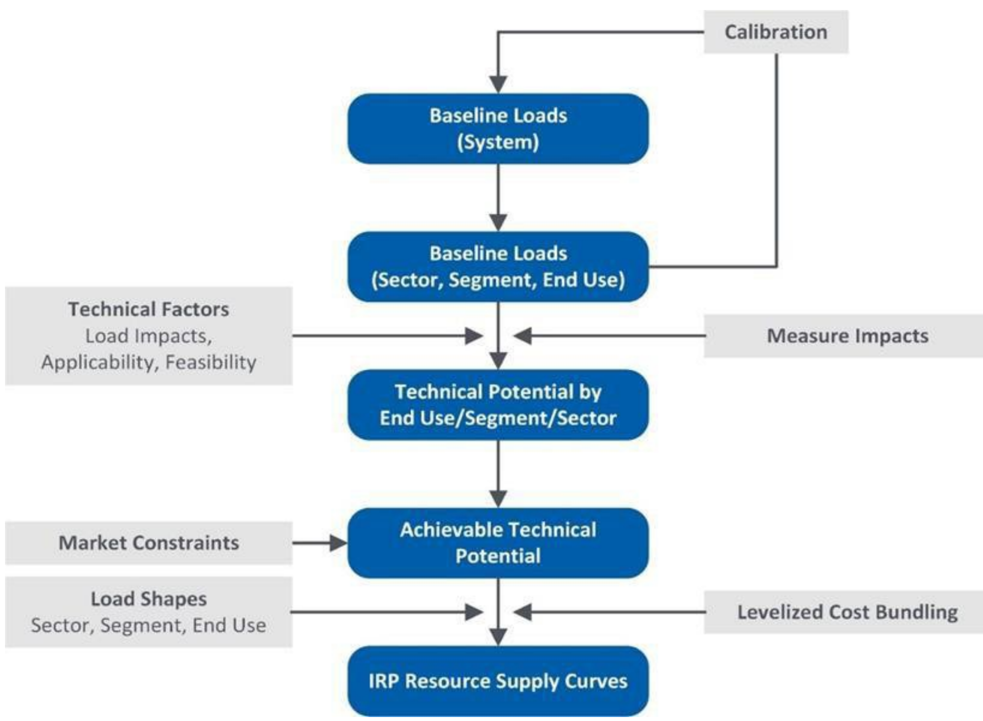
- **Naturally occurring potential** refers to energy saved because of normal market forces, in the absence of any utility or governmental intervention.
- **Technical potential** assumes the complete penetration of all energy-conservation measures that are considered technically feasible from an engineering perspective.
- **Economic potential** refers to the technical potential of those measures that are cost-effective, when compared to supply-side alternatives. The economic potential is very large because it is summing up the potential in existing equipment, without accounting for the period during which the potential would be realized.
- **Maximum achievable potential** describes the economic potential that could be achieved over a given period under the most aggressive program scenario.
- **Achievable potential** refers to energy saved because of specific program funding levels and incentives. These savings are above and beyond those that would occur naturally in the absence of any market intervention.

Figure 5-3: Evaluation of Energy Efficiency Programs



The study considered three types of EE potential illustrated above: naturally occurring, technical, and achievable potential EE programs. The assessment accounted for gradual efficiency increases due to the replacement of older equipment in existing buildings and subsequent new equipment meeting minimum standards at that time. For some end uses, the technical potential associated with certain energy-efficient measures was developed assuming a natural adoption rate. For example, savings associated with ENERGY STAR appliances accounted for current trends in customer adoption. It also accounts for the energy consumption characteristics of new construction done with current building codes. The assessment accounted for improvements in pending equipment efficiency standards that will take effect during the planning horizon. However, the evaluation did not forecast changes to standards that have not passed; rather, it treated these at a "frozen" efficiency level. These impacts resulted in changed baseline sales, from which technical and achievable technical potential were estimated. Figure 5-4 illustrates the methodology used for the EE study.

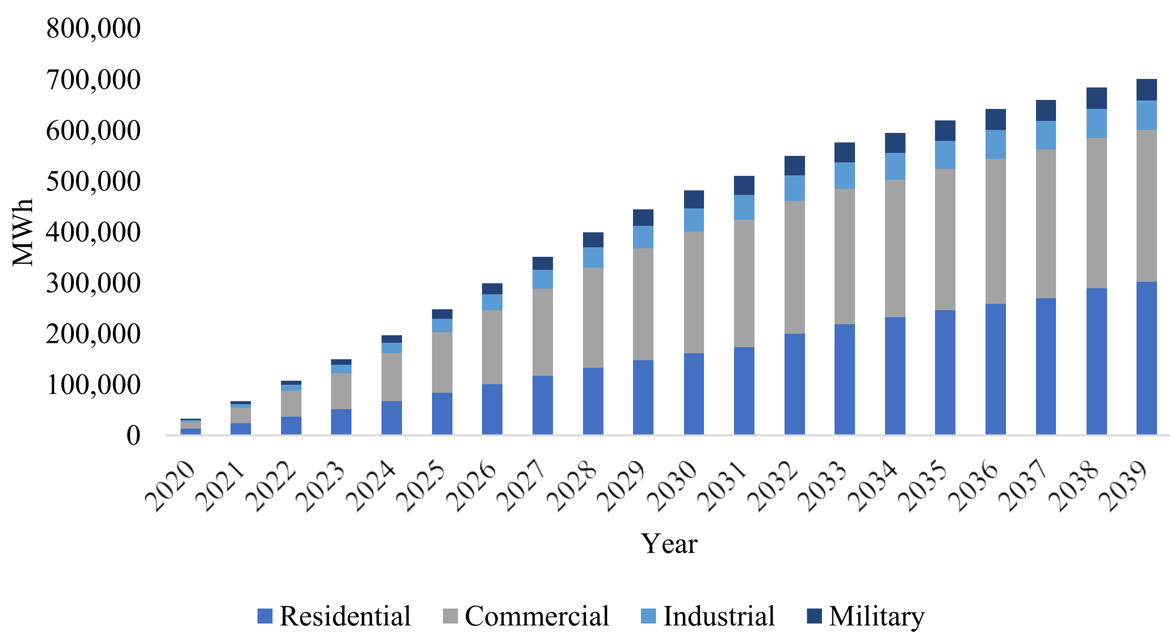
Figure 5-4: Energy Efficiency Modeling Methodology



Technical Potential can be further broken down into discretionary (retrofits) and lost opportunities (new construction and replacement of equipment on burnout). The study's technical potential estimations for EE resources drew upon best-practice research methods and typical utility industry analytic techniques. Such techniques remained consistent with other planning entities' conceptual approaches and methodologies as well as with methods used in Springs Utilities' 2016 DSM Potential Study.

Achievable Technical Potential represents the portion of Technical Potential that might be reasonably achievable over the 20-year planning period (the possibility that market barriers could impede customer adoption was considered). Cost-effectiveness was not considered at this point, and the achievable technical potential levels were identified to principally serve as planning guidelines and information sources for the EIRP process. Figure 5-5 summarizes the energy saved by EE programs for the next 20 years.

Figure 5-5: Projected Energy Efficiency Potential by Sector



5.4 DEMAND-RESPONSE PROGRAM EVALUATION

The study also developed a forecast of potential peak demand savings through DR programs. The DR savings were calculated for the period 2020-2029. Beyond 2029 and up to the end of the EIRP study period the annual savings from DR programs were kept constant at 2029 levels.

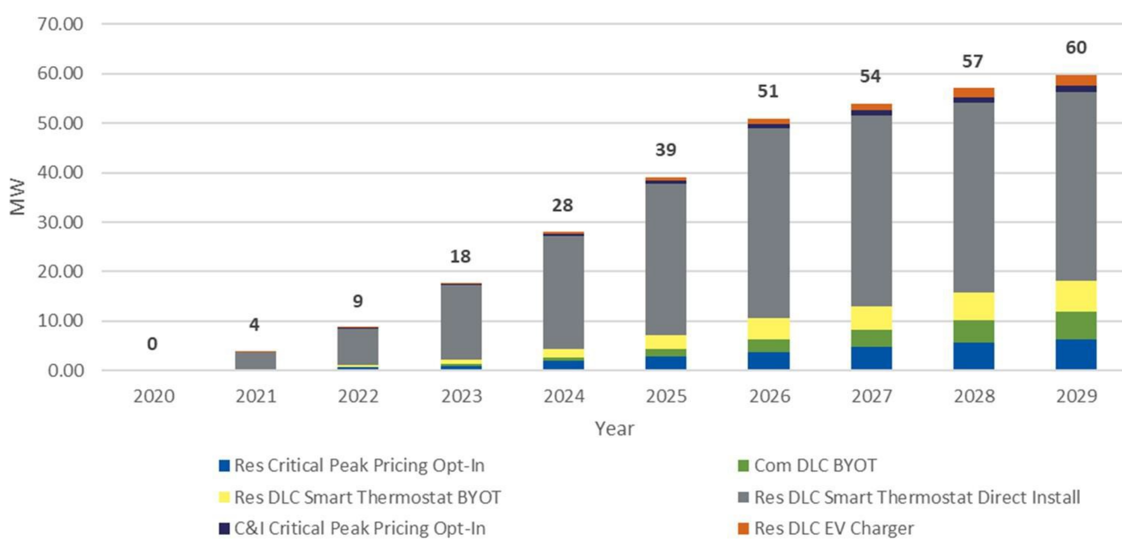
Table 5-2 presents the summer peak coincident achievable potential for electric DR programs, with the total 20-year summer peak coincident potential at approximately 92 MW, equivalent to a 12.7 percent reduction in Springs Utilities' summer peak. When evaluating potential supply and demand-side options, a common benchmark used is the Cost of New Entry ("CONE"). CONE is the cost associated with adding one megawatt of dispatchable natural gas generation, typically in the form of a simple cycle gas turbine. Additionally, CONE can represent the avoided cost of adding new generation to meet capacity obligations. CONE for Springs Utilities area is currently at the $90 per Kilowatt-Year ("kW-yr."), which was based on information provided to Springs Utilities. Programs and generation options that have levelized costs below CONE are generally cost-competitive and programs above CONE are generally not. External factors not captured in the cost calculations, such as environmental considerations or emissions targets, may increase the competitiveness of programs and should be considered during program evaluation.

Table 5-2: Utility's Demand Response Options

Product	Potential Summer Demand Reduction (MW)	Percent of Summer Peak Demand	Levelized Cost ($/kW-yr.)
Res DLC Smart Thermostat Direct Install	23.8	3.3%	$69
Res DLC Smart Thermostat BYOT	18.8	2.6%	$57
Res DLC EV Charger	7.6	1.0%	$291
Res Critical Peak Pricing Opt-In	6.5	0.9%	$42
Com DLC BYOT	25.8	3.5%	$46
Com Curtailment (Peak Savings)	8.7	1.2%	$112
C&I Critical Peak Pricing Opt-In	1.3	0.2%	$131
Total	**92**	**12.7%**	

Figure 5-6 illustrates the growth of DR programs through 2029. Many of the DR programs are cost-competitive against building new generation. As carbon emission restrictions are implemented, DR programs offer a low-cost carbon-free resource that will help reduce CO_2 emissions in combination with wind, solar, and other renewable generation. DR programs are largely consumer-centric, and widespread adoption of DR programs may require extensive marketing and customer outreach to encourage participation in such programs.

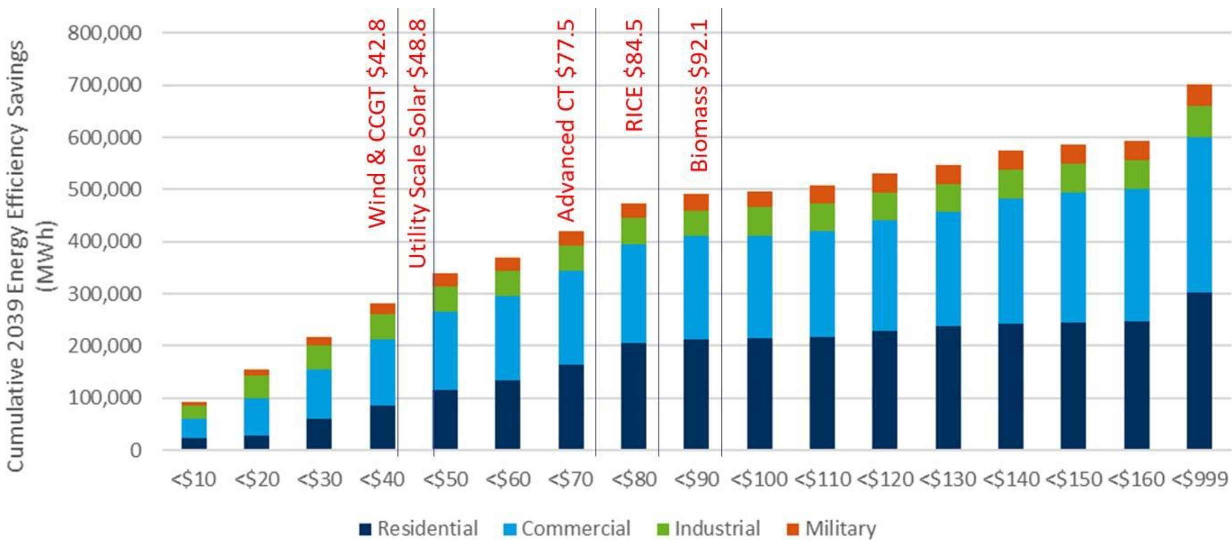
Figure 5-6: Demand Response Program Ramp-Up



5.5 ENERGY EFFICIENCY PROGRAM EVALUATION

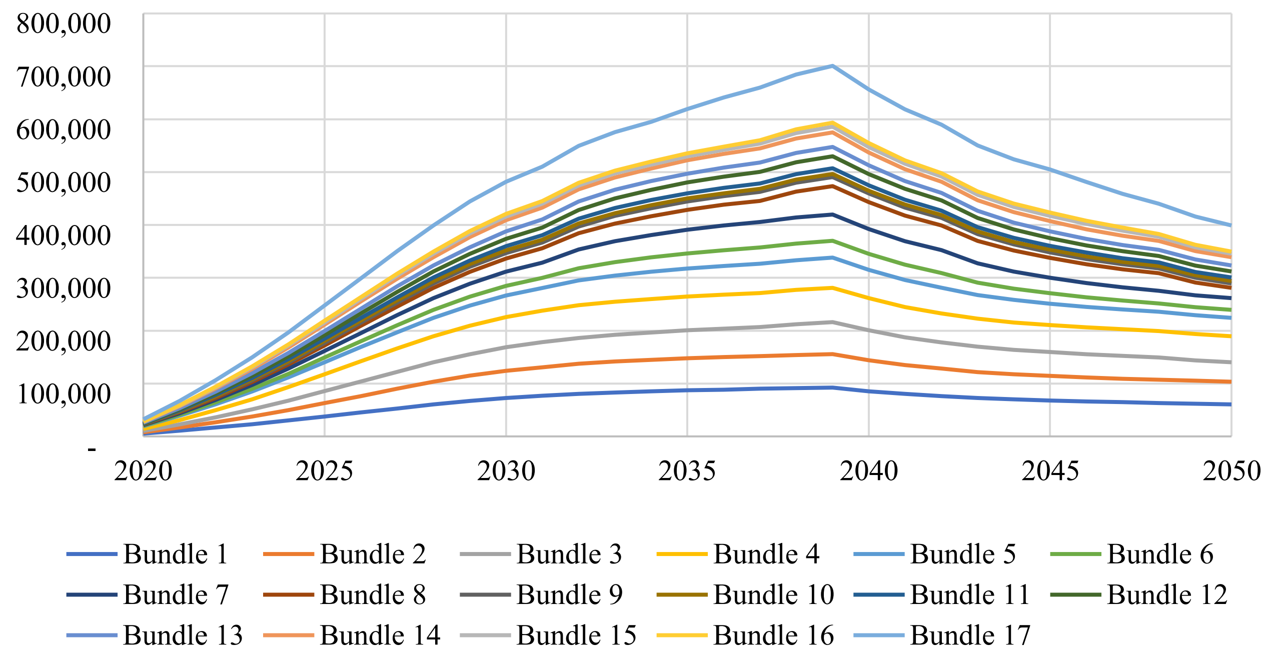
Several energy efficiency programs are cost-competitive from a levelized cost of energy ("LCOE") perspective. LCOE represents an average cost of energy over the lifetime of the asset representing operational, maintenance, and capital costs. Many cost-effective EE programs can be implemented at a lower cost than other generating resources. Figure 5-7 includes the cumulative technical EE potential in order of increasing LCOE. The LCOE of various dispatchable generation alternatives are included as well.

Figure 5-7: Cumulative Technical Potential Levelized Cost



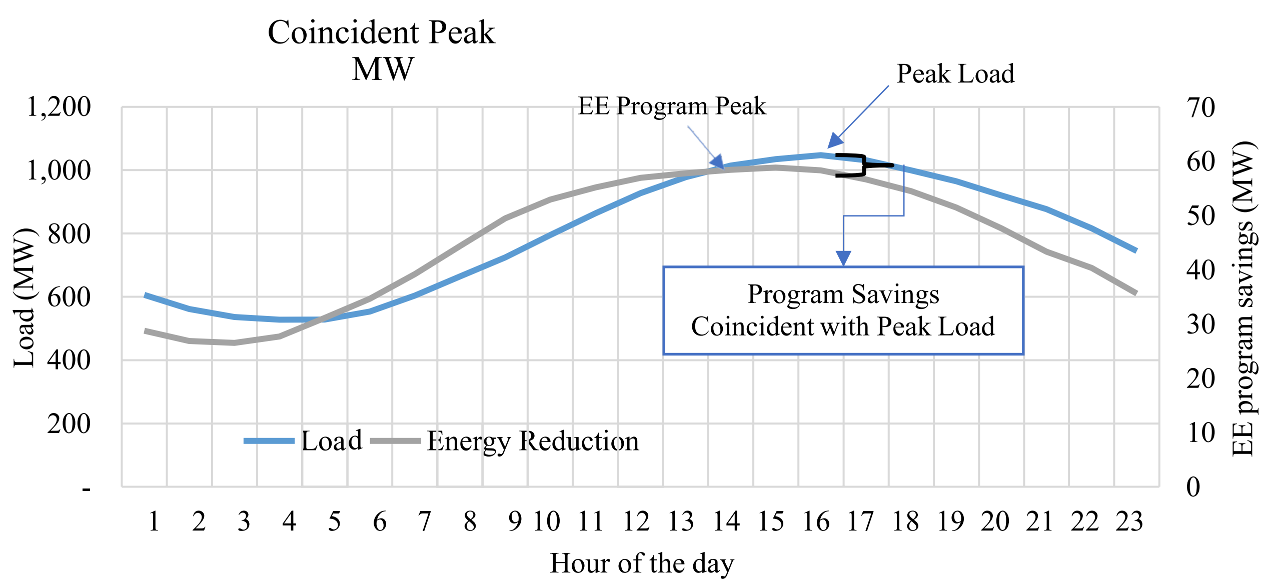
Seventeen individual EE bundles were modeled as resource options in the EIRP. Figure 5-8 illustrates the cumulative energy savings (MWh) for each bundle in the planning horizon.

Figure 5-8: Cumulative Energy Efficiency Savings (MWh) by Bundle



In addition to energy savings, these programs will provide peak load reductions which may, in turn, help defer the need to build new resources. Figure 5-9 shows the impact of EE programs on peak and energy demand for a typical day. As can be seen from the figure, the EE programs help to conserve energy requirements over a 24-hour period and help to reduce the peak demand which occurs at hour 17 of the day.

Figure 5-9: Energy Efficiency Program Savings vs the Peak Load



5.6 NET IMPACT OF DSM PROGRAMS

Table 5-3 shows the technical and achievable technical potential for each resource considered in this study. Total electric DSM potential, representing nearly 701 gigawatt-hours ("GWh") of achievable technical potential, could produce approximately 105 MW of summer peak demand savings. All electric potential estimates in this report are presented at the generator, meaning they include line losses, assumed to be an average of 4.03 percent across Springs Utilities' transmission and distribution system.

Table 5-3: Summary of Energy and Demand Savings Potential

Resource	Energy Savings (MWh)		Summer Coincident Peak Capacity (MW)	
	Technical Potential	Achievable Technical Potential	Technical Potential	Achievable Technical Potential
Energy Efficiency	1,109,594	700,922	169	105
Demand Response	NA	NA	NA	92
Electric Resources Total	1,109,594	700,922	169	197

6.0 ELECTRIC INTEGRATED RESOURCE PLAN

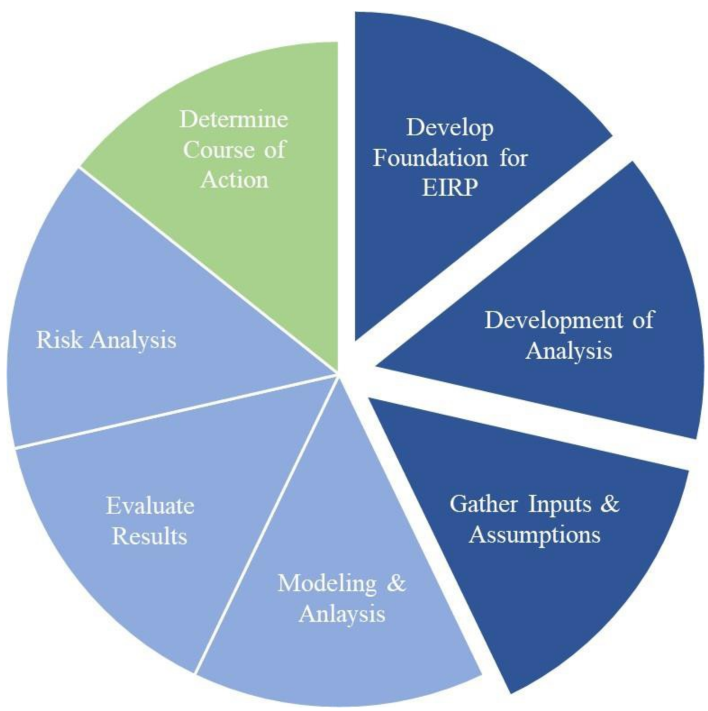
6.1 EIRP PROCESS

The EIRP process consisted of three distinct phases. At the end of each phase, Springs Utilities Board approval was essential to move on to the subsequent phase. The EIRP process can take up to 18 months, the phased approach helped break up the timeline and have milestone points to validate the process and assumptions at various stages. The phased approach narrowed the focus of Springs Utilities' Board discussion to relevant topics needing approval to move on to the next phase of the EIRP. The three phases include EIRP development, EIRP analysis, and the determination or a course of action.

6.2 PHASE ONE - EIRP DEVELOPMENT

Phase One of the EIRP process focused on development of goals and comprised of three main activities. The development of goals that provide a foundation for the EIRP, establishing the various analyses and sensitivities to be performed during the EIRP, and the gathering of necessary inputs and assumptions for the analyses to be performed were the main activities in Phase One as highlighted in Figure 6-1.

Figure 6-1: EIRP Phase 1 Approach



6.2.1 EIRP Goals

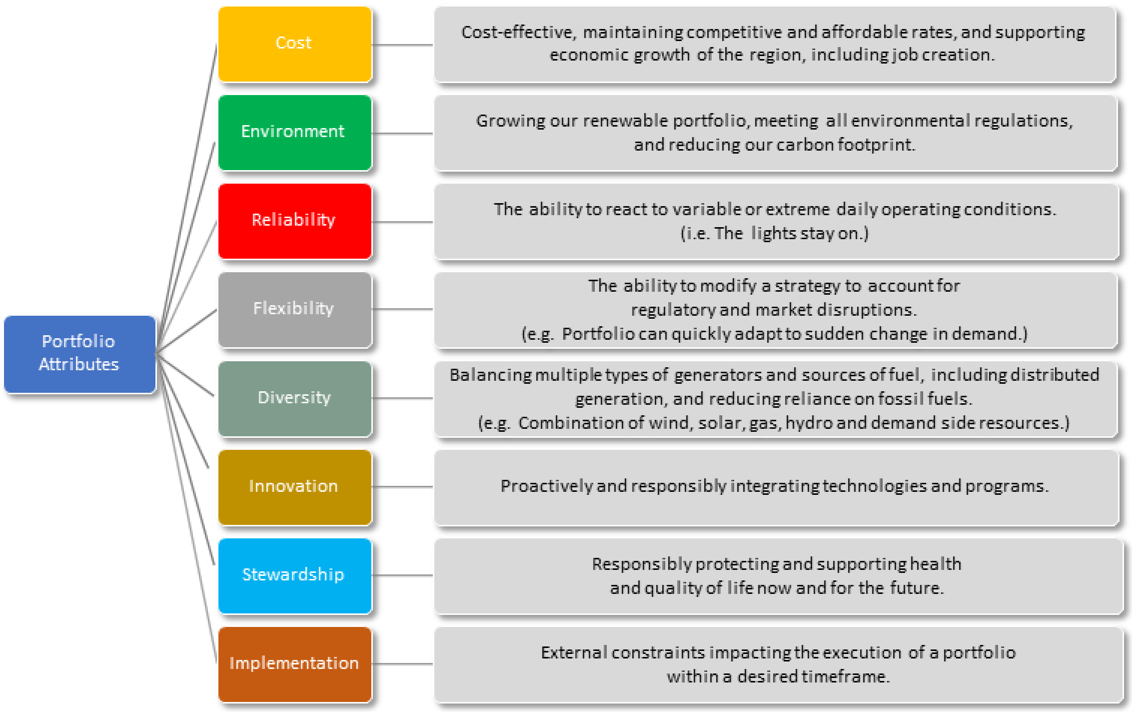
A foundational requirement for Phase One was to establish the main goals of the EIRP. The main goals of the EIRP are summarized below.

- **Resilient and Reliable**
    - Industry leading reliability and resiliency while avoiding potential stranded assets.
    - Support economic growth of the region.
- **Cost**-Effective Energy
    - Maintain competitive and affordable rates.
    - Expand energy efficiency and demand response.
- **Environmental** Sustainability
    - Grow renewable portfolio.
    - Establish timelines for decommissioning of assets.
- **Reduce** Our Carbon Footprint
    - Meet all environmental regulations with specific metrics that include reducing carbon footprint.
    - Reduce reliance on fossil fuels.
- **Uses** Proven State-of-the-Art Technologies
    - Proactively and responsibly integrate new technologies.
- **Public** Input Goals
    - Engage with customers in the development of the Electric IRP and planning for future energy resources for Colorado Springs.
    - Provide the customer input to the Springs Utilities Policy Advisory Committee and the Springs Utilities Board regularly unit the IRPs are approved (to occur no later than August 2020)

6.2.2.1 Portfolio Evaluation Criteria

To assist with evaluating potential EIRP portfolios' alignment with EIRP goals, evaluation attributes were developed to differentiate portfolios. Springs Utilities initially developed eight portfolio attributes that represented factors important to Springs Utilities' customers. Springs Utilities solicited customer feedback on the original eight attributes to gauge the relative importance of each attribute. The original eight attributes are presented in Figure 6-2.

Figure 6-2: EIRP Portfolio Original Attributes

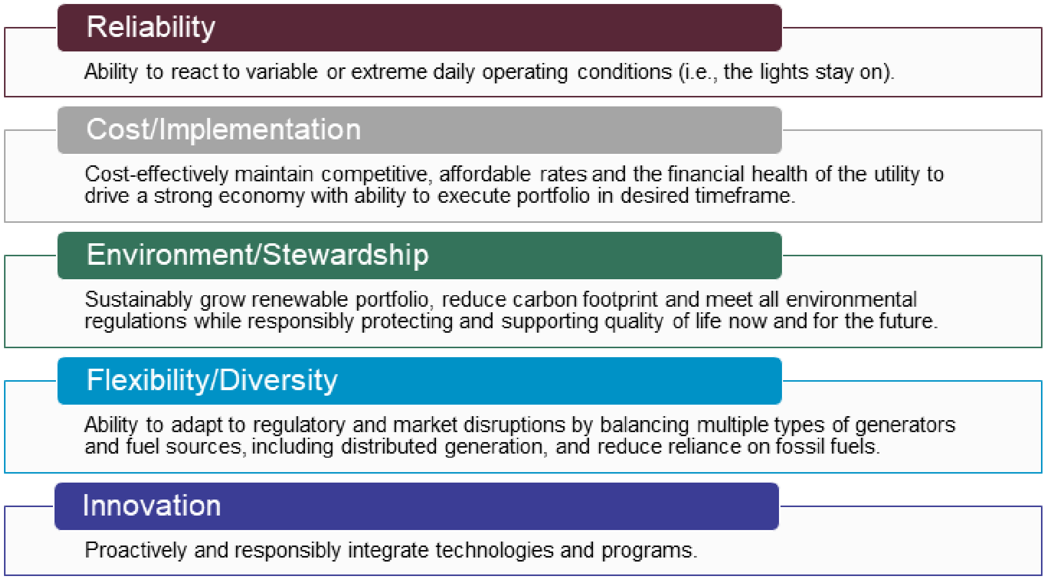


Critical feedback from customer surveys provided a recommendation to consolidate the eight portfolio attributes down to five. The main factors leading to the consolidation of attributes include:

- Combining related concepts
- Making measurements meaningful
- Aligning with Energy Vision pillars and goals
- Simplifying the scoring process
- Consideration of stakeholder input

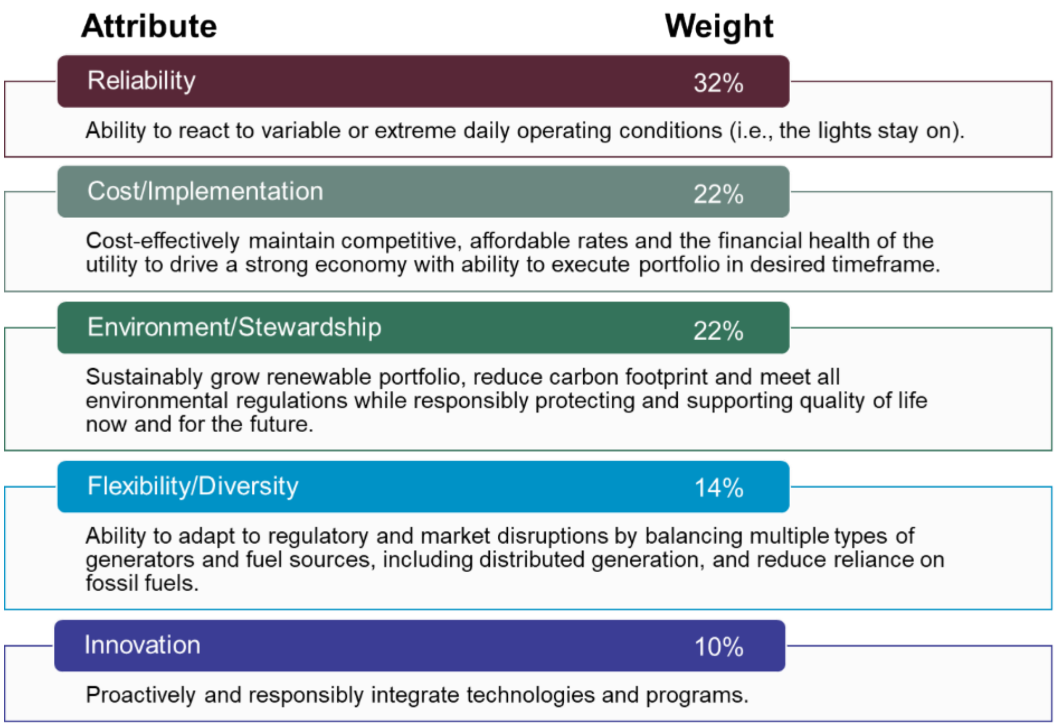
Cost and Implementation were consolidated into the Cost/Implementation attribute, Environment and Stewardship were combined into the Environment/Stewardship attribute, and Flexibility and Diversity were combined into the Flexibility/Diversity attribute. This helped to consolidate the eight attributes into five attributes. The final five attributes and resultant definitions are summarized in Figure 6-3.

Figure 6-3: Final EIRP Portfolio Attributes



After determining critical attributes for portfolio evaluation, weighting was applied to each attribute to quantify its level of importance. The weighting process was completed through public engagement and stakeholder feedback. Based on the stakeholder feedback, Reliability was determined to be the most important attribute, followed by a tie between Cost/Implementation and Environmental/Stewardship. The weighting percent assigned to each of the five attributes is displayed in Figure 6-4.

Figure 6-4: EIRP Attribute Weighting



Each attribute comprised of multiple criteria that contributed to the attribute's overall weighting. Since each criterion's criticality differs for each attribute, a weighting value was applied to each criterion with the total equal to 100 percent.

- **Reliability –** The reliability attribute focused on ensuring a portfolio would have enough resources available to provide ancillary services, limit an over-reliance on energy purchases, and ensure adequate generation availability. The criteria determined for the reliability attribute are highlighted in Table 6-1.

Table 6-1: Reliability Criteria Weighting

Criteria 1 (25%)	Criteria 2 (25%)	Criteria 3 (25%)	Criteria 4 (25%)
Percent of MW capacity with quick ramp capability	Percent of MW capacity with quick start capability	Percent of energy served from spot market purchases	Percent of MW capacity with greater than 50 percent availability

- **Cost/Implementation –** The cost/implementation attribute was measured by lowest Net Present Value of Revenue Requirements ("NPVRR"). This metric reflects an "all-in" cost of meeting

Springs Utilities' customers energy and load requirements over the EIRP study period. A present value incorporates the idea that a dollar spent in 2020 is worth more than a dollar spent in 2050 due to the time value of money. This attribute quantified the amount of capacity to be decommissioned within the next ten years. The attribute sought to capture the complexity of transitioning to a new portfolio over a compressed timeframe. The different criteria for this attribute are highlighted in Table 6-2.

Table 6-2: Cost and Implementation Criteria Weighting

Criteria 1 (79%)	Criteria 2 (21%)
NPVRR	Amount of Capacity retired in 10-year timeframe

- **Environmental/Stewardship –** Consistent with Colorado legislation, the highest weighted criteria for the Environmental/Stewardship attribute measured greenhouse gas reduction from 2005 baselines. Additional measurable criteria considered water and land usage for each portfolio. The different criteria for this attribute are highlighted in Table 6-3.

Table 6-3: Environmental and Stewardship Criteria Weighting

Criteria 1 (68%)	Criteria 2 (16%)	Criteria 3 (16%)
Percent reduction by 2030	Percent reduced water use from Reference Case	Total acres per MW capacity

- **Flexibility/Diversity –**This attribute measures the average capacity per unit to place value on distributed generation and allow for a ramp up in generation as small incremental needs are realized. The Flexibility/Diversity attribute measures the generation mix of a portfolio so as not to overly rely on a single type of generation. The different criteria for this attribute are highlighted in the Table 6-4.

Table 6-4: Flexibility and Diversity Criteria Weighting

Criteria 1 (50%)	Criteria 2 (50%)
Average capacity per unit	Percent of generation from a single energy source

- **Innovation –** Springs Utilities identified demand response as an area where it can directly influence and implement innovation. The criteria for reflecting demand response were measured by the percent of energy and peak demand reduced through demand response programs. For new resources, an innovation score was developed based on the maturity of a technology. For example, battery energy storage is a relatively new technology in the electric utility industry. As is has not yet been deployed widely on a commercial basis a battery resource would have a higher innovation score than a combined cycle (a mature technology). The different criteria for this attribute are highlighted in Table 6-5.

Table 6-5: Innovation Criteria Weighting

Criteria 1 (50%)	Criteria 2 (50%)
Percentage of demand response capacity	Innovation score

6.2.2 EIRP Development of Analysis

The next step in Phase One was the development of the different analyses that needed to be performed. This consisted of developing forecasting and financial assumptions, determining a reasonable reference case scenario, and determining relevant sensitivities for the EIRP.

6.2.2.1 EIRP Forecasting Assumptions

When applicable, Springs Utilities leaned on industry expertise for establishing commodity and pricing trend forecasts. Energy Information Administration ("EIA"), National Renewable Energy Laboratory ("NREL"), and ABB were significant contributors to the critical assumptions used in the EIRP. The forecasts used in the analysis of the EIRP include electric load forecasts, demand side management potential, planning reserve margin, gas and coal price forecast, and the composition of potential electric and gas resources. Many of the detailed forecasting assumptions have been discussed in detail in previous sections of this EIRP report.

The different assumptions for various parameters are as follows:

- **Electric Load Forecasts**
  - Historical trends: ABB Group
  - Population and Economic Growth: University of Colorado – Colorado Springs ("UCCS") economic forecast
  - Modeling: EIA, Bloomberg, Itron
- **Demand** Side Management Potential Study
  - Cadmus
  - Baseline system loads from sector, segment, and end use baseline loads
  - Customer solar photovoltaic and battery potential
- **Planning** Reserve Margin
  - General Electric
- Gas **and** Coal Price Forecast
  - ABB Group

- Forward fuel prices
- **Potential Electric and Gas Resources**
  - EIA
  - Technology price trends sourced from NREL
  - Gas: Staff Recommendations

6.2.2.2 EIRP Financial Assumptions

Multiple financial evaluation techniques were used throughout the EIRP to establish an expectation for results. Early into the process, installed cost and LCOE for new resources were used to provide an indication of the cost effectiveness of similar resources. As the EIRP progressed, more detailed cost comparisons were completed including detailed production costs and critical financial metrics. The key economic components that were considered during the EIRP included the following:

- **Installed Cost** – Capital expenditure supporting installation of a new resource.
- **Debt Service** – Cost relating to financing.
- **Fixed Cost** – Operating and maintenance ("O&M"), fuel reservation costs, contract costs.
- **Variable Cost** – Costs that change with the amount of generation, such as fuel consumption.
- **Production Cost** – Modeling simulation performed to optimize the dispatch of resources to determine the cost of an entire portfolio needed to serve load for every hour. Results are presented in terms of Net Present Value of Revenue Requirement.
- **Detailed Financial Analysis** – Ensures financial metrics are maintained and incorporates existing financial obligations into forecasted spend.

The various levels of financial analysis and the financial metrics used in each stage of financial analysis are summarized in Table 6-6.

Table 6-6: Summary of Financial Analysis

Financial Evaluation	Metric	Installed Cost	Debt Service	Fixed Cost	Variable Cost	Production Cost	Detailed Financial Analysis
Capex Comparison	$/KW	X					
Levelized Cost of Capacity ("LCOC")	$/KW-yr.	X	X	X			
Levelized Cost of Electricity	$/MWh	X	X	X	X		
Net Present Value of Revenue Requirement	Δ$M	X	X	X	X	X	
Detailed Financial Analysis	30-Year RR Cash on Hand Adjusted Debt Service	X	X	X	X	X	X

6.2.2.3 EIRP Reference Case Development

A reference case was developed to allow for the comparison of sensitivities against a common reference point. A common reference point is necessary during comparisons to quantify the impacts of specific changes within a sensitivity. The approved reference case represents a status quo scenario and includes many assumptions that were directed by the Springs Utilities Board in previous EIRPs. A summary of the reference case assumptions is presented in Table 6-7.

Table 6-7: EIRP Reference Case Assumptions

Reference Case Assumptions	Methodology (Study period through 2050)
Load Forecast	Utilize Planning and Finance Department's peak demand and sales forecast.
Planning Reserve Margin	Recommended 16.5 percent from reserve margin study.
Commodity Price Forecast (Gas, Coal, Energy Market)	First five years utilize short-term forward pricing. Fundamental forecast utilized from 2025 to 2050.
Energy Efficiency	1 percent annual energy efficiency savings/spend throughout study period. No dispatchable capacity provided beyond what is included in load forecast.
Renewables	264 MW solar and 25 MW battery storage by 2024. Rooftop solar provides no additional on-peak capacity. Integration costs from Xcel BA.
Drake and Birdsall[1]	Retired by 2035; no selective catalytic reduction ("SCR") control.
Nixon	No SCR control (will perform sensitivities around nitrogen oxides (NO_x) controls). Not retired during study period.
Front Range	No SCR control (will perform sensitivities around nitrogen oxides (NO_x) controls). Not retired during study period.
Hydro	Maintain/extend existing hydro contracts through WAPA.
Interruptible Customer Load	Assume 20 MW of interruptible load throughout the study period.
Transmission	Full transmission project will be completed by 2025 to allow for flow of replacement generation for Drake and Birdsall.
Import Capability	200 MW of energy imports are available in any hour. During planned maintenance outages, additional purchases can be made up to the available transfer capability ("ATC").
Financial Assumptions	Real discount rate 3.78percent, Inflation Rate 2.0 percent, Interest on Debt 4.51 percent.

6.2.2.4 EIRP Sensitivity Development

Once the reference case assumptions were established, Springs Utilities defined parameters that would be altered during the sensitivity analysis. While developing the sensitivities, focus was placed on changing as few variables as possible to determine the direction and magnitude of a specific change for a specific assumption. This was done as it becomes difficult to understand the impact of any one single variable if too many parameters are changed at the same time. When necessary, a high and low forecast was utilized to capture future uncertainties. For example, electric load growth rates have experienced large volatility over the past decade. Because of this, high and low load forecasts were utilized to capture a wide range of uncertainty in future load growth. The high and low forecasts act as bounds with the likely future being somewhere in between both forecasts. The key sensitivities are highlighted below.

- **High Load Forecast -** Springs Utilities relied on a third-party consultant's expertise to develop a long-term load forecast. A combination of regression and fundamental forecasting methodology was used to develop a base, high, and low load forecast. The high load forecast represents an electrification scenario and is largely driven by an increase in electric vehicle penetration. The forecast is discussed in detail in Section 2.0 - System Load Forecast of this EIRP report.

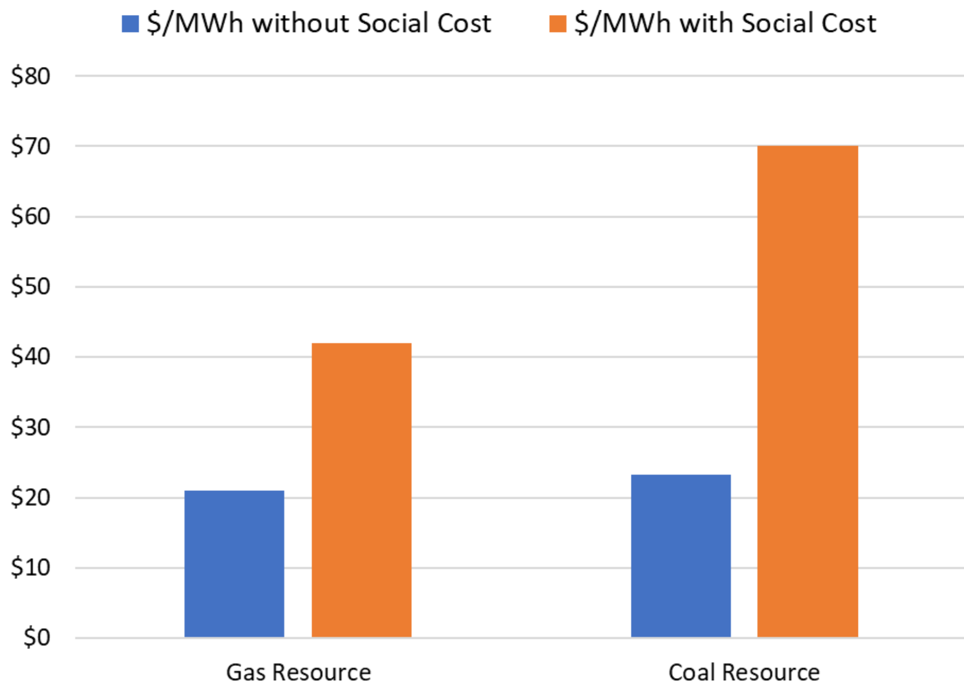
- **Low Load Forecast –** The low load forecast represents the lower bound of a 90 percent confidence interval. The forecast is discussed in detail in Section 2.0 - System Load Forecast of this EIRP report.

- **High and Low Commodity Price Forecast –** Natural Gas, coal, and market power price assumptions for the EIRP from 2020 to 2050 are derived from a combination of a five-year forecast from Springs Utilities' Fuels and Purchase Power Group and ABB's 25-year forecast. The commodity forecasts are discussed in detail in Section 4.2 - General Forecasts of this EIRP report.

- **Social Cost of Carbon –** Beginning in 2020, a social cost of carbon was applied to existing and future resources at a cost of $46/short ton. This assumption aligns with the State's recommendation through Senate Bill 19-236.

A $46/short ton cost of carbon will materially impact the dispatch cost of fossil-based generation. Since a coal unit's CO_2 emission rate is higher than that of a gas unit, the inclusion of a social cost of carbon will impact coal resources more than gas resources. An example of the impacts a social cost of carbon will have on fossil generation dispatch costs is presented in Figure 6-5.

Figure 6-5: Social Cost of Carbon Impact to Dispatch Cost

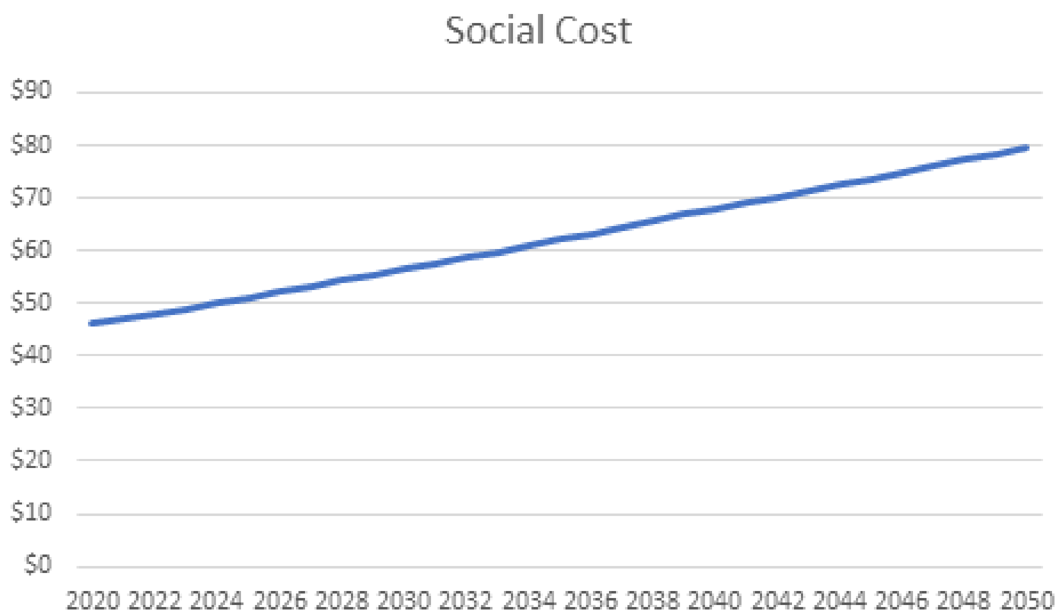


Applying the escalation rate over the study period resulted in a social cost of carbon equal to $80/short ton in 2050. The escalation rates assumed in the EIRP are presented in Table 6-8 and the projected social cost of carbon is highlighted in Figure 6-6.

Table 6-8: Annual Average Escalation Rates of Social Cost of CO2 from 2010 to 2050 (Assumed in EIRP)

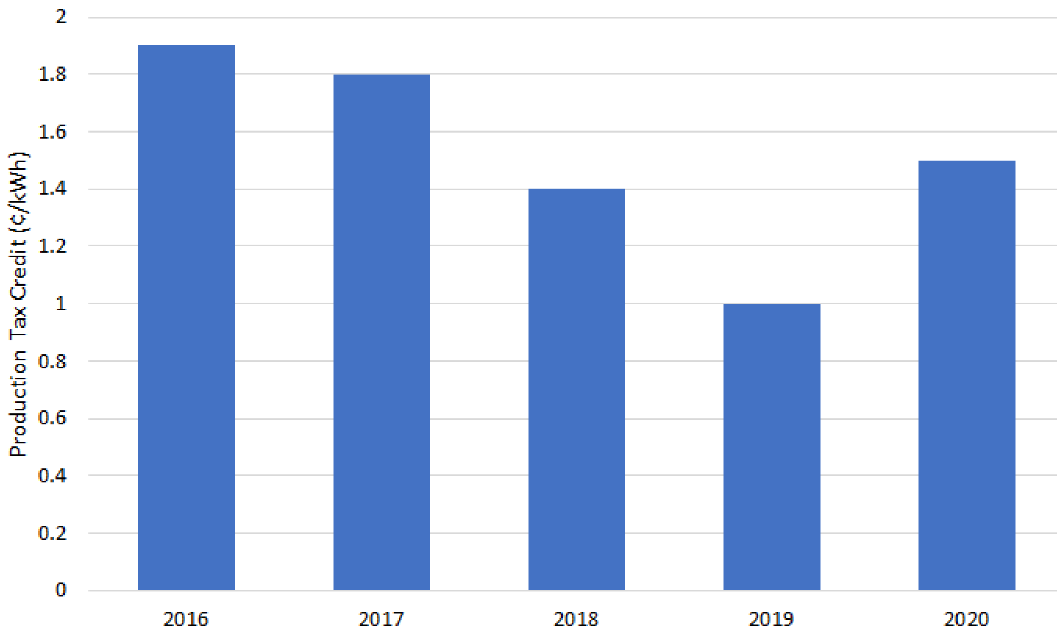
Annual Average Growth Rate (%)	5.0% Avg	3.0% Avg	2.5% Avg	3.0% 95th
2010-2020	1.2%	3.2%	2.4%	4.4%
2020-2030	3.4%	2.1%	1.7%	2.3%
2030-2040	3.0%	1.9%	1.5%	2.0%
2040-2050	2.6%	1.6%	1.3%	1.6%

Figure 6-6: Projected Social Cost of Carbon



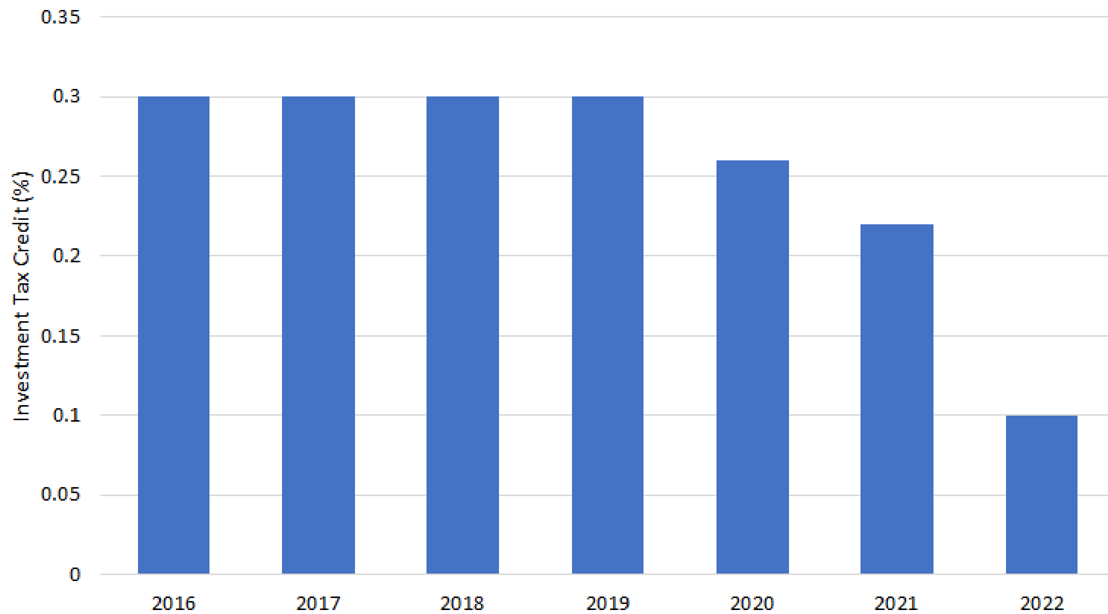
- **Extension of Investment Tax Credit ("ITC") and Production Tax Credit ("PTC") –** The PTC provides a tax credit for the first ten years of electricity generation for utility-scale wind. Based on the current expiration of the PTC, no tax credit benefit will be applied to wind projects that begin construction after 2020. The PTC sensitivity in the EIRP extended the credit for utility-scale wind at a rate of 1.5¢/kWh through 2050. The current expiration of the PTC is highlighted in Figure 6-7.

Figure 6-7: Expiration of the Production Tax Credit



The ITC applies a tax credit to the cost of a new solar system. The ITC starts at a 30 percent tax credit level through 2020 and a declining amount thereafter. After 2022, currently there is an indefinite 10 percent tax credit that can be applied to commercial solar systems. The ITC sensitivity extended the tax credit at 30 percent the expected cost of a solar project through 2050. The current expiration schedule of the ITC is presented in Figure 6-8.

Figure 6-8: Expiration of the Investment Tax Credit



- **Renewable and Carbon Reduction Sensitivities**
  - The following set of sensitivities were established for carbon reduction:
    - 100% by 2030
    - 100% by 2040
    - 100% by 2050
    - 100% by 2030 (market purchases available)
    - 100% by 2040 (market purchases available)
    - 100% by 2050 (market purchases available)
    - 30% and 50% by 2030
    - 40% and 60% by 2040
    - 60% and 80% by 2050
    - 100% Carbon Reduction by 2050
    - 90% Carbon Reduction by 2050
    - 50% by 2030, 90% by 2050
    - 50% by 2030, 100% by 2050
    - 50% by 2030, 80% by 2040, 90% by 2050
    - 80% by 2030, 90% by 2050
    - 80% by 2030, 100% by 2050

- **Additional Sensitivities**
  - In addition to the sensitives previously mentioned, additional sensitives performed during the ERIP study are summarized in Table 6-9 and Table 6-10.

Table 6-9: Additional EIRP Sensitivities

Sensitivity	Methodology
Increased DR Costs	Increase DR cost by 50percent
RICE/Aeroderivative Gas Only	RICE/Aeroderivative new gas resources only available in gas portfolios
200 MW Energy Purchase	Limit available energy purchases to 200 MW for every hour
Limit Energy Purchases to 0 MW	Limit available energy purchases to 0 MW for every hour
200 MW Energy Sales	Allow for energy sales for up to 200 MW for every hour
EE and DR in Reference Case Portfolio	Allow for DSM resources to be selected for new build in the reference case 80 percent by 2030 carbon reduction portfolio
Carbon Rate on Energy	Apply a carbon rate to energy purchases equal to the rate of a natural gas combined cycle
High Integration Cost	Increase integration cost for renewable generation by 100 percent
SCR on Nixon for Portfolio 1a/1b	SCR on Nixon in 2028 on reference case portfolios
Portfolio 11 with Renewable and DSM only	Remove Nuclear, carbon capture, fuel cell resources from portfolio 11. New resources to be renewable and DSM only
Birdsall Early Retire Portfolio 1a	Birdsall Retire in 2023, 2025, 2030 Retire reference case compliance portfolio.
20 Percent Reserve Margin	Minimum reserve margin set to 20 percent, up from 16.5 percent.
More DR Available	Allow for all DR programs available up to full potential. Current limit approximately 75 MW for each portfolio.
JDA Market Price	Utilize JDA market price forecast from independent third-party model.
JDA Market Price with 200 MW Sales	Utilize JDA market price forecast from independent third-party model. Allow for 200 MW of sales for every hour.
Low Battery, Wind, and Solar Costs	Reduce installed cost of battery, wind, solar by 25percent
Low-Cost Energy Efficiency	Reduce cost of program cost of energy efficiency by 25 percent.
90 Percent Reduction by 2030 (“90x30”)CO_2 Reduction	Portfolios to meet a 90 percent reduction in GHG emissions by 2030.
Drake 2021 Retirement	Run portfolios 12, 16 and 17 with a Drake 2021 retirement date and aeroderivative 2020/2021 commissioning.

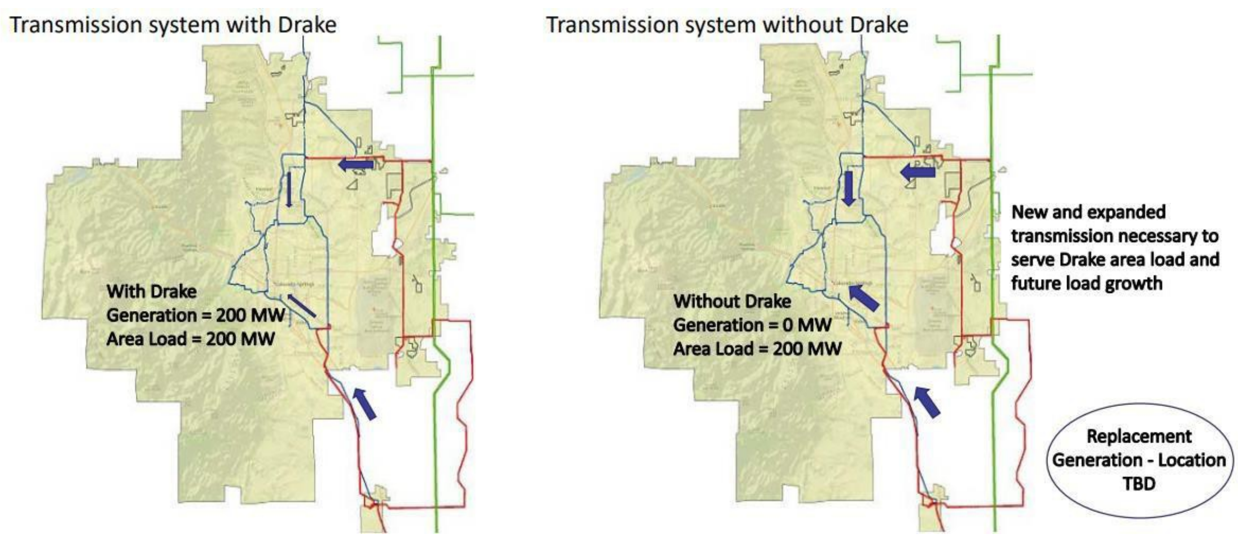
Table 6-10: Plant Decommissioning Sensitivities

Plant	Decommissioning Sensitivities	Selective Catalytic Reduction (“SCR”)
Drake/Birdsall	All Units in – 2023, 2025, 2028,2030 Birdsall Only 2025 Drake 6 Only 2025	N/A
Nixon 1	2026, 2030, 2035, 2040, 2050	2028
Front Range	2030, 2040, 2050	2028, 2038

6.2.2.5 EIRP Transmission Project Assumptions

Springs Utilities operates and maintains the electric transmission system for its customers. Several critical projects were identified that will support the transformation of Springs Utilities' generation portfolio. Springs Utilities performed a Short-Term Energy Plan ("STEP") to identify foundational electric transmission projects needed alongside the EIRP. The STEP study identified North, South, and Central transmission system improvement needs to facilitate the early decommissioning of resources in Springs Utilities' service territory. Projects identified in the STEP study typically have a two to five years' timeline and consist of a combination of upgrading existing transmission lines, building new transmission lines, substation improvements and expansion. Drake provides approximately 200 MW of generation near the Central system and the retirement of Drake Power Plant will create a need for increased transmission flow into the Central system. Figure 6-9 provides a visual representation of the impacts of the Drake Power Plant retirement.

Figure 6-9: Transmission Impact of Drake Retirement

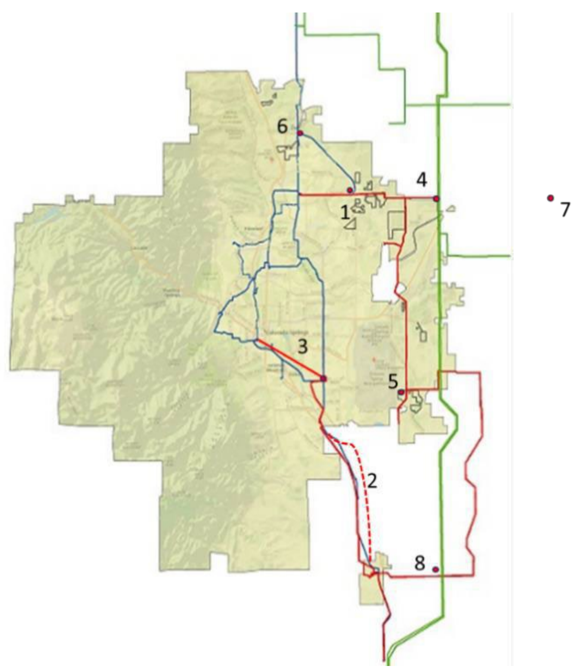


The critical projects identified will ensure reliability while facilitating the decommissioning of Drake Power Plant. Projects were also identified that are needed to facilitate the interconnection of renewable PPAs that are already approved in the reference case. The renewable PPAs include Grazing Yak Solar, Palmer Solar, and Pike Solar and Battery Energy Storage System ("BESS"). After the completion of the transmission projects at the end of 2025, new generation will be needed in the Colorado Spring downtown area to replace Drake Power Plant. Transmission projects identified through this analysis are summarized in Table 6-11 and visualized in Figure 6-10. Springs Utilities deemed these transmission projects to be complementary to the EIRP process and capital costs associated with these transmission costs are assumed to be outside of the portfolio analysis of the EIRP unless the EIRP portfolio impacts the transmission cost in any manner.

Table 6-11: Transmission Project Summary

Project	Name	Purpose
1	North System Improvements	Reliability
2	South System Improvements	Reliability
3	Central System Improvements	Reliability
4	Fuller Transformer	Load Serving
5	Horizon Substation and Transformer	Load Serving
6	Kettle Creek Transformer	Load Serving
7	Grazing Yak Solar	Renewable PPA
8	Palmer Solar	Renewable PPA
9	Pike Solar and BESS	Renewable PPA

Figure 6-10: Map of Transmission Projects



The identified transmission projects are expected to maintain Springs Utilities' load and reliability requirements through 2035. As the details of future projects become clearer, interconnection studies will be performed to identify additional transmission projects required to support new generation.

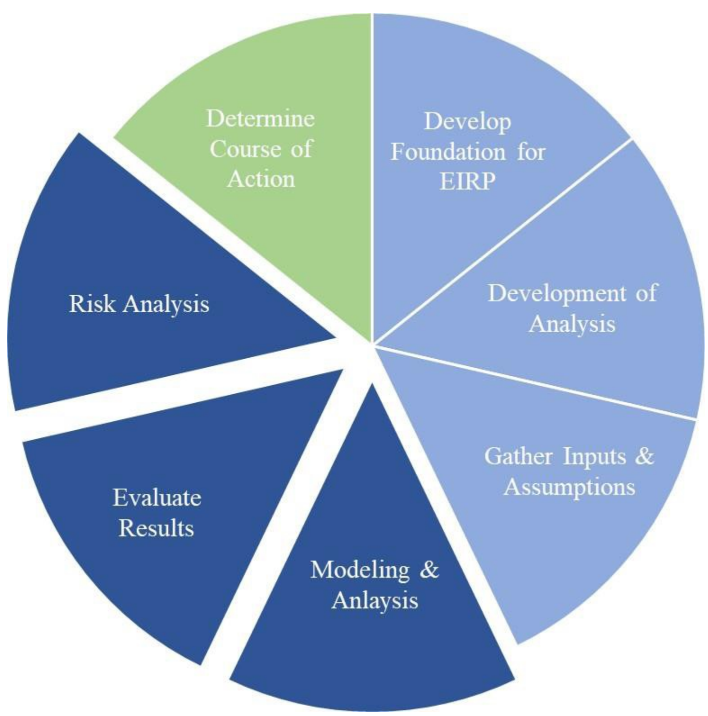
6.2.3 EIRP Summary of Inputs and Assumptions

All inputs and assumptions described herein were utilized to perform the EIRP analyses. The inputs and assumptions include load forecasts, existing resources, the joint dispatch agreement, potential new resources, DSM programs, reserve margin, commodity forecasts, ELCC, financial assumptions, the reference case development, sensitivity analysis, and transmission projects. Each were integral in performing the EIRP analysis, summarizing the EIRP results, and determining the final course of action.

6.3 PHASE TWO - EIRP ANALYSIS

Phase Two of the EIRP process comprised of three main activities: the modeling and analyses of EIRP portfolios using assumptions and inputs from Phase One, the evaluation of EIRP portfolio results, and risk analysis. Phase Two activities are highlighted in Figure 6-11.

Figure 6-11: EIRP Phase 2 Approach



6.3.1 EIRP Modeling and Analysis

Phase Two of the EIRP utilized an ABB modeling software package that includes Capacity Expansion and Portfolio Optimization ("PO"). Capacity Expansion is an energy portfolio management software solution, which, under a given set of assumptions, considers multiple resource combinations to minimize cost over a time horizon while fulfilling all system and capacity needs that complies with reliability and emissions standards. Springs Utilities is subject to Colorado House Bill 19-1261, which mandates at least a 90 percent greenhouse gas reduction by 2050. The EIRP analysis was performed through 2050 to help determine the impacts of meeting HB19-1261 requirements on certain portfolios. The reference case did not have GHG reduction targets and was used as a baseline to determine the "cost of compliance" with GHG reduction targets.

- **Reliability –** A marginal ELCC was determined for new and existing resources to ensure a LOLE of less than one day in ten years. Additionally, a high unserved energy penalty was modeled to ensure new resources are not only selected solely on an ELCC rate (which may decline as penetration for renewables increases) but also considered for resources that will help economically reduce unserved energy.

- **Emission Targets –** Different emission targets were evaluated in the EIRP using mass-based CO_2 constraints. The reference case assumed no CO_2 emission rate would be applied to energy purchases. For each portfolio, a sensitivity was performed with energy purchases having a CO_2 emission rate approximately equal to the Front Range combined cycle power plant.

- **Economic Analysis –** Each resource was evaluated based on its impact to total system cost. A production cost simulation was performed to determine the fuel and purchase power cost impact from serving electric load. Additionally, ongoing O&M, capital, and debt service was included in the NPVRR comparison between portfolios.

The PO model was used to perform in-depth analysis of the portfolios. To adequately solve and optimize a build plan over 30 years while meeting all constraints, a typical week for each month (2,016 hours) was modeled in Capacity Expansion. PO directly imported build plans selected by Capacity Expansion. Importing the build plans from Capacity Expansion reduced the number of variables PO was required to optimize. This enabled PO to include additional operational parameters and evaluate a portfolio on an hourly (8,760 hours) basis. The PO simulations can provide more detailed results regarding detailed production cost modeling.

6.3.2.1 EIRP Portfolio Development

Different portfolios were developed through a public process to incorporate a reasonable range of resources, unit retirement dates, and carbon goals in the EIRP analyses. Each portfolio could be compared against one another to understand the cost and environmental impacts of specific changes.

Table 6-12 summarizes the 20 portfolios that were evaluated in detail for the EIRP study. The CO_2 target category represents the modeled emission constraint that must be achieved. A range of retirement dates were predetermined for each portfolio so the impact of unit retirement data can be understood. The new resources category represents the types of new generation that could be selected within each portfolio. The options of new resources varied by portfolio to help understand the impact of varying penetrations of non-carbon generation.

Table 6-12: EIRP Portfolio Summary

Portfolio	CO_2 Target	Retirements	New Resources
1	80% by 2030 90% by 2050	Drake 2035	Gas/Renewable/Storage
R	No Carbon Restriction	Drake 2035	Gas
2	50% by 2030 90% by 2050	Drake 2030	Gas/Renewable/Storage/DSM
3	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2050	Gas/Renewable/Storage/DSM
4	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2040	Gas/Renewable/Storage/DSM
5	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/Renewable/Storage/DSM
6	50% by 2030 90% by 2050	Drake 2030	Renewable/Storage/DSM
7	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2050	Renewable/Storage/DSM
8	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2040	Renewable/Storage/DSM
9	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM
10	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM
11	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM
12	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable e/Storage/ DSM
13	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/DSM
14	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM
15	100% by 2030	Drake/Nixon/Front Range 2030	Renewable/Storage/DSM
16	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/ Renewable/Storage/DSM
17	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non- Carbon/Renewable/Storage/D SM
18	100% by 2040	Drake 2035 Nixon/Front Range 2040	Renewable/Storage/DSM
19	100% by 2050	Drake 2035 Nixon/Front Range 2050	Renewable/Storage/DSM

6.3.2.2 EIRP Pathway Development

After determining the various portfolios, pathways were developed to narrow the scope and focus of the decision-making process to near-term activities. Pathways act as a way of further summarizing and grouping together the portfolios based on common characteristics. The EIRP analysis evaluated portfolios and pathways to determine important factors over the next 10 years, while keeping flexibility for long term changes in subsequent EIRPs. Each portfolio falls into a specific pathway based on total emissions reduction, available new resources, and decommissioning years. Overall, seven pathways were identified in the EIRP study, and the 20 portfolios were assigned to one of these pathways as summarized in Table 6-13.

Table 6-13: EIRP Pathway Descriptions

Pathway	Description
Reference	Business as usual case where only approved decommissioning dates were included for existing resources. Portfolio R does not have any carbon emission constraints and the difference between Portfolio 1 and Portfolio R is reflective of the cost of compliance. Portfolio 1 was set up to include natural gas as replacement generation but a solution that met the carbon and reliability constraints was infeasible with coal generation (Nixon 1). To meet these constraints, renewable energy and storage resources could replace Drake and Birdsall in 2035.
A	Portfolios that comply with a 50 percent carbon reduction by 2030 and at least 90 percent reduction by 2050.
B	Portfolios that primarily have gas and DSM as replacement generation. Portfolio 13 has the same main assumptions as Portfolio 5 along with a market sensitivity.
C	Portfolios that have the DSM, energy storage, and renewable generation as replacement resources. Portfolio 14 has the same main assumptions as Portfolio 9 along with a market sensitivity.
D	A singular portfolio that allows for non-carbon generation as a replacement resource. In addition to renewables, fuel cells, modular nuclear reactors, and a combined cycle with carbon capture are modeled as available replacement generation.
E	Portfolios with reasonably achievable early decommissioning of generation resources. Generation is required at the Drake facility for transmission reliability until necessary transmission projects are completed (expected completion 2025). Modular aeroderivative combustion turbines are the only reasonable replacement generation for the Drake facility prior to 2025. If selected, it would be anticipated that the aeroderivative units would be moved to other sites within Springs Utilities' service area after 2025.
F	Portfolios that have 100 percent renewable generation by varying target dates.

Table 6-14 summarizes the different pathways and the different portfolios that are characterized by each pathway.

Table 6-14: EIRP Pathways and Portfolios

Pathway	Portfolio	Attainable Carbon Goals	2023	2026	2030	2035	2040	2050
Reference Business as Usual	1	80% by 2030				Retire Drake and Birdsall 1-3 Gas / Renewable / Storage		
	R	90% by 2050				Retire Drake and Birdsall 1-3 Gas		
Pathway A 50% Carbon Reduction by 2030	2	50% by 2030 90% by 2050			Retire Drake 6&7 Gas / DSM	Retire Birdsall 1-3 Renewable / Storage / DSM		
	6	50% by 2030 100% by 2050			Retire Drake 6&7 Renewable / Storage / DSM	Retire Birdsall 1-3 Renewable / Storage / DSM		
Pathway B Gas & DSM Replacement Generation	3	50% by 2030 90% by 2050		Retire Drake 6&7 Gas / DSM		Retire Birdsall 1-3 Renewable / Storage / DSM		Retire Nixon 1 Gas / DSM
	4	50% by 2030 90% by 2050		Retire Drake 6&7 Gas / DSM		Retire Birdsall 1-3 Renewable / Storage / DSM	Retire Nixon 1 Gas / DSM	
	5	80% by 2030 90% by 2050		Retire Drake 6&7 Gas / DSM	Retire Nixon 1 Gas / DSM	Retire Birdsall 1-3 Renewable / Storage / DSM		
	13	80% by 2030 90% by 2050		Retire Drake 6&7 Gas / DSM	Retire Nixon 1 Gas / DSM	Retire Birdsall 1-3 Gas / DSM		

Pathway C Renewable and DSM Replacement Generation	7	50% by 2030 100% by 2050		Retire Drake 6&7		Retire Birdsall 1-3		Retire Nixon 1
				Renewable / Storage / DSM		Renewable / Storage / DSM		Renewable / Storage / DSM
	8	50% by 2030 100% by 2050		Retire Drake 6&7		Retire Birdsall 1-3	Retire Nixon 1	
				Renewable / Storage / DSM		Renewable / Storage / DSM	Renewable / Storage / DSM	
	9	80% by 2030 100% by 2050		Retire Drake 6&7	Retire Nixon 1	Retire Birdsall 1-3		
				Renewable / Storage / DSM	Renewable / Storage / DSM	Renewable / Storage / DSM		
	10	80% by 2030 100% by 2050		Retire Drake 6&7	Retire Nixon 1	Retire Birdsall 1-3		Retire Front Range, Nixon CT
				Renewable / Storage / DSM	Renewable / Storage / DSM	Renewable / Storage / DSM		Renewable / Storage / DSM
	14	80% by 2030 100% by 2050		Retire Drake 6&7	Retire Nixon 1	Retire Birdsall 1-3		
				Renewable / Storage / DSM	Renewable / Storage / DSM	Renewable / Storage / DSM		
Pathway D Carbon Free	11	80% by 2030 100% by 2050		Retire Drake 6&7	Retire Nixon 1	Retire Birdsall 1-3		Retire Front Range, Nixon CT
				Non-Carbon / DSM	Non-Carbon / DSM	Non-Carbon / DSM		Non-Carbon / DSM

Pathway E Early Coal Decommissioning	12	50% by 2023 80% by 2030 90% by 2050	Retire Drake 6&7 Aero-derivative Gas	Retire Nixon 1 Gas / Renewable / Storage / DSM		Retire Birdsall 1-3 Gas / Renewable / Storage / DSM		
	16	50% by 2023 80% by 2030 90% by 2050	Retire Drake 6&7 Aero-derivative Gas		Retire Nixon 1 Gas / Renewable / Storage / DSM	Retire Birdsall 1-3 Gas / Renewable / Storage / DSM		
	17	50% by 2023 80% by 2030 90% by 2050	Retire Drake 6&7 Aero-derivative Gas		Retire Nixon 1 Non-Carbon / DSM	Retire Birdsall 1-3 Non-Carbon / DSM		
Pathway F 100% Renewable	15	100 % Renewable by 2030		Retire Drake 6&7 Renewable / Storage / DSM	Retire Nixon 1, 2, 3, Front Range, Birdsall Renewable / Storage / DSM			
	18	100 % Renewable by 2040				Retire Drake 6&7 Renewable / Storage / DSM	Retire Nixon 1, 2, 3, Front Range, Birdsall Renewable / Storage / DSM	
	19	100 % Renewable by 2050				Retire Drake 6&7 Renewable / Storage / DSM		Retire Nixon 1, 2, 3, Front Range, Birdsall Renewable / Storage / DSM

6.3.2 EIRP Results Evaluation

6.3.2.1 Portfolio Results and Scoring

Each portfolio was modeled and simulated using Capacity Expansion. Critical portfolios were then simulated using Portfolio Optimization to obtain a more detailed analysis of the selected portfolios. The 30 Year NPVRR, average annual revenue requirement, average adjusted debt service coverage, average adjusted days cash on hand, and 30-year electric revenue were calculated for each simulation. The financial metrics for each portfolio are summarized in Table 6-15. The financials for each of the portfolios were used in the evaluation process to determine the course of action for the EIRP. Along with financials, additional desirable attributes were identified through public engagement. The results from the financial analysis are separate from the cost/implementation attribute defined in earlier sections. The financial results include the NPVRR for all four services that Springs Utilities provides for 30 years while the cost/implementation attribute solely considers the cost impact to electric services. As discussed in Section 6.2.1.1, each attribute was identified through the public engagement process and a methodology was determined to assign a score for each attribute for each portfolio. Each attribute score was weighted and utilized to help determine a course of action. The initial 20 portfolios were narrowed down to 12 portfolios during the May 2020 UPAC meeting. Portfolio 2, Portfolio 3, Portfolio 4, Portfolio 6, Portfolio 7, and Portfolio 8 were eliminated because they did not achieve 80% carbon reduction by 2030. Portfolio 13 and Portfolio 14 were eliminated because they were regional market sensitivity runs of Portfolio 5 and Portfolio 10. Portfolio 15, Portfolio 18, and Portfolio 19 represent the 100% renewable portfolios and were included in the group of 12. Attribute scoring, financial analysis, sensitivities, and risk analysis were performed as portfolios were narrowed down. The portfolios in red text in Table 6-15 were eliminated from consideration after the initial screening process. At the same time, the top five portfolios were identified as shown in the table below.

Table 6-15: Portfolio Results Summary

Portfolio	R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Pathway	Ref	Ref	A	B	B	B	A	C	C	C	C	D	E	B	C	F	E	E	F	F
30- Year Revenue Requirement ($B)	$35.72	$36.55	$35.41	$35.40	$35.89	$36.21	$35.35	$35.81	$36.63	$37.07	$37.69	$36.54	$36.52	$38.01	$36.42	$48.94	$36.27	$36.47	$42.42	$36.62
Average Annual Revenue Requirement ($B)	$1.19	$1.22	$1.18	$1.18	$1.20	$1.21	$1.18	$1.19	$1.22	$1.24	$1.26	$1.22	$1.22	$1.27	$1.21	$1.63	$1.21	$1.22	$1.41	$1.22
Average Adjusted Debt Service Coverage	2.05	1.89	2.11	2.18	2.20	2.11	1.96	1.93	1.91	1.84	1.83	1.94	2.07	2.14	1.85	1.84	2.09	1.85	1.84	1.84
Average Adjusted Cash on Hand	159	156	177	264	202	248	156	158	159	155	155	155	211	225	157	154	179	154	152	152
30-Year Electric Revenue ($B)	$17.78	$18.6	$17.23	$17.67	$17.81	$18.21	$17.26	$17.59	$18.29	$18.67	$19.28	$18.2	$18.23	$20.19	$17.5	$29.98	$18.0	$18.21	$23.14	$17.72
Financial Rank											5	3	2				1	4		

6.3.2.2 Sensitivity Analysis

When applicable, sensitivity analyses were performed on each of the portfolios consistent with the sensitivities defined in Phase One. Table 6-16 shows the main sensitivities performed on each portfolio. The table includes the difference between each sensitivity's NPVRR compared against that of the reference case. If a negative value is shown, the NPVRR for the sensitivity is less than the reference case. The results of the sensitivity analysis highlight uncertainties in the future and emphasize that Springs Utilities should maintain flexibility in their EIRP action plan to mitigate the unknown.

Table 6-16: Sensitivity Analysis Results Summary ($M)

Portfolio	High Gas	Low Gas	No Energy Purchase	90x30	100x50	Drake 2022	High Load	Low Load	CO_2 on Purchases	Low Renewable Cost	Social Cost of Carbon
1	382	-471	269	169	115	[redacted]	373	-276	194	-39	1,081
R	411	-388	58	[redacted]			279	-253	50	0	1,660
2	361	-427	63	[redacted]			264	-236	35	-4	1,380
3	467	-390	93	[redacted]			326	-225	98	[redacted]	1,427
4	470	-479	73	[redacted]			284	-232	32	-2	1,319
5	492	-498	181	208	117	[redacted]	306	-282	156	-2	1,075
6	310	-398	217	[redacted]			310	-274	42	-70	1,259
7	347	-449	181	[redacted]			332	-316	72	-71	1,196
8	400	-297	314	[redacted]			355	-444	209	-85	1,099
9	406	-547	510	140	[redacted]		370	-366	169	-126	844
10	387	-511	514	162	[redacted]		333	-321	223	-174	940
11	484	-466	336	165	[redacted]		401	-374	170	-69	926
12	579	-554	220	183	166	-14	277	-291	231	-8	1,012
13	[redacted]		369	[redacted]			814	-226	346		242
14	[redacted]		130	[redacted]			367	-323	43	-322	135
15	[redacted]										1,317
16	535	-482	207	217	193	-13	308	-238	200	-1	1,047
17	458	-491	163	98	100	-55	330	-317	127	-96	98
18	[redacted]										2,198
19		[redacted]									3,048

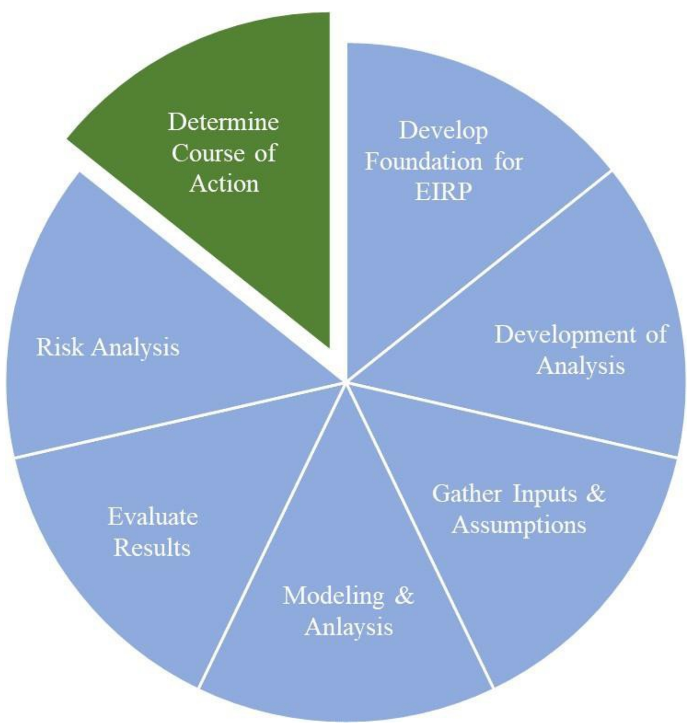
6.3.3 EIRP Risk Analysis

Springs Utilities also performed risk analysis of the portfolios when possible and used the sensitivity analysis to quantify uncertainty when possible. This form of financial risk analysis identifies a range of likely costs for portfolios based on uncertain inputs rather than solely offering one cost. Portfolios with less risk will have smaller extremes in its cost spectrum relative to another portfolio. After screening portfolios based on results, further risk analysis was performed, and potential mitigation techniques were identified. The detailed risk analysis for the screened portfolios is summarized in Section 6.4.1.

6.4 PHASE THREE - EIRP COURSE OF ACTION

Phase Three of the EIRP process focused on the development of a course of action based on the analysis and results collected in Phase Two of the EIRP. The main activities of Phase Three included evaluating portfolio weighted scores for the top 12 portfolios. The weighted scores indicated on how well each portfolio addresses desired qualities, developing and selecting a proposed course of action, and determining the next steps to implement and monitor the progress of the course of action. The main activities associated with Phase Three are featured in Figure 6-12.

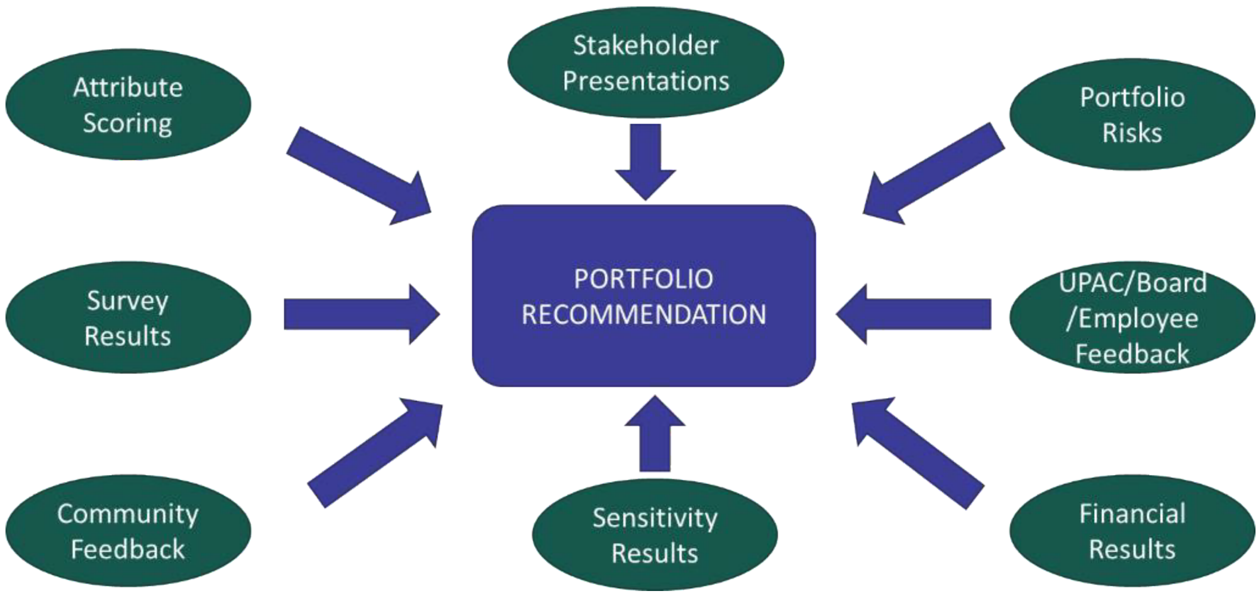
Figure 6-12: EIRP Phase 3 Approach



6.4.1 EIRP Portfolio Recommendation

During this phase, a significant amount of information was gathered through an interactive public process with Springs Utilities' customers and stakeholders. This was necessary to make an informed recommendation to the Springs Utilities Board. The public process was a critical component needed to incorporate the opinion of Springs Utilities' customers into a portfolio recommendation. The various information that was considered and the stakeholder groups referenced in the development of the portfolio recommendation are highlighted in Figure 6-13.

Figure 6-13: Portfolio Recommendation Process



The top 12 portfolios were evaluated further based upon the attribute weightage established earlier in the EIRP process and a normalized weighted score was determined for each portfolio. The scoring for the top 12 portfolios is shown in Table 6-17. The green cells in the table on the next page indicate the portfolio that received the highest score for each attribute. The attribute scores were normalized based on the best scoring portfolio with the top portfolio scoring a 100 and the remaining portfolios scored proportionally to the top performing portfolio. These portfolios and their weighted scores were further discussed with various stakeholders, and the top five portfolios were finalized. These portfolios were evaluated further to determine a course of action.

Table 6-17: Top 12 Portfolio Attribute Scoring

Portfolio	Pathway	CO_2 Target	Retirements	New Resources	Attribute Ranking	Total Score Normalized	Reliability	Cost/ Implementation	Environment/ Stewardship	Flexibility/ Diversity	Innovation
17	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative / Non-Carbon / Storage / DSM	1	100	100	52	69	88	70
16	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative / Gas / Renewable / Storage / DSM	2	98.7	93	71	72	75	50
12	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative / Gas / Renewable / Storage / DSM	3	97.6	93	71	69	75	50
10	C	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable / Storage / DSM	4	97.5	80	34	81	100	100
11	D	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon / Storage / DSM	5	92.6	87	34	84	88	60
R	Ref	N/A	Drake 2035	Gas	6	88.4	80	100	38	75	30
5	B	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas / Renewable / Storage / DSM	7	83.5	73	71	76	25	50
15	F	100% by 2030	Drake/Nixon/Front Range 2030	Renewable / Storage / DSM	8	82.8	73	24	100	50	60
9	C	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable / Storage / DSM	9	78.5	60	34	69	100	50
18	F	100% by 2040	Drake 2035 Nixon/Front Range 2040	Renewable / Storage / DSM	10	74.2	80	34	53	50	60
1	Ref	80% by 2030 90% by 2050	Drake 2035	Gas / Renewable / Storage	11	71.8	53	62	61	50	40
19	F	100% by 2050	Drake 2035 Nixon/Front Range 2050	Renewable / Storage / DSM	12	67.3	73	44	38	63	30

The top five portfolios were selected primarily based on having a total normalized score greater than 90 and a score better than the reference case. Subsequently, a detailed risk analysis was also performed for the top five portfolios. The risks identified for each portfolio and their potential mitigation approach are summarized in Table 6-18.

Table 6-18: Portfolio Risk Analysis

Portfolio	Risk	Mitigation
10	• Resource overbuild and energy purchase needed to maintain reliability. • Transmission import limitations for wind generation. • Reliance on Demand Response.	• Consider backup/firming resources such as gas and battery storage. • Perform renewable potential study to determine potential for Hydro, Biomass, Geothermal, and Pump Storage near Colorado Springs. • Perform transmission study to determine projects needed to facilitate increasing wind generation. Ramp up solar, battery, and energy efficiency in the interim. • Evaluate regional market opportunities. • Plan to displace future capacity once demand response programs have been tested and validated for availability.
11	• Carbon Capture may not be ideal for Springs Utilities location. • Modular nuclear resources have limited operation in the U.S. • Regulatory risk permitting modular nuclear.	• Potential study to determine feasibility of Carbon Capture. • Allow time for technology to mature, do not plan for the Drake or Nixon plant to be replaced by modular nuclear. • Near-term resources should include wind, solar, battery, and demand side management. • Start permitting process for in advance of anticipated need.
12, 16, 17	• Tight on capacity with early Drake decommissioning. • Electrification will be a challenge in serving increased load while reducing GHG emissions. • Future regulatory risk (e.g., 100 percent renewables). • Transmission import limitations for wind generation.	• Increase market purchase, add another aeroderivative resource, or increase Pike battery capacity to 50 MW. • Ramp up renewable, battery, and demand side management programs prior to anticipated year of need. • Allow Drake's replacement to include gas resources to limit likelihood of a stranded asset. • Perform transmission study to determine projects needed to allow for the delivery of wind generation. • Evaluate regional market opportunities. • Increase energy efficiency and renewable generation.

The five portfolios that had a total normalized score above 90 were then evaluated based on their attribute scoring, detailed financial ranking, sensitivity analysis, and risk analysis. A summary of the detailed evaluation is presented in Table 6-19.

Table 6-19: Top 5 Portfolio Evaluation

Portfolio	Pathway	CO2 Target	Retirements	New Resources	Attribute Ranking	Total Score Normalized	Financial Ranking	Total NPVRR	% Increase to Portfolio R	% Increase to Portfolio 1
17	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative / Non-Carbon / Storage / DSM	1	100	4	$36.47B	2.06%	-0.21%
16	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative / Gas / Renewable / Storage / DSM	2	98.7	1	$36.27B	1.51%	-0.76%
12	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative / Gas / Renewable / Storage / DSM	3	97.6	2	$36.52B	2.21%	-0.06%
10	C	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable / Storage / DSM	4	97.5	5	$37.69B	5.23%	3.13%
11	D	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon / Storage / DSM	5	92.6	3	$36.5B	2.25%	-0.02%

Figure 6-14 and Figure 6-15 present the total revenue requirement and average annual revenue requirement across all four of Springs Utilities' service offerings of the top five portfolios, Portfolio 1, and Portfolio R (reference case).

Figure 6-14: Total Revenue Requirement Comparison

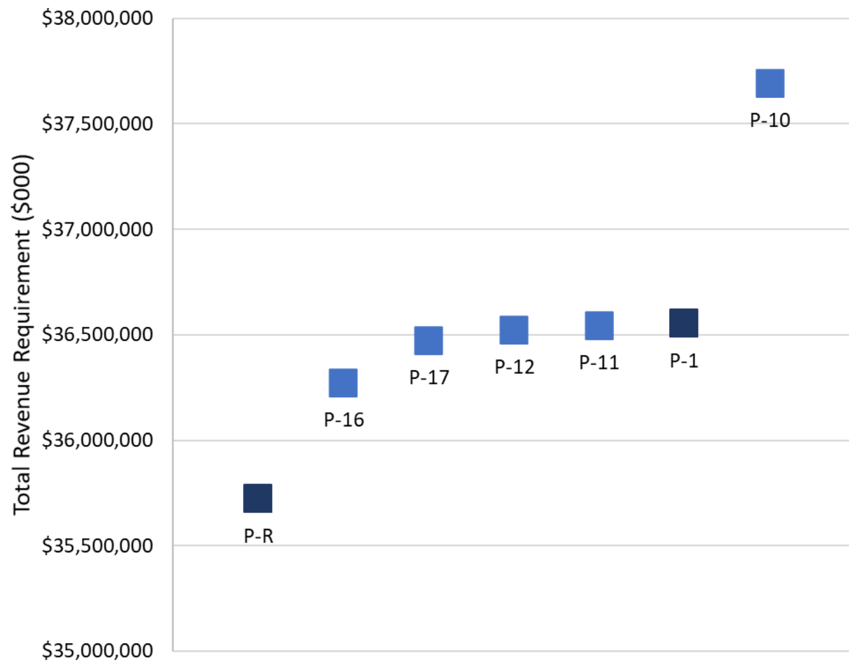
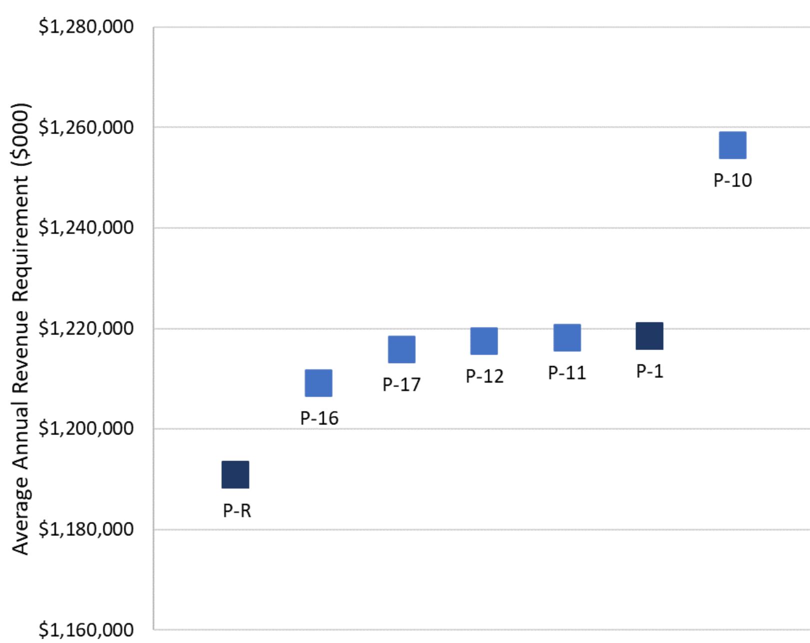
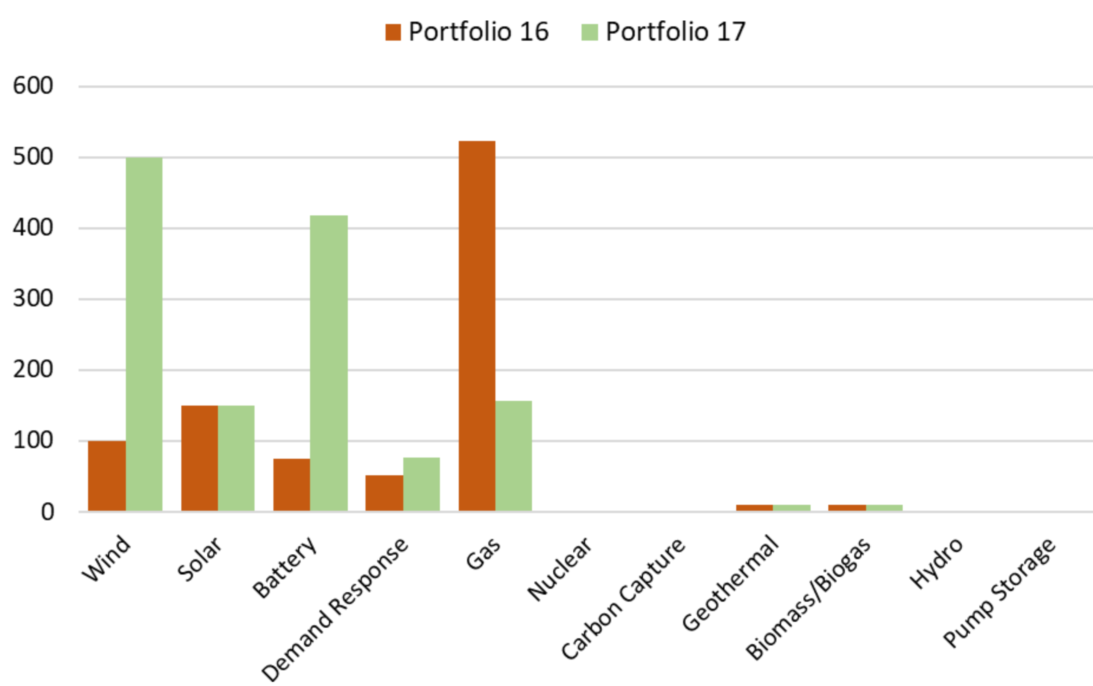


Figure 6-15: Average Annual Revenue Requirement Comparison



The top five portfolios were subsequently narrowed down to the top two portfolios. Portfolio 10 was an outlier in the total revenue requirement comparison and was removed from consideration. An important factor among public stakeholders was the retirement of Drake by 2023. Pathway E included the option of retirement of Drake by 2023. Each of the top three portfolios were in Pathway E and therefore were able to also comply with Springs Utilities' stakeholders' preference. Portfolio 12 was removed from consideration because the retirement of Nixon 1 in 2026 would create less flexibility in the portfolio providing less time for Springs Utilities to evaluate the feasibility of newer technologies such as BESS. Evaluating the attribute scoring along with the risk analysis helped to further establish Portfolio 16 and Portfolio 17 as the top two portfolios. The main reason for narrowing down the selection to these two portfolios was that both portfolios achieved an 80 percent greenhouse gas reduction by 2030 and decommissioned the remaining coal generation fleet in that same timeframe. The major difference between the top two portfolios is Portfolio 17 limits any new generation beyond Drake's retirement in 2023 to be a non-carbon-emitting resource such as renewable and battery storage resources whereas Portfolio 16 primarily consists of utilizing new natural gas fired generation to meet future demand. The new resource additions by technology/fuel are presented in Figure 6-16 for both portfolios.

Figure 6-16: New Resource Additions by Generation Type



Each portfolio resulted in a higher revenue requirement when compared to the reference case largely because the reference case did not have any carbon reduction goals that impacted the economic dispatch of a portfolio. The portfolio descriptions and attribute ranking score are summarized in Table 6-20.

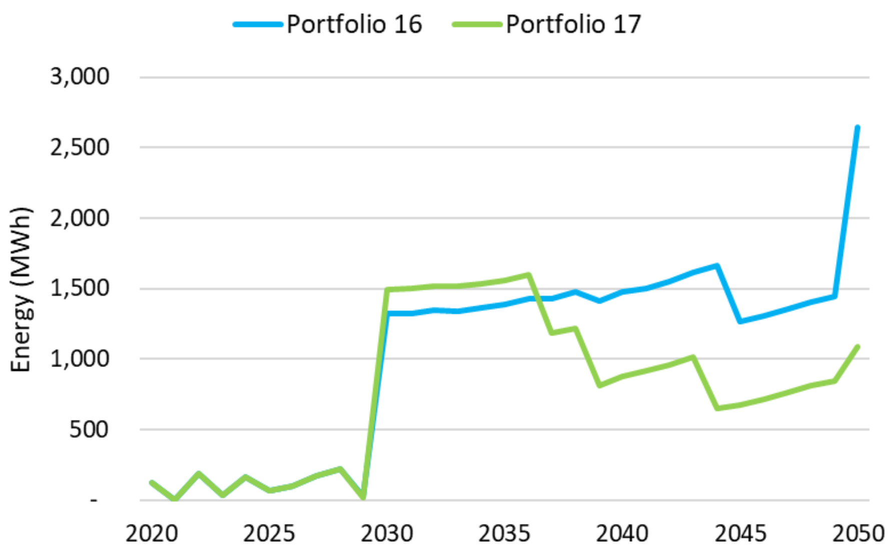
Table 6-20: Final Portfolio Comparison

Portfolio	Pathway	CO_2 Target	Retirements (Next 10 Years)	New Resources	Attribute Ranking	Total Score Normalized	Financial Ranking	NPVRR ($B)	Percent Increase from Portfolio R	Percent Increase from Portfolio 1
17	E – Early Decommissioning	80% by 2030	Drake 2023	Aeroderivative / Non-Carbon / DSM	1	100	4	$36.47	2.10%	-0.21%
16	E – Early Decommissioning	90% by 2050	Nixon 1 2030	Aeroderivative / Gas / Renewable / Storage / DSM	2	98.7	1	$36.27	1.53%	-0.76%

The portfolios were further compared to identify their impact on market purchases, Front Range generation, battery storage capacity, demand response, renewable capacity, and carbon reduction. The following figures highlight the differences of some of the key characteristics between the two portfolios.

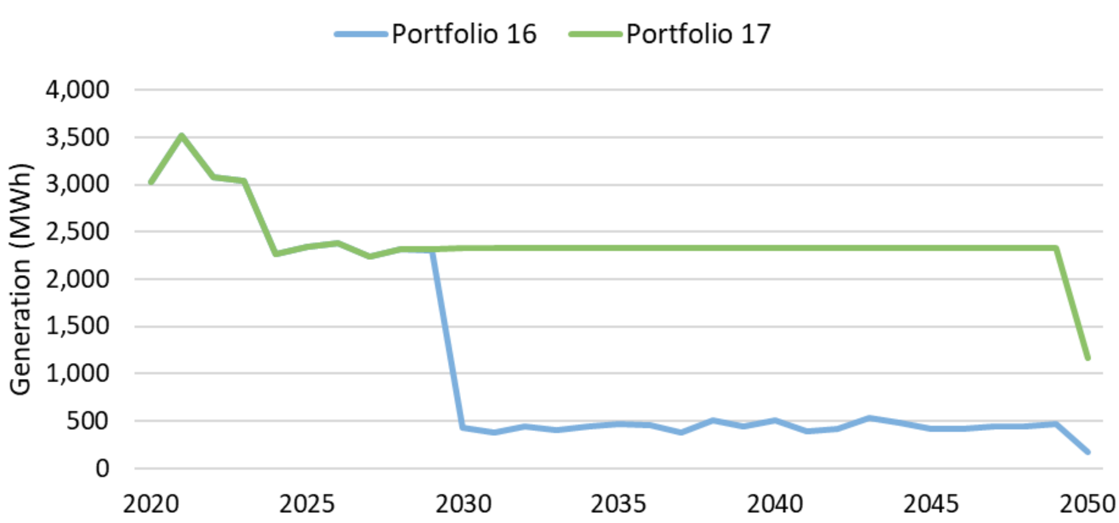
Market purchases were higher in Portfolio 16 after 2035 because the portfolio relied heavily on energy purchases from the market to comply with carbon reduction goals. The reference case assumption featured no CO_2 emission rate applied to energy purchases. The market purchase comparison is highlighted in Figure 6-17.

Figure 6-17: Market Purchase Energy by Portfolio



Relative to Portfolio 17, the Front Range Power Plant is expected to have lower generation in Portfolio 16 due to the addition of a more efficient combined cycle with a lower dispatch cost. The Front Range Power Plant is responsible for a large percentage of Springs Utilities' generation requirement. Although a decrease in Front Range Power Plant generation would reduce the carbon emissions from the plant, the generation from a new combined cycle in Portfolio 16 would offset emissions reductions. The Front Range Power Plant generation comparison in presented is Figure 6-18.

Figure 6-18: Front Range Generation by Portfolio



Energy storage capacity and demand response differ between the two portfolios primarily due to Portfolio 17 restricting gas resources from being added after the addition of an aeroderivative unit in 2023. The energy storage capacity comparison and the demand response comparison are presented in Figure 6-19 and Figure 6-20 respectively.

Figure 6-19: Energy Storage Capacity by Portfolio

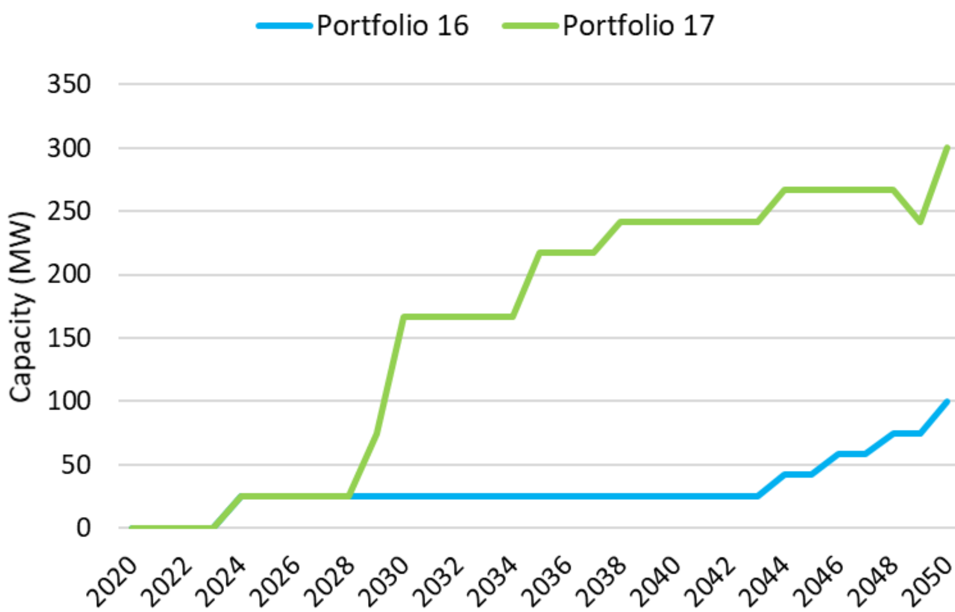
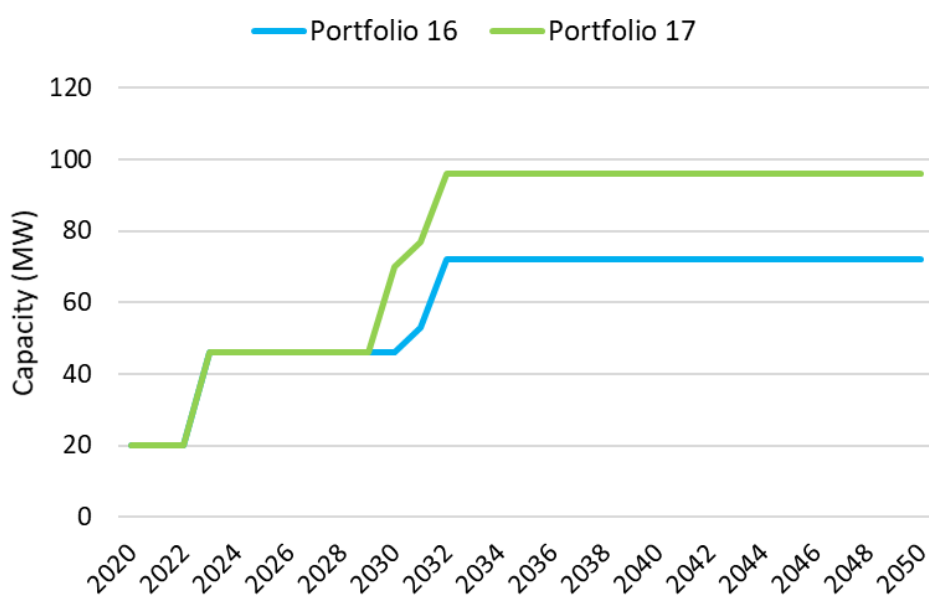
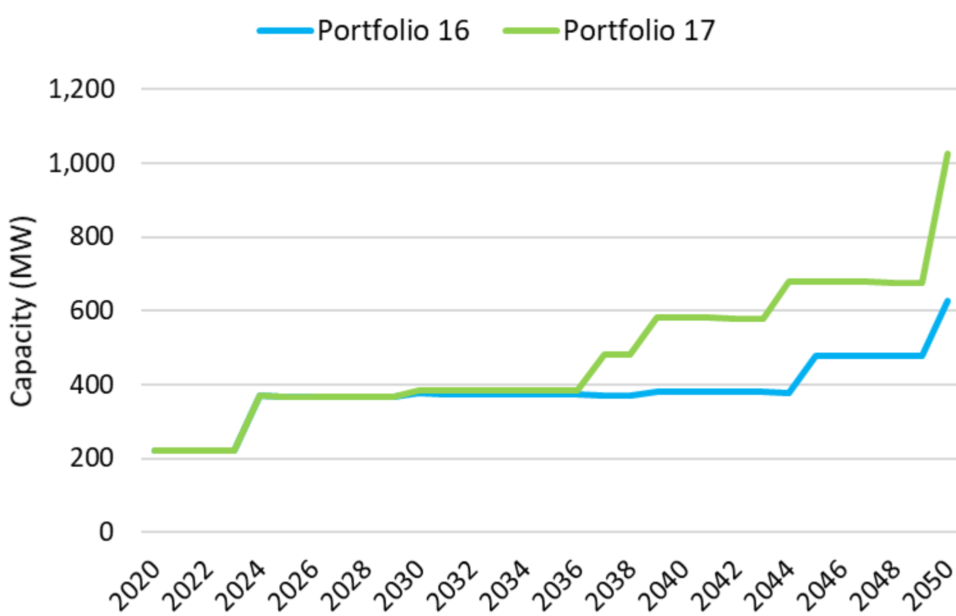


Figure 6-20: Demand Response Capacity by Portfolio



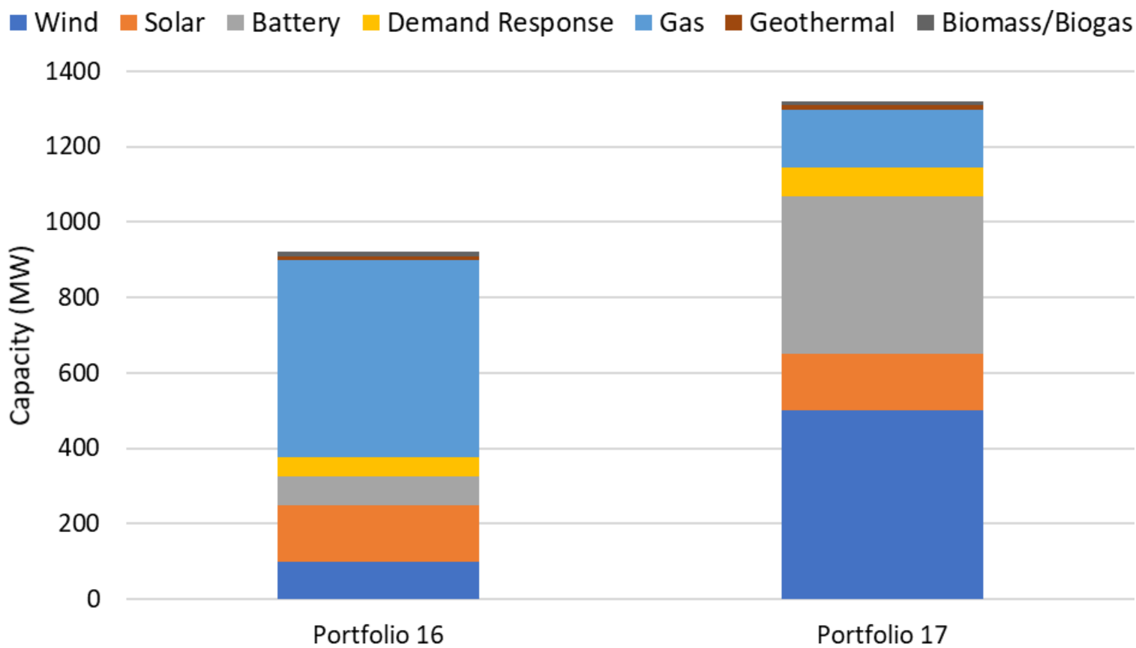
The amount of additional renewable generation in Portfolios 16 and 17 begin to diverge in 2030, continuing through 2050. The renewable capacity comparison is displayed in Figure 6-21.

Figure 6-21: Renewable Capacity by Portfolio



Portfolio 17 will require more nameplate capacity than Portfolio 16 due to differences in the amount of installed renewable generation and the ELCC credit that the renewable resources can get over time. As wind generation increases in Portfolio 17, additional wind generation's contribution toward meeting the reserve margin requirement is less than the capacity contribution of an identically sized gas generator. The difference in nameplate capacity additions between Portfolio 16 and Portfolio 17 is highlighted in Figure 6-22.

Figure 6-22: New Resource Capacity Additions by Portfolio



Both portfolios reach an 80% reduction in CO_2 emissions by 2030 and a 90% reduction by 2050. To comply with CO_2 emission targets, gas generation is limited in the amount of energy it can produce annually. The reduced ability to use dispatchable generation to meet energy demand as wind and solar generation fluctuates prompts concern for system reliability. Addressing these concerns requires developing a strategy to determine the most efficient way to balance emission reductions with system reliability. The energy mix and CO_2 emission reduction for Portfolio 16 and Portfolio 17 is displayed in Figure 6-23 and Figure 6-24.

Figure 6-23: Portfolio 16 Energy Mix and Carbon Reduction

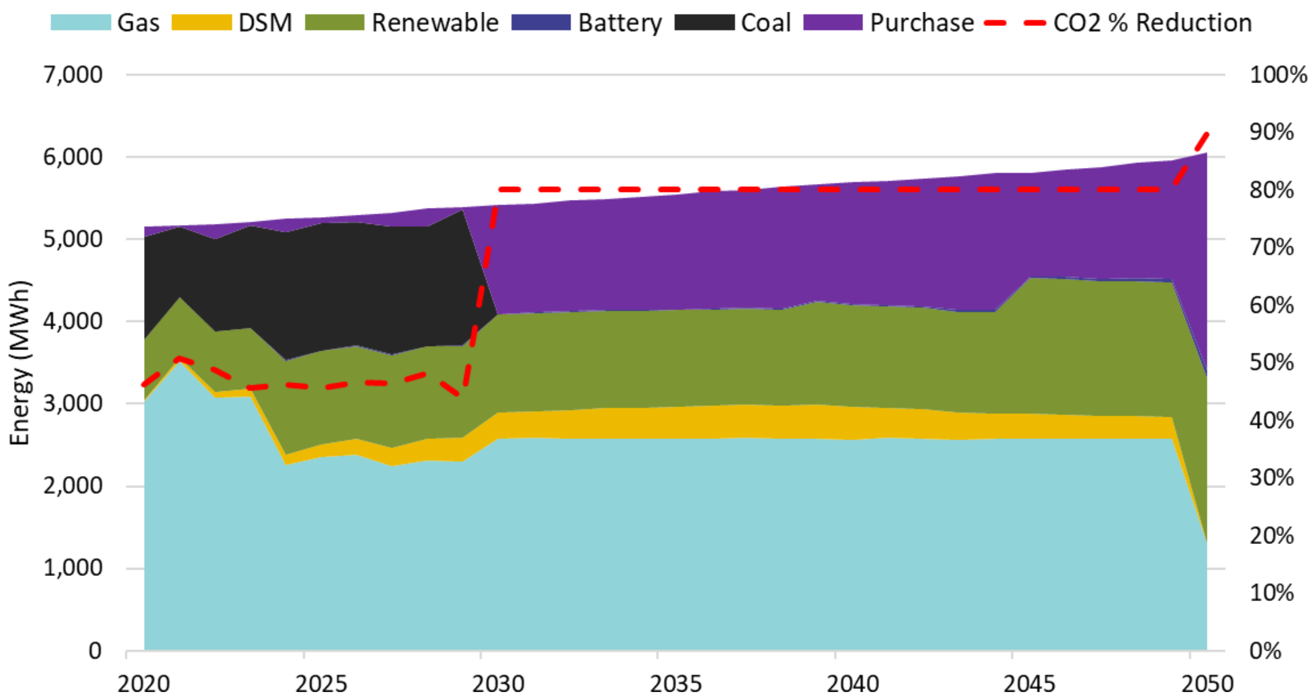
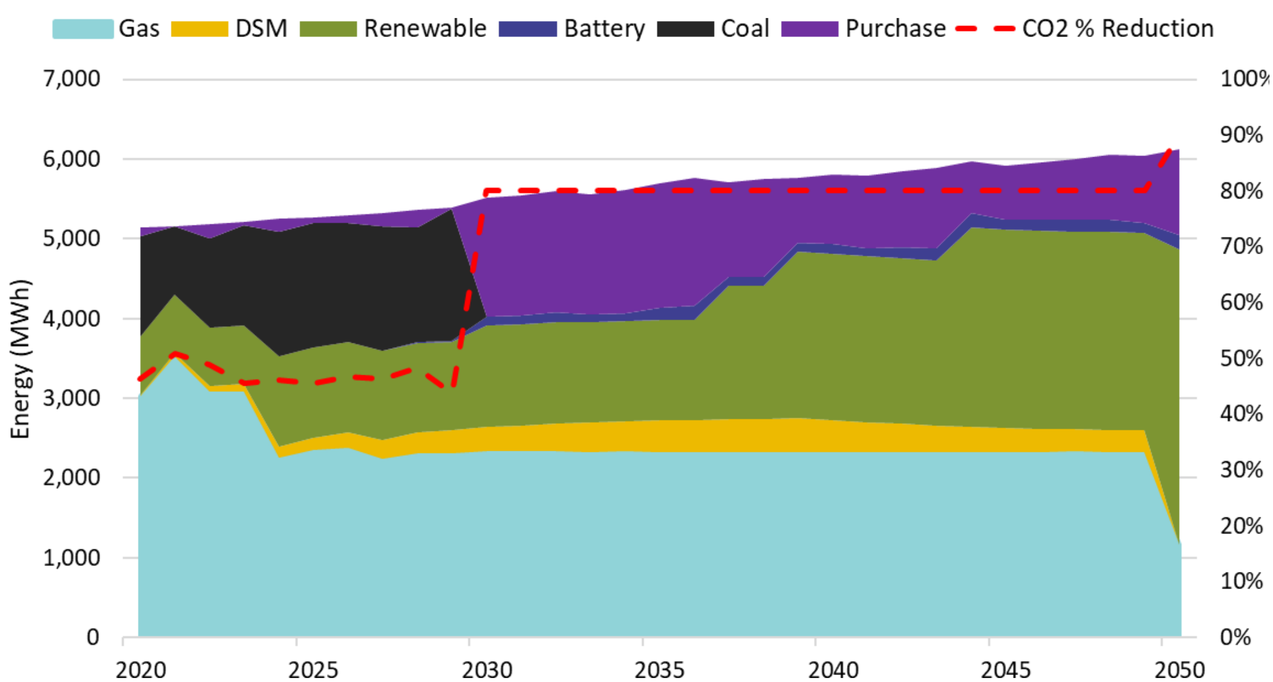


Figure 6-24: Portfolio 17 Energy Mix and Carbon Reduction



After careful consideration of all results, Springs Utilities recommended Portfolio 17 as a path of action to the Springs Utilities Board. The reasons for Springs Utilities recommendation of Portfolio 17 include:

- Enhanced reliability and resilience
- Investment in infrastructure to support renewables and advanced technologies
- Supports development of new renewable energy and future technologies (e.g., microgrids,storage, electric vehicles, AMI, distributed resources, etc.)
- Promotes innovation, utility transformation, and agility
- Uses gas resources for Nixon replacement only as a contingency/back up plan

6.4.2 Plan Approval

After considering the impacts of Portfolio 16 and Portfolio 17 in detail, the Energy Vision, and public stakeholder feedback, the Springs Utilities Board approved Portfolio 17 on June 26, 2020 as the path forward. See Colorado Springs Utilities Board meeting minutes in Section 7.0.

6.4.3 Future Steps

Springs Utilities has established the Sustainable Energy Plan (SEP) program to implement the projects identified in Portfolio 17. SEP's mission is to strategically leverage our talent and experience to safely deliver the SEP Portfolio by the required in-service dates identified for each project, which will allow for execution of the 2020 Gas and Electric Integrated Resource Plans including the decommissioning of the Martin Drake and Ray Nixon Unit 1 Power Plants.

Out of the 61 projects identified to fully implement the IRPs, 28 are currently in design or construction. Projects include several transmission and substation upgrades and expansions, new build projects, new generating units, the decommissioning of the Drake Power Plant, and Demand Side Management related activities. The figure below shows the progression of milestones, as of October 2021, for active projects needed to implement Portfolio 17.

Sub-Portfolio	Projects Started	MS Finish N+30 Days	MS Finish N+60 Days	MS Finish N+90 Days	# Of Milestones	Total Completed Milestones	Total Open Milestones	Milestone Comp %
Advanced Technologies Campus		0	0	0	105	10	95	10%
Distributed Generation Resources (D.G.R)	3	0	1	1	82	3	79	4%
Drake and Nixon Sites	3	0	1	0	7	0	7	0%
Drake Generation	2	6	9	1	58	17	41	29%
DSM/DER	6	0	0	7	40	2	38	5%
Electric Infrastructure	10	3	7	2	176	77	99	44%
Gas Infrastructure	1	0	0	1	30	0	30	0%
Generation Integration	3	0	2	3	21	0	21	0%
Portfolio Management		0	0	0	0	0	0	0%
Total	28	9	20	15	519	109	410	21%

7.0 Colorado Springs Utilities Board Meeting Minutes

Colorado Springs Utilities
It's how we're all connected

COLORADO SPRINGS UTILITIES BOARD
Microsoft Teams Web Conference
and Blue River Board Room
Plaza of the Rockies
121 S. Tejon Street
South Tower, 5th Floor

MINUTES
Colorado Springs Utilities Board Meeting
Friday, June 26, 2020

Utilities Board Members Present in the Blue River Board Room: Chair Jill Gaebler; Vice Chair Wayne Williams; Andy Pico; Don Knight; David Geislinger and Yolanda Avila

Utilities Board Members Present via web conference: Bill Murray; Richard Skorman and Tom Strand

Staff Members Present in the Blue River Board room or on web conference: Aram Benyamin; Melissa Noble; Scott Shewey; Earl Wilkinson; Dave Padgett; Phil Tunnah; Travas Deal; Cindy Newsome; Marcy Hudson; Joe Awad; Michael Avanzi; Dave Grossman; Kerry Baugh; John Hunter; Michael Avanzi; Joe Awad; Al Wells; Bethany Schoemer and Toni Bircher

City of Colorado Springs Staff Members Present in the Blue River Board Room or on web conference: Mayor John Suthers; Bethany Burgess; Renee Congdon; Michael Gustafson; Denny Nester and Jeff Greene

Others Present: UPAC Chair Rex Adams

1. **Call to Order**

   Chair Jill Gaebler called the Utilities Board meeting to order at 8:01 a.m. and Ms. Toni Bircher, Utilities Board Administrator, called the roll.

   Chair Gaebler read a statement regarding Colorado Open Meetings Law and the City Charter, that the meeting was open to the public and intended to provide information to the Utilities Board regarding matters of public business and public policy. The statement also provided information on the meeting platform, Microsoft Teams, and instructions for participants to join virtually and by telephone.

2. **Pledge of Allegiance**
   Chair Gaebler led the Pledge of Allegiance.

3. **Welcome and Introduction**
   Chair Gaebler introduced Mayor John Suthers and he congratulated the Utilities Board Members on their work toward early closure of the Drake Power Plant and added that any decision that the Board would make on the closure of Drake for reliable, cost effective and environmentally sustainable energy generation would transform the City's downtown core to a more inviting and livable urban center which will attract new businesses. He said that today's decisions must ensure the security and resilience of military installations and commended the Utilities Board and UPAC for a thorough and collaborative process with recommendations that help make the case for the permanent home of the U.S. Space Force. He declared that Colorado Springs Utilities is helping to build a beautiful city that matches our scenery.

4. **Summary of Utilities Policy Advisory Committee (UPAC) Electric and Gas Integrated Resource Plans (IRP) Recommendations**
   Mr. Rex Adams, UPAC Chair, thanked the Board for holding the special meeting and commented that the decisions to be made are huge steps for the community and a new energy future for Colorado Springs. Mr. Adams discussed public input during the IRP process and gave a summary of the UPAC recommendations for the Electric and Gas portfolios.

   Mr. Michael Avanzi, Energy Planning and Innovation Manager, discussed the UPAC Electric recommendation and the Gas recommendation and features of each of the recommended portfolios. He stated that reasons for UPAC's recommendation of Electric Portfolio 16 included: a high attribute ranking, meeting state regulatory carbon reduction goals, solid financial results, a reasonable risk profile and its use of proven innovative technology. Mr. Avanzi added that Portfolio 16 calls for the earliest closing date of the Drake Power Plant and provides flexibility on the replacement of Nixon 1.

   Mr. Avanzi discussed UPAC's recommendation for Gas Portfolio 6 and listed that the portfolio includes the best attribute score, the lowest revenue requirement, contains demand response and energy efficiency, a controllable risk profile and defers new infrastructure requirements.

5. **Portfolios 16 and 17 Comparison**
   Mr. Avanzi offered comparisons of Electric Portfolios 16 and 17 for the Board's consideration. He indicated that there had been a lot of community input in favor of Portfolio 17 and that some Board Members had expressed interest in receiving more information on Portfolio 17 in comparison to Portfolio 16.

Mr. Avanzi discussed the key differences in the portfolios at the 2030 retirement of Nixon 1. He stated that replacing Nixon 1 with gas futures or carbon free and energy storage type of futures are included and that the main difference is there is more gas expansion required in Portfolio 16 than for Portfolio 17.

He discussed differences in capacity and energy andstated that Portfolio 16 requires more gas capacity and Portfolio 17 relies more on renewable energy and energy storage and includes more Demand Side Management (DSM) than Portfolio 16. Mr. Avanzi confirmed that Portfolio 17 uses more renewableenergy that is owned and controlled by Colorado Springs Utilities. Board Members commented and asked questions about anticipating the future, opportunities for renewable energy, whether it is easier to switch from Portfolio 17 toPortfolio 16 and which portfolio provides the most flexibility. They asked about additional gas resources, building infrastructure, for a short explanation of the reasons for closing the Drake Power Plant in 2023, about Demand Side Management (DSM) comparisons, revenue requirement differences and commented that the Phase 3 customer survey was very interesting. Mr. Travas Deal, Energy ServicesOfficer, answered questions.

Mr. Aram Benyamin, Chief Executive Officer, reported on information regarding both portfolios and confirmed that Portfolio 16 requires 350 MW of replacement power up front, would require a central plant on the Colorado Springs Utilities system requiring land acquisition and additional transmission. He stated that it would be preferable to build capacity as it is needed and that it is not cost effective to abandon the Front Range Power Plant.

6. Customer Comments

Comments were received from the following customers supporting Portfolio 17:

Susan Permit	Robin Izer	Liz Rosenbaum
Amy Gray	Scott Harvey	Jenna Lozano
Kelsey Brown	Mercedes Perez	Jim Walker
Melody Williams	Jessica Hannebert	Lindsay Factness
Wesley Joseph	Benedict Wright	Scott Carter
Lee Milner	Callie Hadnut	Sam Masias

7. Board Discussion and Decision

Vice Chair Wayne Williams commented on the current energy market, current operating costs of the Drake Power Plant and his support of Portfolio 17. Board Member Dave Geislinger commented on the negligible cost differences between the portfolios and the support younger citizens have expressed in Portfolio17 and announced his support of Portfolio 17.

Board Member Don Knight stated that natural gas prices will rise and that he does not have confidence in battery storage technology and that since Portfolio 17 relies heavily on battery storage he is concerned with the reliability of Portfolio 17. He reported that the generation replacement solution in Portfolio 16 doesn't have to be a big gas plant and expressed his support of Portfolio 16.

Board Member Andy Pico declared that a lot of detailed analysis had been done to propose 20 different portfolios. He announced that staff answered every question he asked in great depth and discussed changes in markets, replacing the Drake Power Plant with gas generators and the operational aspects of running Drake in comparison to the gas generators. Board Member Pico agreed that it does make sense to replace coal units with gas generators. He reported that he is not in support of Portfolio 17. Board Member Pico referred to reliability and cost as the highest factors from survey respondents and confirmed that he would not support Portfolio 17 or Portfolio 16 because of technologic risks in each.

Board Member Tom Strand saluted the UPAC for the incredible work and effort they put into the IRPs. He indicated that the time he spent with staff virtually was very helpful. He reported that he liked listening to all the input and data and reminisced that five years ago Board Members voted to close the Drake Power Plant no later than 2035 but he had always hoped the date would be sooner. He reported that he was amazed that the new closure date for Drake is so soon as 2023 and expressed his support of Portfolio 17.

Board Member Yolanda Avila announced that throughout her three years on the Utilities Board she had been hoping for an IRP option such as Portfolio 17. She expressed appreciation of Colorado Springs Utilities staff, UPAC and acknowledged CEO Aram Benyamin. She stated that the Board asked for innovation from the CEO and agreed that there is risk with Portfolio 17 but that it is bold and innovative. Board Member Avila commented that as stewards of the lands for indigenous people, the land has not been taken care of and some generation sources are used at the expense of health and environment. She stated that she is not completely satisfied with going from one fossil fuel to another, but that Portfolio 17 is a good compromise. She stated that she feels privileged and honored to be part of the Utilities Board and thanked all.

Chair Gaebler highlighted that staff had provided extraordinary support to the Board and followed through on every question. She acknowledged that the UPAC had worked hard and provided community outreach and many opportunities for the public to voice their opinion.

She confirmed it was an exciting day and indicated that the retirement of the Drake Power Plant is a critical consideration for choosing an IRPportfolio. She expressed her pride that Drake will close no later than 2023 and thanked Colorado Springs Utilities staff for helping the Board understand everything. Chair Gaebler announced her support of Portfolio 17 and referred to its balance and alignment with the pillars of the Energy Vision.

Vice Chair Williams moved approval of Electric Portfolio 17 and Board Member Murray seconded the motion. The motion was approved with Chair Gaebler, Vice Chair Williams and Board Members Murray, Skorman, Avila and Strand in favor and Board Members Knight and Pico against.

Board Member Strand moved approval of Gas Portfolio 6 and Board Member Geislinger seconded the motion. The motion passed unanimously.

8. Adjournment

The meeting adjourned at 10:06 a.m.

8.0 Colorado Springs Utilities Board Phase Presentations

Utilities Policy Advisory Committee Electric and Gas Integrated Resource Plans Assignment

Phase 1 Recommendations

Colorado Springs Utilities Board

September 19, 2019

Agenda

- IRP Assignment and Background
- IRP Goals and Guiding Principles
- Public Input Process
- Key Inputs
- Reference Case and Sensitivities
- Next Steps

UPAC Assignment Deliverables

Public Process Oversight

Goals, Reference Case, Inputs and Sensitivities

- Recommendation to Utilities Board (Sept) and Board approval (Oct)

Portfolio Evaluation Criteria

- Recommendation to Utilities Board (Feb) and Board approval (Mar)

Portfolio Recommendation with Metrics

- Recommendation to Utilities Board (Jun) and Board approval (Jul)

IRP Process

Portfolio Recommendation with Metrics

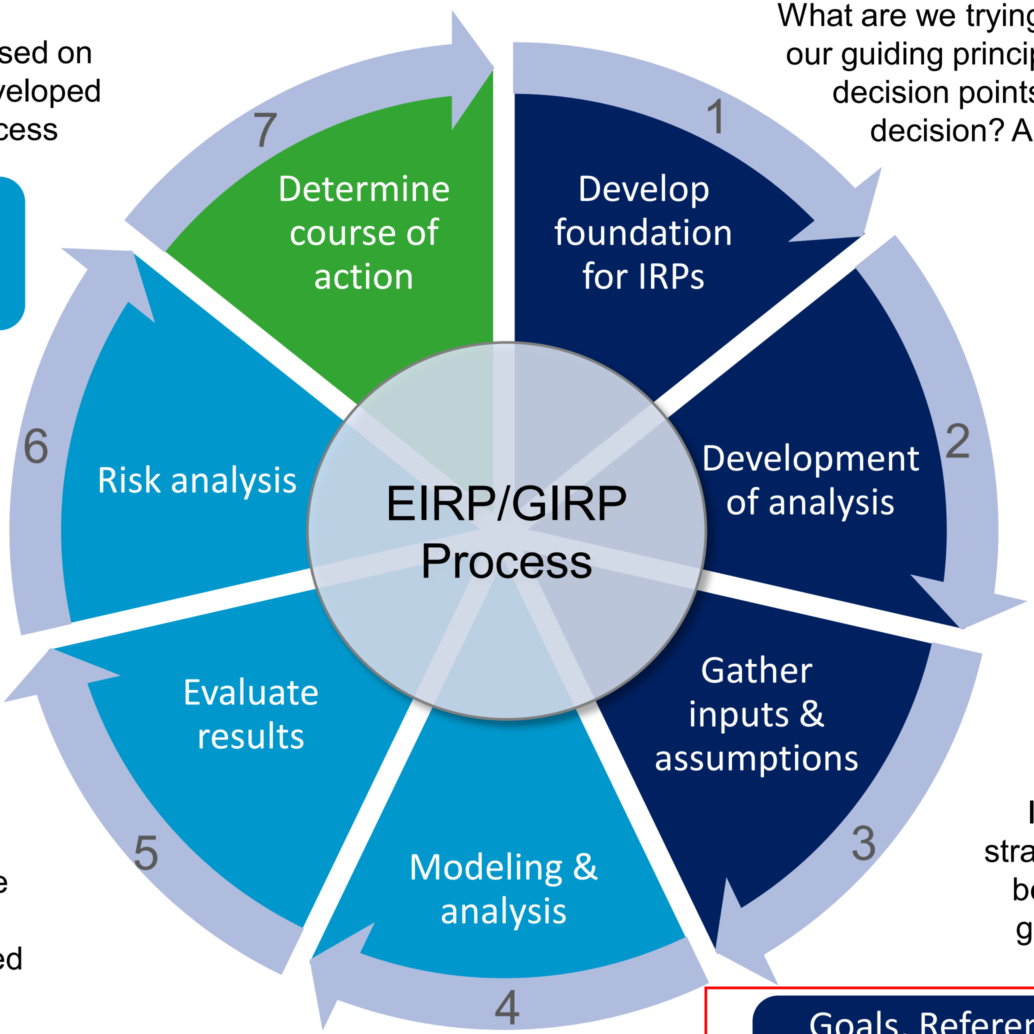
Q3 2020

What are we trying to accomplish? What are our guiding principles? What are the critical decision points? How will we make a decision? Alternative resources

Rate portfolios based on scoring criteria developed early in the process

Q1 2020

Portfolio Evaluation Criteria



Focus in on specific plans to understand the uncertainty and impact of changes in assumptions

What is being evaluated and how will it be analyzed? Sensitivities / strategies / risk / reference case

It is critical to know the strategies and sensitivities to be considered in order to gather the correct inputs

Initial results may provide insight to additional sensitivities to be evaluated

Goals, Reference Case, Inputs and Sensitivities

Q4 2019

Energy Vision

Provide resilient, reliable and cost-effective energy that is environmentally sustainable, reduces our carbon footprint and uses proven state-of-the-art technologies to enhance our quality of life for generations to come.

Pillars of the Energy Vision

IRP Goals -- Developing Long-Term Plans that Align with the Energy Vision (slide 1 of 2)

Resilient and reliable

- Industry leading reliability and resiliency while avoiding potential stranded assets
- Support economic growth of the region

Cost-effective energy

- Maintain competitive and affordable rates
- Further advance energy efficiency and demand response

Environmentally sustainable

- Grow renewable portfolio
- Establish timelines for decommissioning of assets

IRP Goals -- Developing Long-Term Plans that Align with the Energy Vision (slide 2 of 2)

Reduces our carbon footprint

- Meet all environmental regulations with specific metrics that include reducing our carbon footprint
- Reduce reliance on fossil fuels

Uses proven state-of-the-art technologies

- Proactively and responsibly integrate new technologies

to enhance our quality of life for generations to come

Public Input Process

Goals

- Engage with customers in the development of the Electric and Natural Gas IRPs and planning for future energy resources for Colorado Springs.
- Provide this customer input to the Utilities Policy Advisory Committee and the Utilities Board regularly until the IRPs are approved (to occur no later than August 2020).

Objectives

- Conduct public listening sessions and engage with key stakeholders.
- Conduct surveys among residents and businesses within our community to measure public opinion of proposed IRPs.
- Leverage various communication channels to:
  - Educate customers about the new Energy Vision, Pillars, Guiding Principles and their role in the creation of the IRPs
  - Encourage community involvement in the planning process
  - Inform customers of the approved IRPs

Stakeholder Outreach – Key Groups

- Apartment Association
- Association of Realtors
- Black Chamber of Commerce
- Building Owners & Managers Assoc. (BOMA)
- City of Colorado Springs
- Colorado Springs Chamber/EDC
- Colorado Springs Forward
- Colorado Springs Leadership Institute (CSLI)
- Colorado Springs Young Professionals
- Council of Neighbors and Organizations (CONO)
- Downtown Colorado Springs Rotary
- Downtown Partnership
- Energy Resource Center
- Health Foundation
- Hispanic Chamber of Commerce
- Housing & Building Association
- Leadership Pikes Peak (LPP)
- Military Installations
  - Fort Carson
  - Peterson Air Force Base
  - United States Air Force Academy
- Neighboring Communities
  - City of Fountain
  - City of Manitou Springs
- Pikes Peak Area Council of Governments (PPACG)
- Pikes Peak Community Foundation
- Pikes Peak Small Business Development Center
- School Districts
- Sierra Club – Colorado Springs Chapter
- Student Groups
  - Colorado College
  - Pikes Peak Community College
  - University of Colorado at Colorado Springs
- Together for Colorado Springs
- Women's Chamber

Phase 1 Communications Outreach

- Paid Media
  - Print (Aug. 21 & 28)
  - Social media advertising (Aug. 12-28)
- Customer Newsletters (August)
  - Connection
  - Smart Home
  - First Source
- Social media event (August)
- Media advisory (Aug. 26)

Phase 1
Public Outreach and Comment Summary

- Comments collected from public meetings and emails
- Public Comment Summary
  - 6 emails
- Events
  - Wagon Trail Recreation Association
  - Chapel Hills Safety Day
  - Smart Home "Ask the Experts" Day
- Public Meetings
  - Sustainability in Progress
  - City of Manitou Springs City Council Workshop
  - Colorado Springs Utilities IRP Public Workshop
  - Downtown Rotary Meeting
- Results from Energy Vision public survey conducted in Spring 2019

Methodologies/Sources on Key Inputs

- **Electric Load Forecasts**
  - Historical trends: ABB Group
  - Population and economic: UCCS economic forecast
  - Modeling: Energy Information Administration (EIA), Bloomberg, Itron
- **Gas Peak Load Forecasts**
  - Regression based modeling and weather analysis
- **Demand Side Management Potential Study**
  - Cadmus
  - Baseline system loads from sector, segment, end use baseline loads
  - Customer solar photovoltaic and battery potential
- **Planning Reserve Margin**
  - General Electric
- **Gas Price Forecast**
  - ABB Group
  - Staff forecast
- **Potential Electric and Gas Resources**
  - Energy Information Administration (EIA)
  - Gas: Staff Recommendations

Definitions: Reference Case and Sensitivities

Reference Case

- Status quo with existing policies, Board directives and updated inputs
- Existing and approved assets

Sensitivities

- A change to the status quo to determine potential scenarios

Electric IRP Reference Case (draft)

Reference Case Assumptions	Methodology (Study period through 2050)
Load Forecast	Utilize Planning and Finance Department's peak demand and sales forecasts
Planning Reserve Margin	16.5%. Recommendation from reserve margin study
Commodity Price Forecast (Gas, Coal, Energy Market)	First 5 years utilizes short-term forward pricing. Fundamental forecast utilized between 2025-2050.
Energy Efficiency	1% annual energy efficiency savings/spend throughout study period. No dispatchable capacity provided beyond what's included in load forecast.
Renewables	264 Megawatt (MW) solar and 25 MW battery by 2024. Rooftop solar provides no additional capacity on peak. Integration costs from Xcel Balancing Authority.
Drake and Birdsall[1]	Retire by 2035; no selective catalytic reduction control
Nixon	No selective catalytic reduction control (will perform sensitivities around nitrogen oxides [NO_x] controls). Not retired during study period.
Front Range	No selective catalytic reduction control (will perform sensitivities around NO_x controls). Not retired during study period.
Hydro	Maintain/extend existing hydro contracts through Western Area Power Administration (WAPA)
Interruptible Customer Load	Assume 20 MW of interruptible load throughout study period
Transmission	Full transmission project to import replacement generation for Drake/Birdsall[2]

1. Replacement Generation is Gas Reciprocating Engines
2. Assumes no generation at Drake or Birdsall sites

EIRP Sensitivities (draft)

- High and low load growth
- Low cost energy efficiency
- High demand response potential
- Regional transmission organization (RTO)/Market
- High and low natural gas prices
- Plant decommission dates*
- Carbon reduction*
- Renewables*
- Military resiliency
- Low energy purchases available
- High and low renewables/battery costs
- Carbon price
- High renewable integration costs
- Extension of investment tax credit/ production tax credit (ITC/PTC)
- Higher and lower planning reserve margin
- Front Range reliability[1]

*see subsequent slides

1. Control Upgrades, isolate combustion turbine from steam turbine

Plant Decommission Sensitivities (draft)

	Decommissioning Sensitivities	Selective Catalytic Reduction
Drake/Birdsall	All units in – 2023, 2025, 2028, 2030 Birdsall Only 2025 Drake 6 only 2025	
Nixon 1	2026, 2030, 2035, 2040, 2050	2028
Front Range	2030, 2040, 2050	2028, 2038

Renewables Sensitivities (draft)

- 100% by 2030
- 100% by 2040
- 100% by 2050
- 100% by 2030 (market purchases available)
- 100% by 2040 (market purchases available)
- 100% by 2050 (market purchases available)
- 30% and 50% by 2030
- 40% and 60% by 2040
- 60% and 80% by 2050
- 100% Carbon Reduction by 2050
- 90% Carbon Reduction by 2050

Carbon Reduction Sensitivities (draft)

- 50% by 2030, 90% by 2050[1]
- 50% by 2030, 100% by 2050
- 50% by 2030, 80% by 2040, 90% by 2050
- 80%[2] by 2030, 90% by 2050
- 80% by 2030, 100% by 2050

1. State requirement. Uncertain if electric utility will have to exceed these goals
2. Intended to represent carbon reduction that includes Drake and Nixon retirement

Gas IRP Reference Case (draft)

Reference Case Assumptions	Methodology (Study period through 2050)
Load Forecast	Utilize Planning and Finance Department's peak demand and sales forecasts
Hourly Peak Factor[1]	5.1% based on recent study conducted by gas planning
Natural Gas Price Forecast	First 5 years utilizes short-term forward pricing. Fundamental forecast utilized between 2025-2050.
Gas-fired generation	No new local distributing company (LDC) load from gas-fired generation
Interruptible Customer Load	Assume no change to prior years
Current Capacity	Assume no changes to current capacity charges (Firm, No Notice Transport (Storage), Propane Air)

1. Planning Criteria is a 1 hour in 25 year event
Design Temperature is -13F daily average

GIRP Sensitivities (draft)

- High and low load growth
- High and low gas prices
- Firm reservation cost
- Firm and non-firm capacity options
- Higher heat content fuel
- Gas demand side management potential
- Gas-fired generation sensitivities to align with EIRP capacity expansion
- Planning criteria alternatives 1-in-10 year event (vs. 1-in-25 year event)

Next Steps

October

- Board approval of IRP Phase 1
- UPAC begins IRP Phase 2

January

- Public meeting for IRP Phase 2

February

- UPAC recommendations for IRP Phase 2

March

- Board approval of IRP Phase 2

Utilities Policy Advisory Committee

Electric and Gas Integrated Resource Plans
Phase 1

Questions, Discussion

Utilities Policy Advisory Committee Electric and Gas Integrated Resource Plans

Phase 2 Recommendations

Colorado Springs Utilities Board

February 19, 2020

Utilities Board Agenda

- Review IRP Process
- Phase 1 Summary
- Phase 2 Public Process Summary
- Phase 2 Deliverable Recommendation

UPAC Assignment Deliverables

Public Process Oversight

Reference Case, Inputs, Sensitivities, and Goals →

- Recommendation to Utilities Board (Sept) and Board approval (Oct)

Portfolio Attributes →

- Recommendation to Utilities Board (Feb) and Board approval (Mar)

Portfolio Recommendation with Metrics

- Recommendation to Utilities Board (Jun) and Board approval (Jul)

Phase 1 Summary

Electric IRP Reference Case

Reference Case Assumptions	Methodology (Study period through 2050)
Load Forecast	Utilize Planning and Finance Department's peak demand and sales forecasts.
Planning Reserve Margin	16.5%. Recommendation from reserve margin study .
Commodity Price Forecast (Gas, Coal, Energy Market)	First 5 years utilizes short-term forward pricing. Fundamental forecast utilized between 2025-2050.
Energy Efficiency	1% annual energy efficiency savings/spend throughout study period. No dispatchable capacity provided beyond what's included in load forecast.
Renewables	264 Megawatt (MW) solar and 25 MW battery by 2024. Rooftop solar provides no additional capacity on peak. Integration costs from Xcel Balancing Authority.
Drake and Birdsall[1]	Retire by 2035; no selective catalytic reduction control.
Nixon	No selective catalytic reduction control (will perform sensitivities around nitrogen oxides [NO_x] controls). Not retired during study period.
Front Range	No selective catalytic reduction control (will perform sensitivities around NO_x controls) Not retired during study period.
Hydro	Maintain/extend existing hydro contracts through Western Area Power Administration (WAPA).
Interruptible Customer Load	Assume 20 MW of interruptible load throughout study period.
Transmission	Full transmission project to import replacement generation for Drake/Birdsall[2]

1. Replacement Generation is Gas Reciprocating Engines
2. Assumes no generation at Drake or Birdsall sites

EIRP Sensitivities

- High and low load growth
- Low cost energy efficiency
- High demand response potential
- Regional transmission organization/market
- High and low natural gas prices
- Plant decommission dates[1]
- Carbon reduction[1]
- Renewables[1]
- Military resiliency
- Low energy purchases available
- High and low renewables/battery costs
- Carbon price
- High renewable integration costs
- Extension of investment tax credit/ production tax credit
- Higher and lower planning reserve margin
- Annexations
- Front Range reliability[2]

1. See subsequent slides
2. Control Upgrades, isolate combustion turbine from steam turbine

Plant Decommission Sensitivities

	Decommissioning Sensitivities	Selective Catalytic Reduction
Drake/Birdsall	All units in – 2023, 2025, 2028, 2030 Birdsall Only 2025 Drake 6 only 2025	
Nixon 1	2026, 2030, 2035, 2040, 2050	2028
Front Range	2030, 2040, 2050	2028, 2038

SCR = Selective Catalytic Reduction

Gas IRP Reference Case

Reference Case Assumptions	Methodology (Study period through 2050)
Load Forecast	Utilize Planning and Finance Department's peak demand and sales forecasts
Hourly Peak Factor[1]	5.1% based on recent study conducted by gas planning
Natural Gas Price Forecast	First 5 years utilizes short-term forward pricing. Fundamental forecast utilized between 2025-2050, from ABB 2019 Spring reference case commodity forecast
Gas-fired generation	No new local distributing company (LDC) load from gas-fired generation
Interruptible Customer Load	Assume no change to prior years
Current Capacity	Assume no changes to current capacity charges (Firm, No Notice Transport (Storage), Propane Air)

1. Planning Criteria is a 1 hour in 25 year event
Design Temperature is -13F daily average

GIRP Sensitivities

- High and low load growth
- High and low gas prices
- Firm reservation cost
- Firm and non-firm capacity options
- Higher heat content fuel
- Gas demand side management potential
- Gas-fired generation sensitivities to align with EIRP capacity expansion
- Planning criteria alternatives 1-in-10 year event (vs. 1-in-25 year event)

Phase 2
Public Process Summary

IRP Phase 2 Communications Outreach

Paid Media

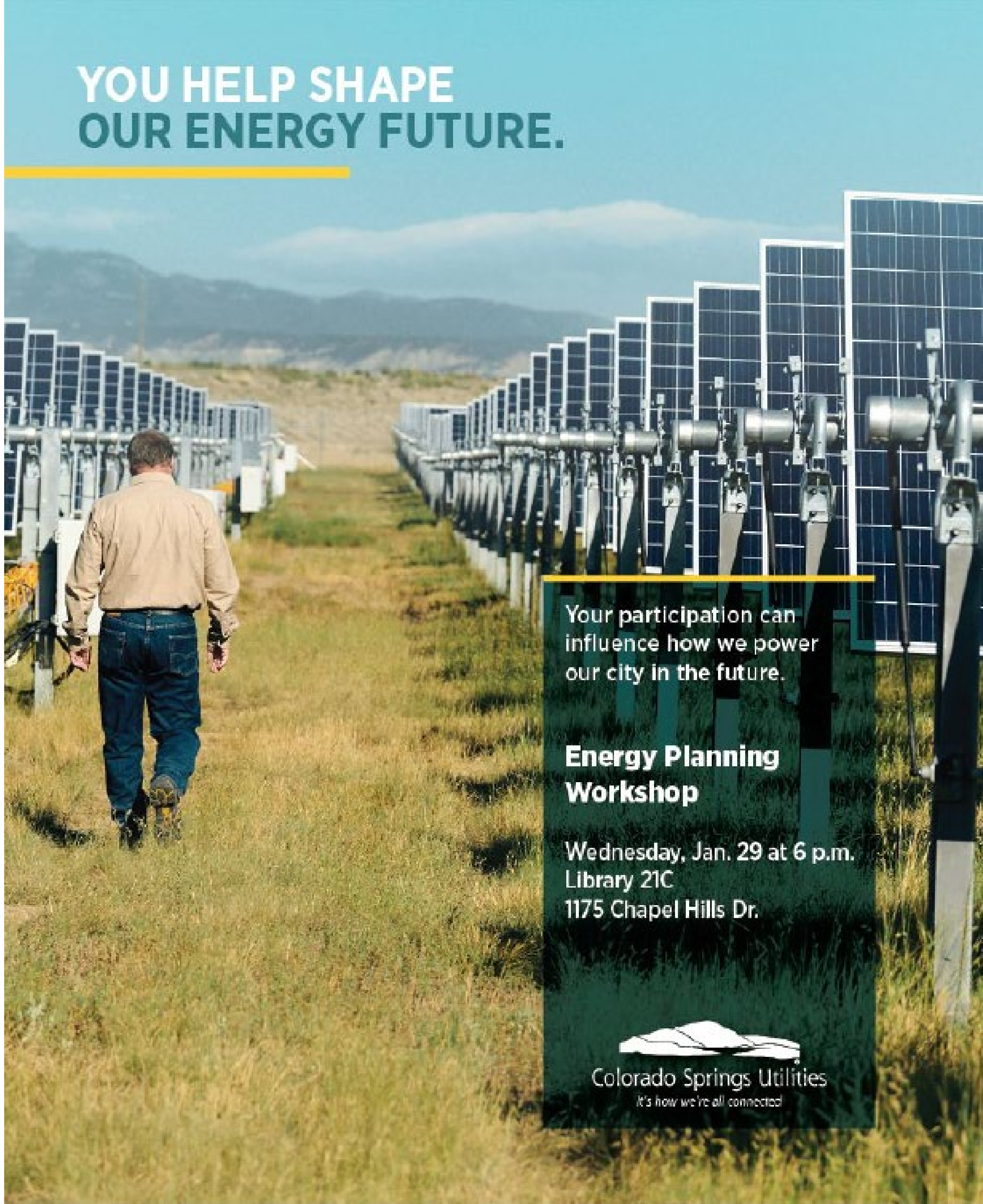
- Print (Jan. 15 & 22)
- Social media advertising (Jan. 8-29)

Newsletters (December & January)

- Connection
- Smart Home
- First Source

Social media event & posts (January)

Media advisory (Jan. 23)



Phase 2
Outreach Summary

- Public Comment Summary
  - 389 emails

- Events
  - Compassion International Wellness Fair
  - Home Depot Safety Event
  - Swerdfeger Construction
  - UCCS Cool Science Carnival
  - Fort Carson Safety Expo

- Outreach and Presentations
  - Pikes Peak Construction Specifications Institute
  - Business Customer Managed Accounts
  - QUAD Partnership Youth Outreach
  - Downtown Partnership Board of Directors
  - Manitou Springs City Council
  - Public Workshop – January 29, 2020

- Stakeholder Presentations to UPAC
  - Sierra Club Beyond Coal
  - Southeast Colorado Renewable Energy Society
  - Colorado Lung Association

IRP Phase 2
Public Comment Summary - Emails

- All public comment is provided to UPAC prior to each meeting

- Of 389 emails received at energyvision@csu.org:
  - 275 individual senders
  - "Chain" email of 170 responses

- Comments included:
  - Drake and Nixon Power Plants decommissioning in 2023/2026, including keeping lower-cost generation
  - Advocating renewable energy, primarily solar and wind
  - Concern for climate change, public health and air quality
  - Concern for capacity, rate impacts and costs moving to renewable energy
  - Inclusion of societal costs of using fossil fuels, monetizing societal costs, and concern for societal vs. renewable energy costs

Public Comment Summary
January 29 Workshop

- 172 Sign-Ins, 46 Comments Submitted
- Comments included:
  - Concern with high renewables
  - Advocate sustainability, clean air, concern for climate change
  - Close Drake or run it on natural gas
  - Utilize clean energy sources, especially solar (including on rooftops) and wind
  - Include environmental and health impacts to cost analyses
  - Use proven technology to reduce risk to ratepayers
  - Use coal for energy security
  - No certainty of costs in use of renewables
  - Use DSM/Energy Efficiency as a resource
- Attribute Comments:
  - Prioritize the environment
  - Combine innovation with flexibility/diversity

Input on Attributes

Business Customer Workshop

Key Themes:

- Concern over *cost* and what is included in *environment*
- Add *resiliency* to the attributes with *reliability*
- Desire for more mention of efficiency and DSM

Attribute Input

- Most often mentioned targets for combining with other attributes:
  - Diversity
  - Flexibility
  - Reliability
  - Stewardship
  - Innovation

Quad Youth Outreach

Key Themes:

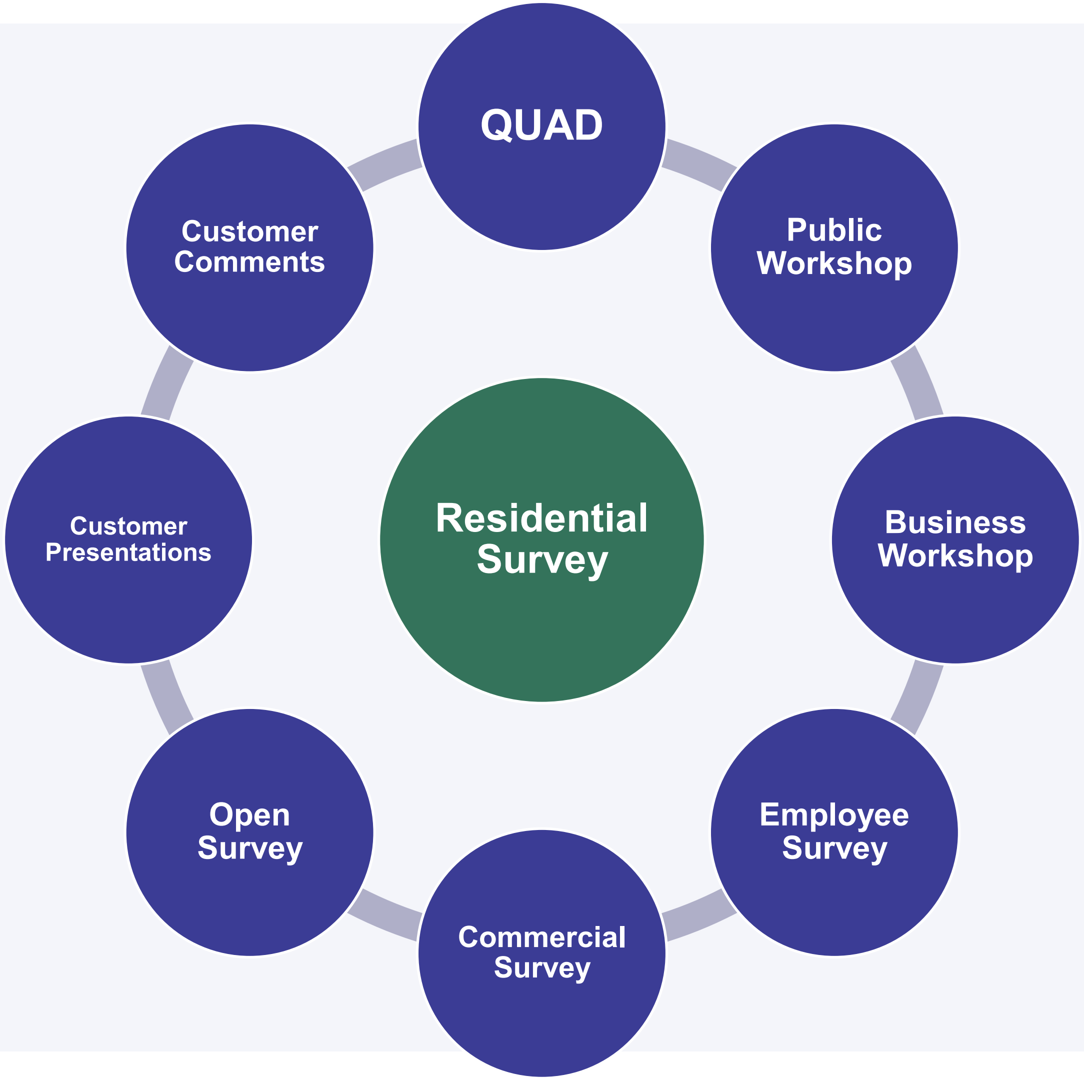
- Highest consideration given to *environment* attribute, followed by reliability and cost
- *Stewardship* had largest increase in importance after education and discussion
- Public health is an important consideration

Attribute Input

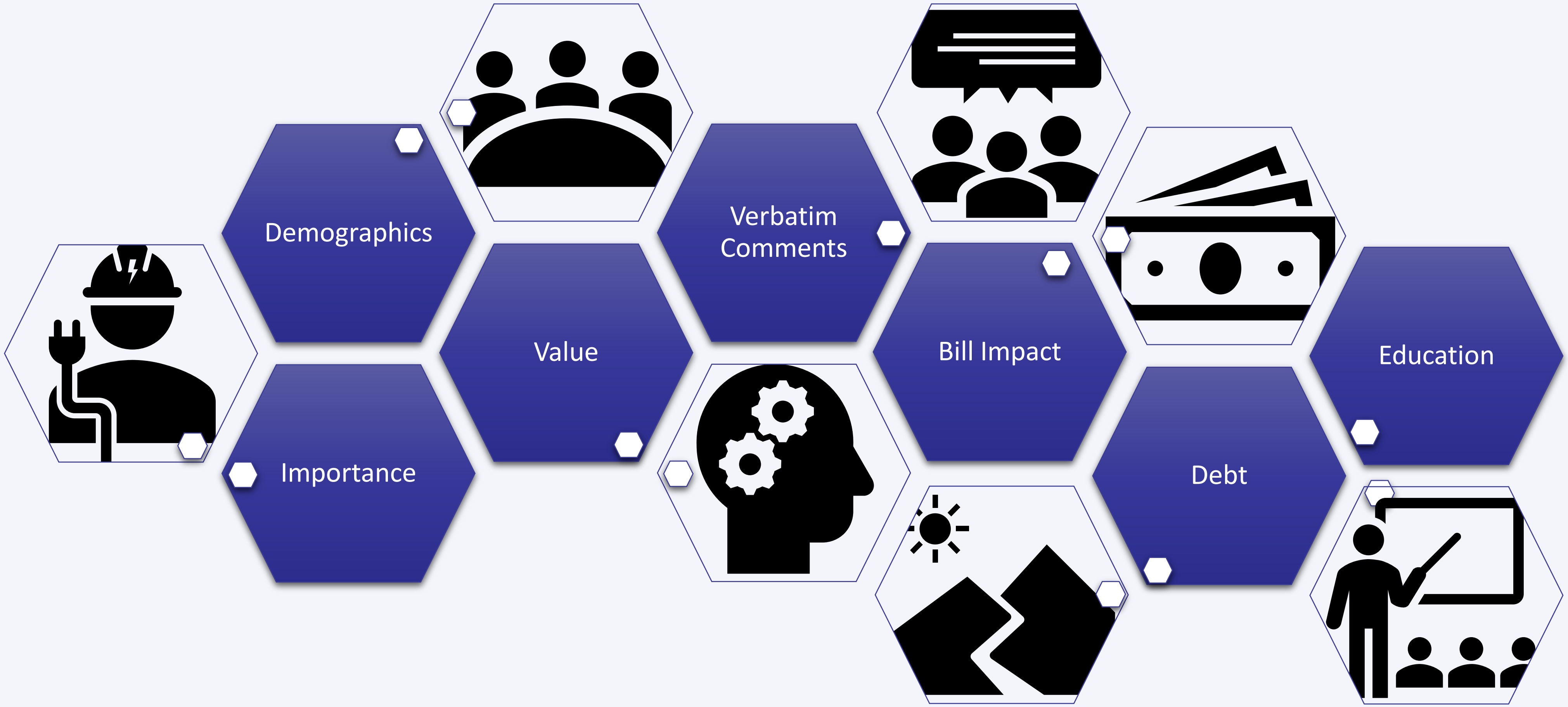
- Recommended for combining with other attributes:
  - Innovation/ Implementation
  - Reliability/Flexibility
  - Diversity/Flexibility

Survey Results

Voice of the Customer – Community Input



Survey Design



Survey Performance

- 1,918 completed surveys
- 1,824 comments reviewed

Quantitative Results

- Residential (n=619)
- Employee (n=350)

Qualitative Results

- Commercial (n=136)
- Open Web Survey (n=813)

Attributes Surveyed

Cost	Cost-effective, maintaining competitive and affordable rates, and the financial health of the utility which drives a strong economy.
Diversity	Balancing multiple types of generators and sources of fuel, including distributed generation, and reducing reliance on fossil fuels.
Environment	Sustainably grow our renewable portfolio, reduce our carbon footprint and meet all environmental regulations.
Flexibility	The ability to modify a strategy to account for regulatory and market disruptions. (e.g. Portfolio can quickly adapt to sudden change in demand.)
Innovation	Proactively and responsibly integrating technologies and programs.
Implementation	Constraints impacting the execution of a portfolio within a desired timeframe.
Reliability	The ability to react to variable or extreme daily operating conditions. (i.e. The lights stay on.)
Stewardship	Responsibly protecting and supporting quality of life now and for the future.

Key Residential Findings

- Cost, Environment, Reliability, and Stewardship were rated most important
- Cost, Environment, Reliability, and Stewardship showed to have the most value
- 39% of residential customers would resist any bill increase or up to $2
- 16% of residential customers would approve of a bill increase of $15 or more
- 49% of residential customers needed more information on the debt question

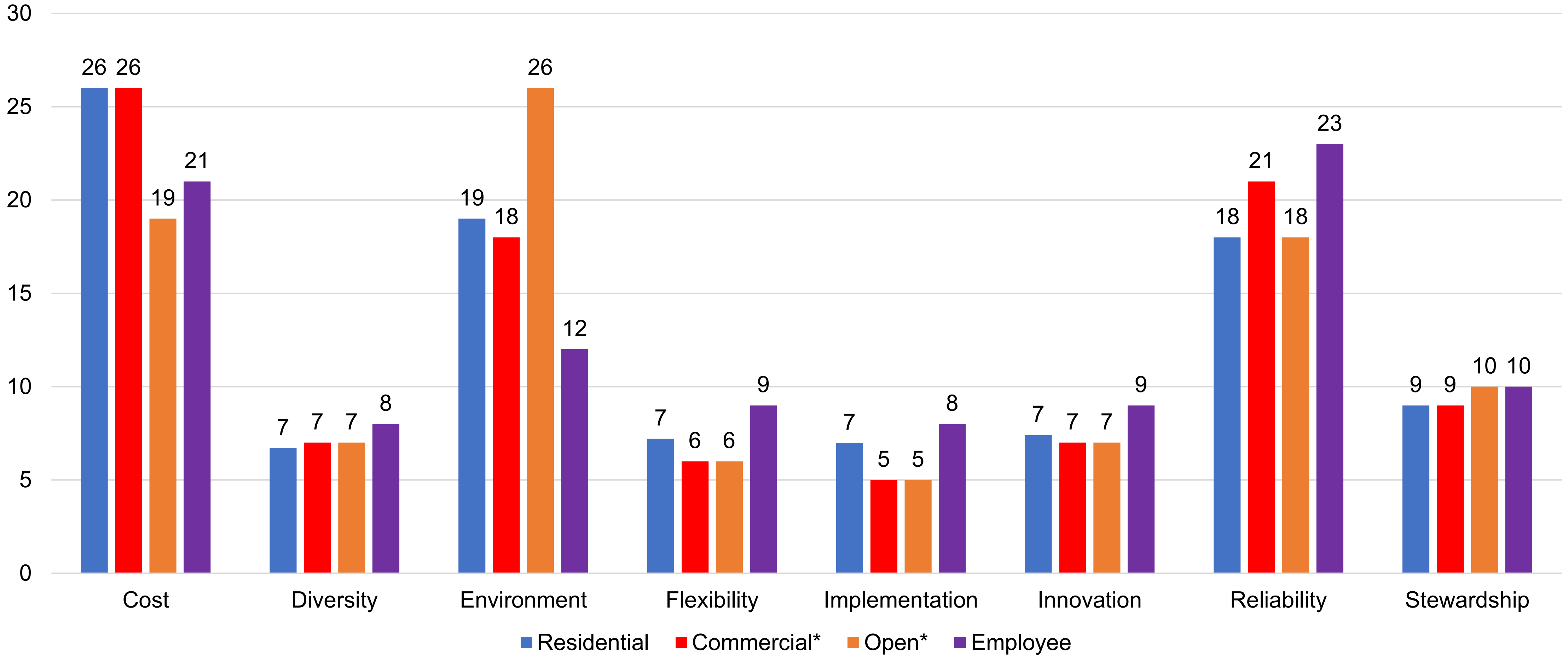
Key Findings Overall

- Top four attributes for all segments are Cost, Reliability, Environment and Stewardship
  - Residential - Focused on Cost and Reliability
  - Commercial* - Focused on Cost and Reliability
  - Employee - Focused on Reliability and Cost
  - Open* - Focused on Environment and Cost
- Diversity did not resonate on any survey

*Qualitative Results

Value Allocation By Attribute – 8

*Qualitative Results



Attribute Consolidation

- Combining related concepts
- Making measurements meaningful
- Aligning with Energy Vision pillars and goals
- Simplifying scoring process
- Considering stakeholder input

Phase 2 Attributes (5 attributes draft)

Cost	Implementation	Cost-effective, maintaining competitive and affordable rates, and the financial health of the utility which drives a strong economy while being able to execute the portfolio within a desired timeframe.
Environment	Stewardship	Sustainably grow our renewable portfolio, reduce our carbon footprint, meet all environmental regulations while responsibly protecting and supporting quality of life now and for the future.
Flexibility	Diversity	The ability to modify a strategy to account for regulatory and market disruptions through balancing multiple types of generators and sources of fuel, including distributed generation, and reducing reliance on fossil fuels.
Innovation		Proactively and responsibly integrating technologies and programs.
Reliability		The ability to react to variable or extreme daily operating conditions. (i.e. The lights stay on.)

IRP Phase 2 Recommendations

Phase 2 Recommendations Process

INPUT (Qualitative and Quantitative)

IRP Phase 1:

- Reference Case, Inputs & Sensitivities
- Energy Vision goals
- Colorado legislation
- Industry trends
- Information from staff
- Customer, employee & open surveys
- Input at public meetings
- Email comments
- Stakeholder input

UPAC

- Selected eight attributes
- Based on public input consolidated eight attributes to five
- Members individually applied weightings
- Members deliberated and finalized weightings as a group
- Recommend attributes and weightings to Utilities Board

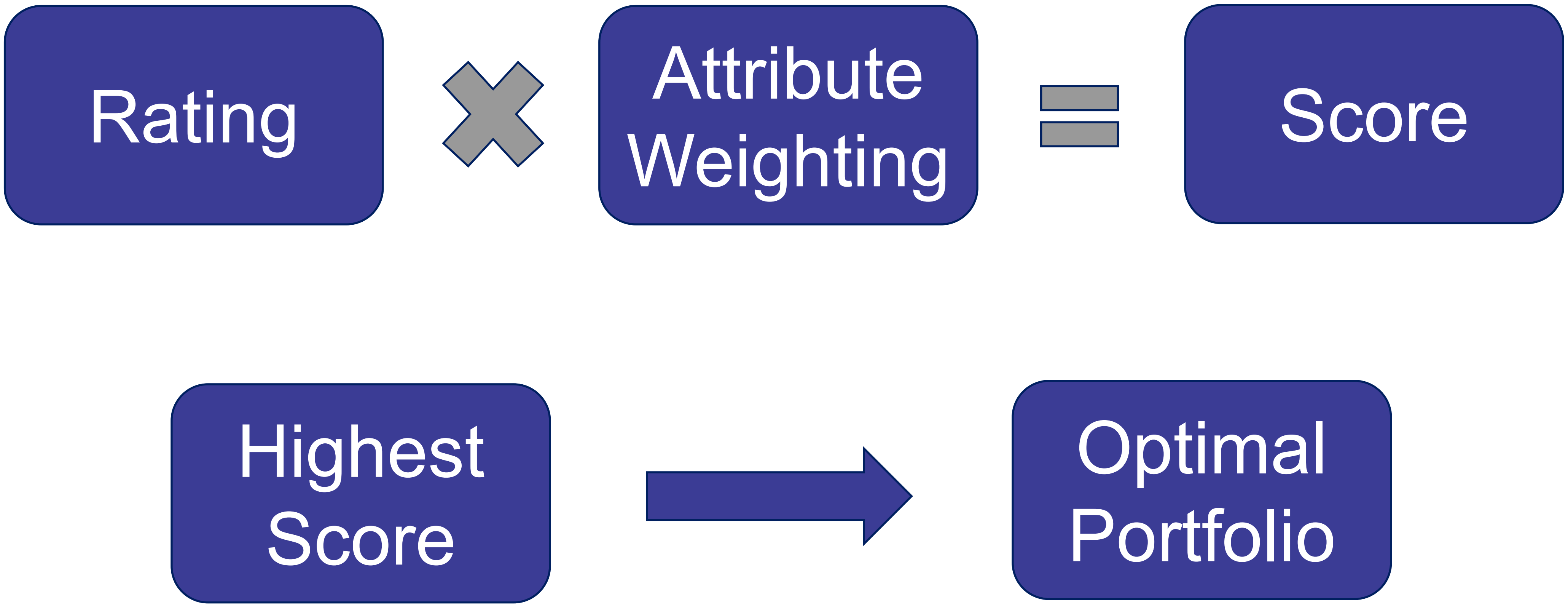
UTILITIES BOARD

- Discuss and approve final attributes and weighting

Phase 2 Recommended Attributes and Weighting

Attribute	Weight
Reliability Ability to react to variable or extreme daily operating conditions (i.e., the lights stay on).	32%
Cost/Implementation Cost-effectively maintain competitive, affordable rates and the financial health of the utility to drive a strong economy with ability to execute portfolio in desired timeframe.	24%
Environment/Stewardship Sustainably grow renewable portfolio, reduce carbon footprint and meet all environmental regulations while responsibly protecting and supporting quality of life now and for the future.	22%
Flexibility/Diversity Ability to adapt to regulatory and market disruptions by balancing multiple types of generators and fuel sources, including distributed generation, and reduce reliance on fossil fuels.	14%
Innovation Proactively and responsibly integrate technologies and programs.	8%

Applying Attribute Weighting to Portfolios



Scoring Example

Year	Portfolio 1	
2023		
2024	25 MW Battery	150 MW Solar
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033	New Gas Supply	
2034	265 MW RECIP	
2035	Decommission Drake 6 & 7	
2036		
2037		
2038		
2039		
2040		
2041		
2042	New Gas Supply	
2043	65 MW RECIP	
2044		

Attribute	Weighting		Portfolio 1		Score
Reliability	32%	×	4	=	128
Cost / Implementation	24%	×	5	=	120
Environment / Stewardship	22%	×	1	=	22
Flexibility / Reliability	14%	×	3	=	42
Innovation	8%	×	2	=	16

Example Rating Criteria

Cost/Implementation	Score	Portfolio 1	Portfolio 2	Cost/Implementation	Score	Portfolio 1	Portfolio 2
Lowest Revenue Requirement	5			Operational lead time 1 year or less	5		
	4			Operational lead time less than 3 years	4		
	3			Operational lead time less than 5 years	3		
	2			Operational lead time less than 10 years	2		
Highest Revenue Requirement	1			Operational lead time 10 year or more	1		

Next Steps

March

- Utilities Board approval of IRP Phase 2
- UPAC begins IRP Phase 3

April

- Public survey for IRP Phase 3

May

- Public Workshop

June

- UPAC IRP recommendations to Utilities Board

July

- Board approval of IRP

Utilities Policy Advisory Committee

Electric and Gas Integrated Resource Plans
Phase 2

Questions, Discussion

Colorado Springs Utilities
It's how we're all connected

Electric and Gas Integrated Resource Plans

Utilities Policy Advisory Committee

June 3, 2020

Agenda

- Legislative update (for ELT only)
- Public process update
- Portfolios with Scoring, Financial Results, Sensitivities and Risks
- IRP Workshop and Workbook
- Recommendation to Utilities Board
- Finalize June Utilities Board presentation
- Next assignment for UPAC

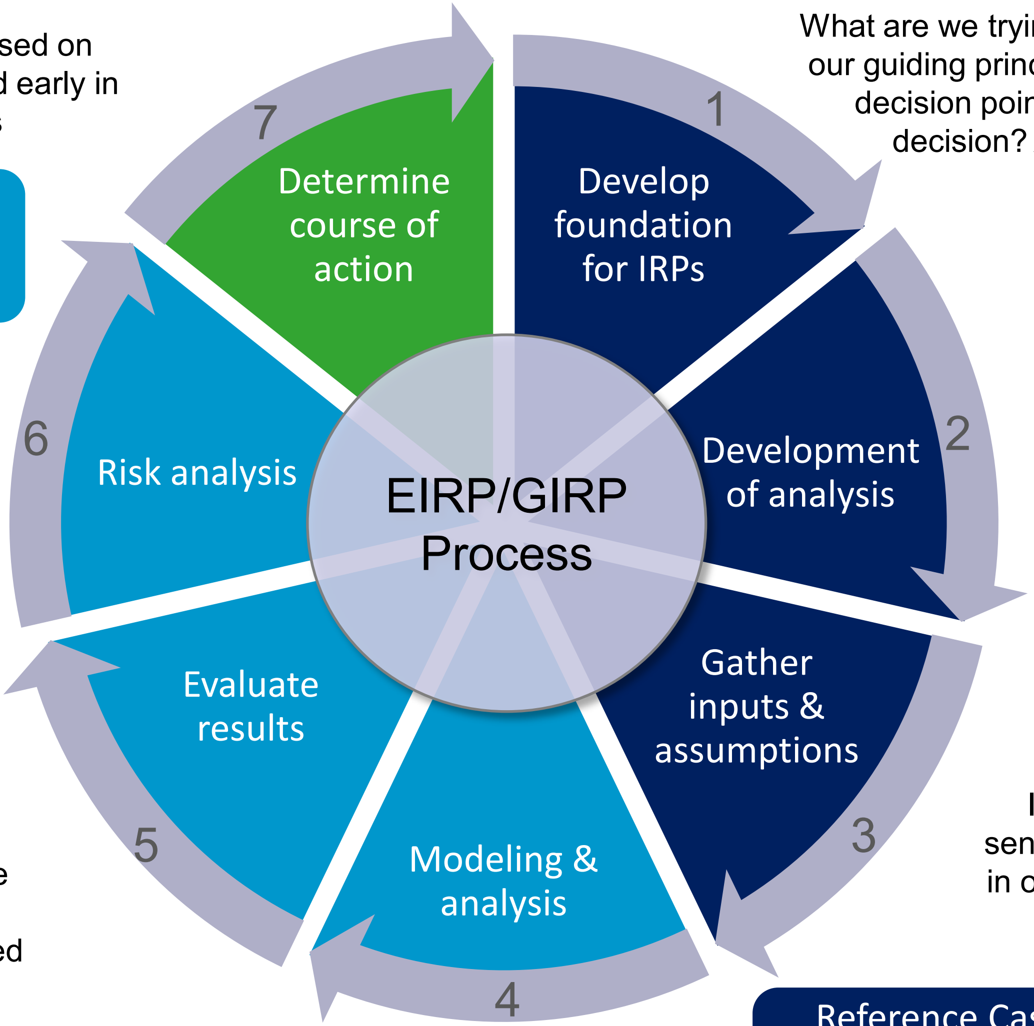
IRP Process

Portfolio Recommendation with Metrics Q3 2020

Rate portfolios based on attributes developed early in the process

Q1 2020 **Portfolio Attributes**

What are we trying to accomplish? What are our guiding principles? What are the critical decision points? How will we make a decision? Alternative resources



What is being evaluated and how will it be analyzed? Sensitivities / risk / reference case

Focus in on specific plans to understand the uncertainty and impact of changes in assumptions

It is critical to know the sensitivities to be considered in order to gather the correct inputs

Initial results may provide insight to additional sensitivities to be evaluated

Reference Case, Inputs, Sensitivities, and Goals Q4 2019

Legislative update

Regulatory Landscape Coming Into Focus

CEO and CDPHE presentations to AQCC and PUC that HB19-1261 goals cannot be met without 80 x 30 emissions reductions from all Colorado generators

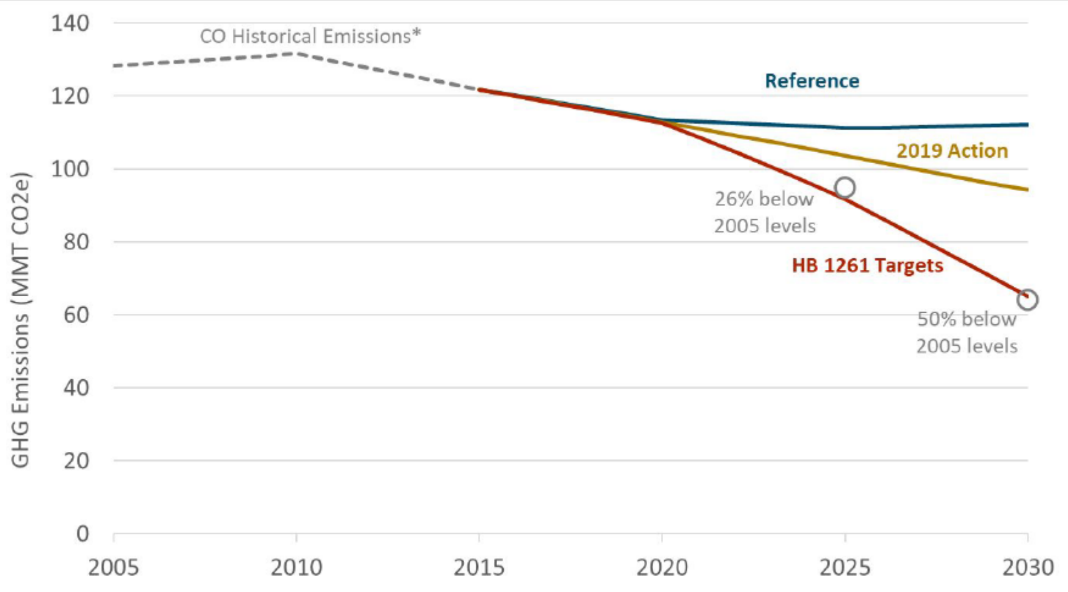
- Any scenarios that achieve 1261 targets will likely require 80%+ emissions reductions in generation by 2030…." –CEO & CDPHE presentation to the Colorado PUC on 05/11/20

Utility Peer Announcements

- Xcel: 80 x 30 / Comanche 1 & 2 (3 / Brush / Hayden?) / Must file CEP
- TSGT: 90 x 30 (gen) 70 x 30 (sales) / No coal / Will file CEP
- BHE: No coal (CACJ 2010) / Will file CEP
- PRPA: 90 x 30* / No coal* / Likely to File CEP*

Recent State Presentation Takeways

Scenarios



- ***Reference Scenario***
  - Existing policies and actions included (e.g. federal CAFE standards)
- ***2019 Action Scenario***
  - Adds recent policies (e.g. 2019 CO Legislative Session)
- ***1261 Target Scenario(s)***
  - Illustrative measures not currently in CO policy that will help the State meet GHG targets

*revised post-2005 with constant Oil & Gas emissions

COLORADO Energy Office | COLORADO Department of Public Health & Environment | COLORADO Department of Agriculture | COLORADO Department of Transportation | COLORADO Department of Natural Resources

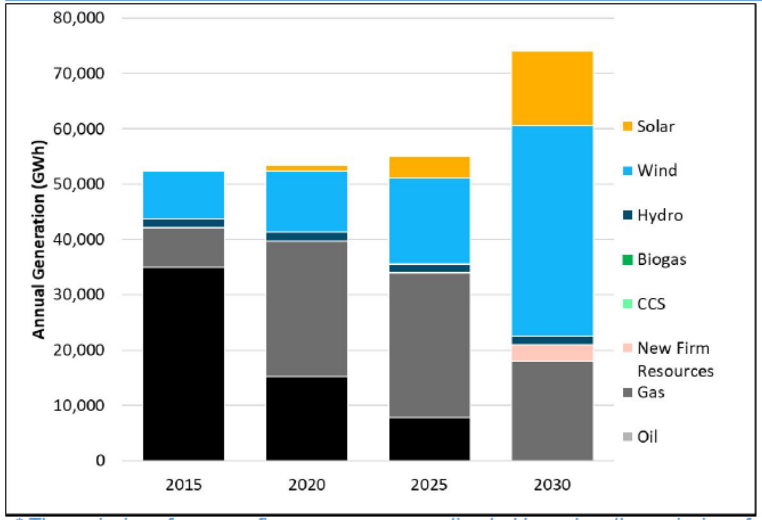
Recent State Presentation Takeways

Potential Electricity Supply - HB 1261 Targets

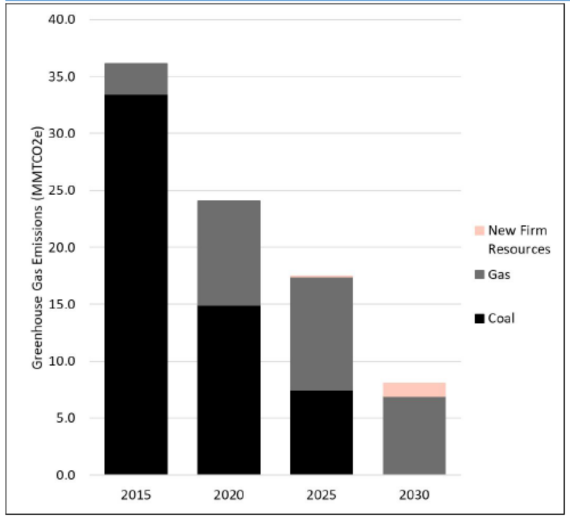
Key Observations
Coal plants are retired by 2030 to meet the GHG emission reduction target
Wind, solar, batteries, and new firm resources are added to replace coal

Metric	2025	2030
GHG Emissions (MMT)	17.5	8.1
Effective RPS (%)	40%	75%

Energy Balance (GWh)



Emissions (MMT CO2e)



* The emissions from new firm resources are estimated based on the emissions from equivalent gas plants

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Recent State Presentation Takeways

Some key takeaways

- Electricity generation, transportation and building electrification, and energy efficiency account for more than 50% of potential 2030 reductions
- PUC has a key role through ERPs, CEPs, transportation electrification plans, beneficial electrification, and gas and electric DSM
- Any scenarios that achieve 1261 targets will likely require 80%+ emissions reductions in generation by 2030, significant utility support for transportation and building electrification, and strong utility DSM

COLORADO Energy Office | COLORADO Department of Public Health & Environment | COLORADO Department of Agriculture | COLORADO Department of Transportation | COLORADO Department of Natural Resources

Two Regulatory Paths Available

Clean Energy Plan

- Must achieve least 80 x 30
- Verified by PUC & APCD
- Ultimately approved by governing board
- “Safe harbor” through 2030

AQCC Rule Making

- Required reductions unknown, but safe to assume 80 x 30 based on input being provided
- Process will be open to entire state
- State Agencies will be reaching out to develop potential compliance scenarios (summer 2020)

CEP Advantages (Certainty)

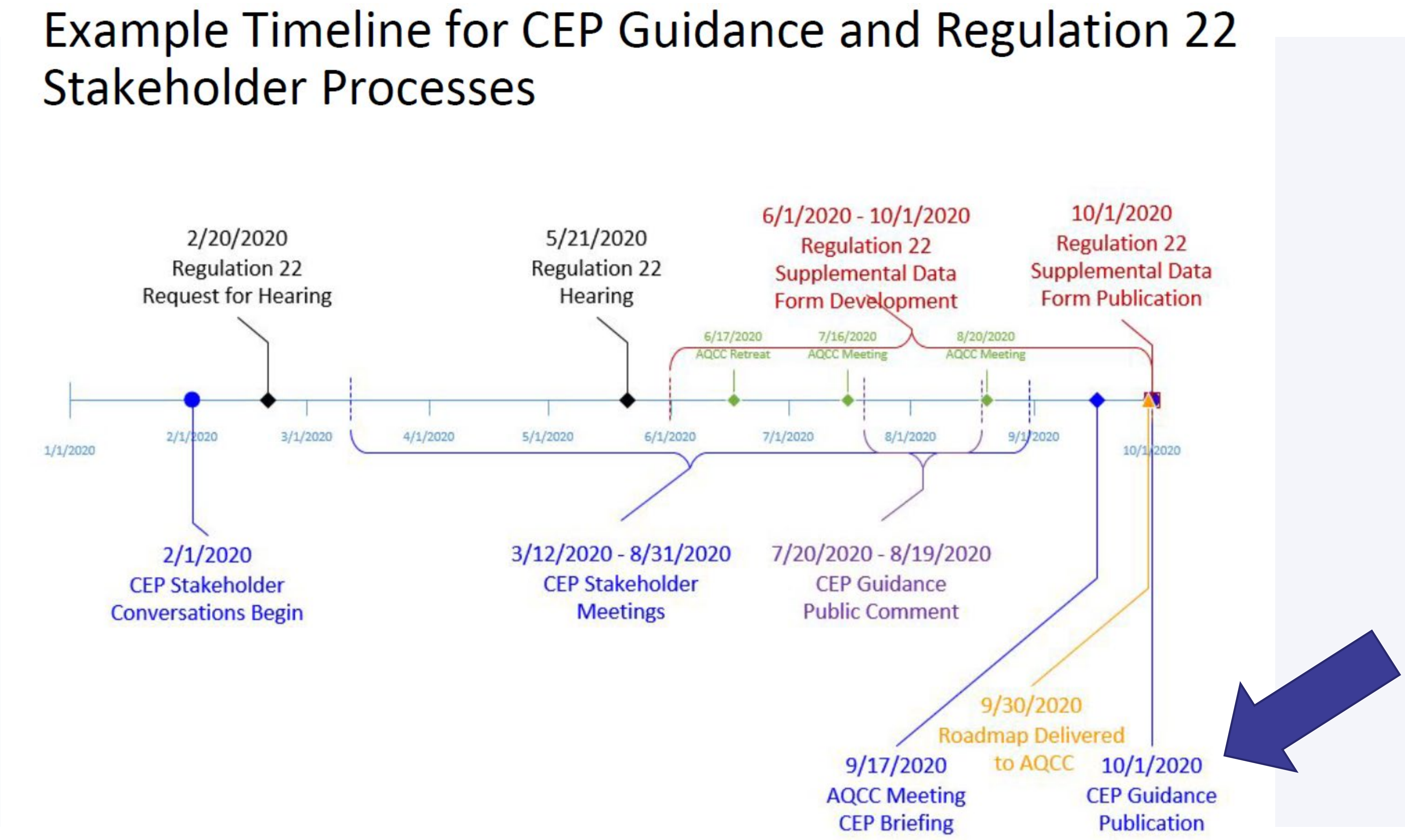
PUC

- Voluntary for MOUs
- Deemed approved if 80 x 30 jointly verified by APCD
- No additional jurisdiction
- Must account for system reliability (SB19-236)
- Max retail rate impact 1.5% (SB19-236)

AQCC / APCD

- Already crafting parameters
- Shall take CEP into consideration
- Shall not
  - Dictate mix of generation
  - Mandate additional reductions (through 2030)
  - Impose direct costs associated with remaining GHGs if CEP achieves at least 75% x 30 (through 2030)

CEP Timeline



Concluding Thoughts

What we know:

- State law requires us to reduce our GHG emissions
- Safe assumption that 80 x 30 will be our expected target
- APCD will be verifying our plan either way

What we don’t know:

- What a CEP process looks like (though picture getting clearer)
- Does filing a CEP pose significant precedent issues with PUC?
- Does filing a CEP necessarily provide an advantage?
  - Is the so-called “safe harbor” safe? / What about post 2030?

Recommendation

- All of the portfolios UPAC selected in May put us on track from a policy and decision-making standpoint for meeting the 80% reduction by 2030.
- UPAC would recommend one of these portfolios (with a couple of alternates) to the Board for consideration of approval.
- We recommend expressing to the state agencies (after the Board IRP decision) that we intend to file an associated CEP, and that this would be sometime subsequent to the finalization of the associated guidance document.
- In the meantime, Environmental Services, Government Affairs and Energy Planning will continue to flesh out requirements for two compliance paths.

Public process update

Communication Outreach

IRP Phase III Public Participation

Utilities Policy Advisory Committee

- May 6
- June 3 – Finalize portfolio recommendations

Utilities Board

- June 17 – Discuss UPAC's portfolio recommendation
- June 26 - Consider approval of final portfolios

Workshop

- May 14, 6:00 pm – Public Telephone Town Hall
- June 19, Business Customer Meeting

Survey

- April 1 – May 3

Email energyvision@csu.org

Website: csu.org

Integrated Resource Plan – Next Steps External Engagement

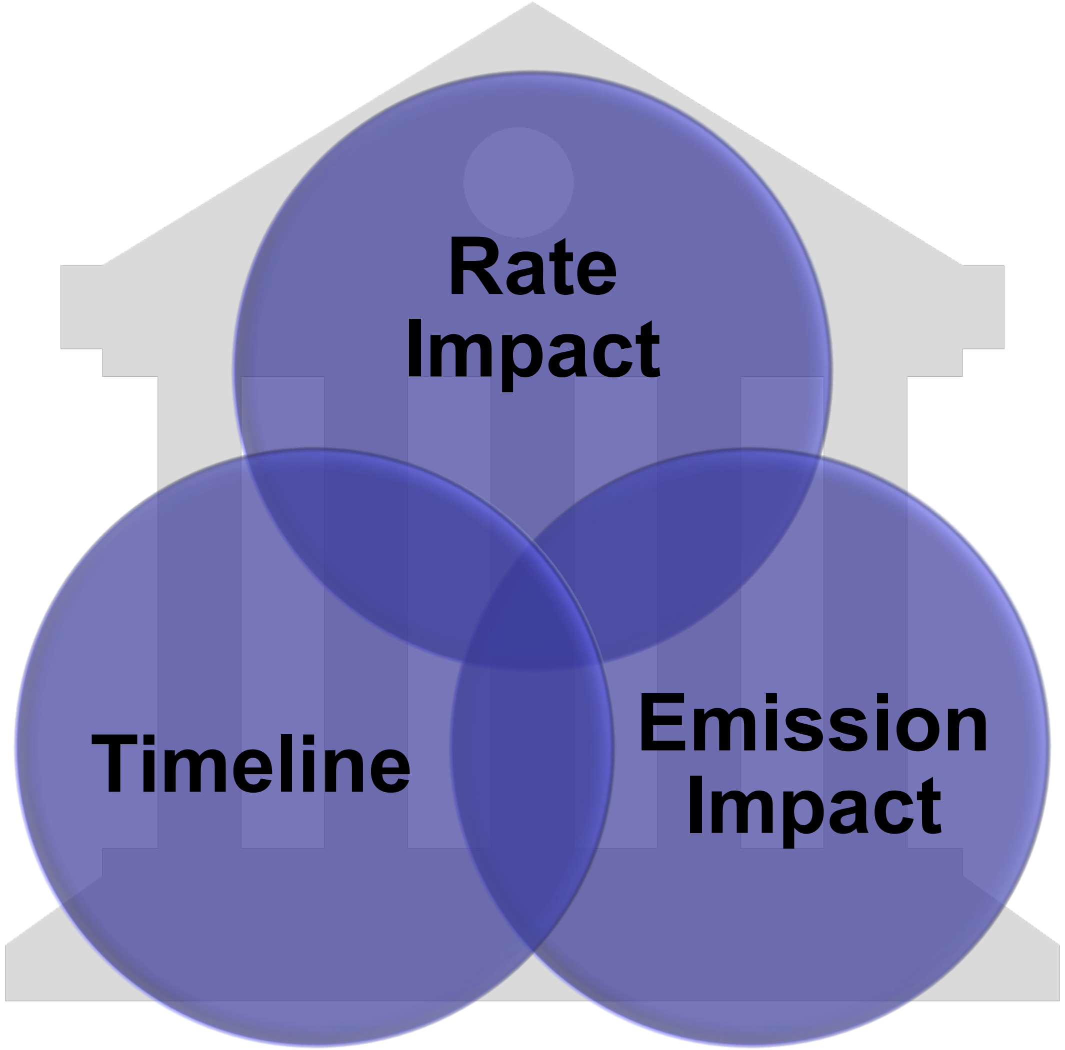
Date	Activity
June 17: 9:30am – 12pm	Joint UPAC/UB Workshop for in-depth portfolio review
June 17: 1pm	Utilities Board meeting: UPAC formally recommends portfolio
June 26: 8am – 10am	Special Utilities Board meeting: final approval of portfolio

Telephone Town Hall Summary

QUAD Youth Outreach

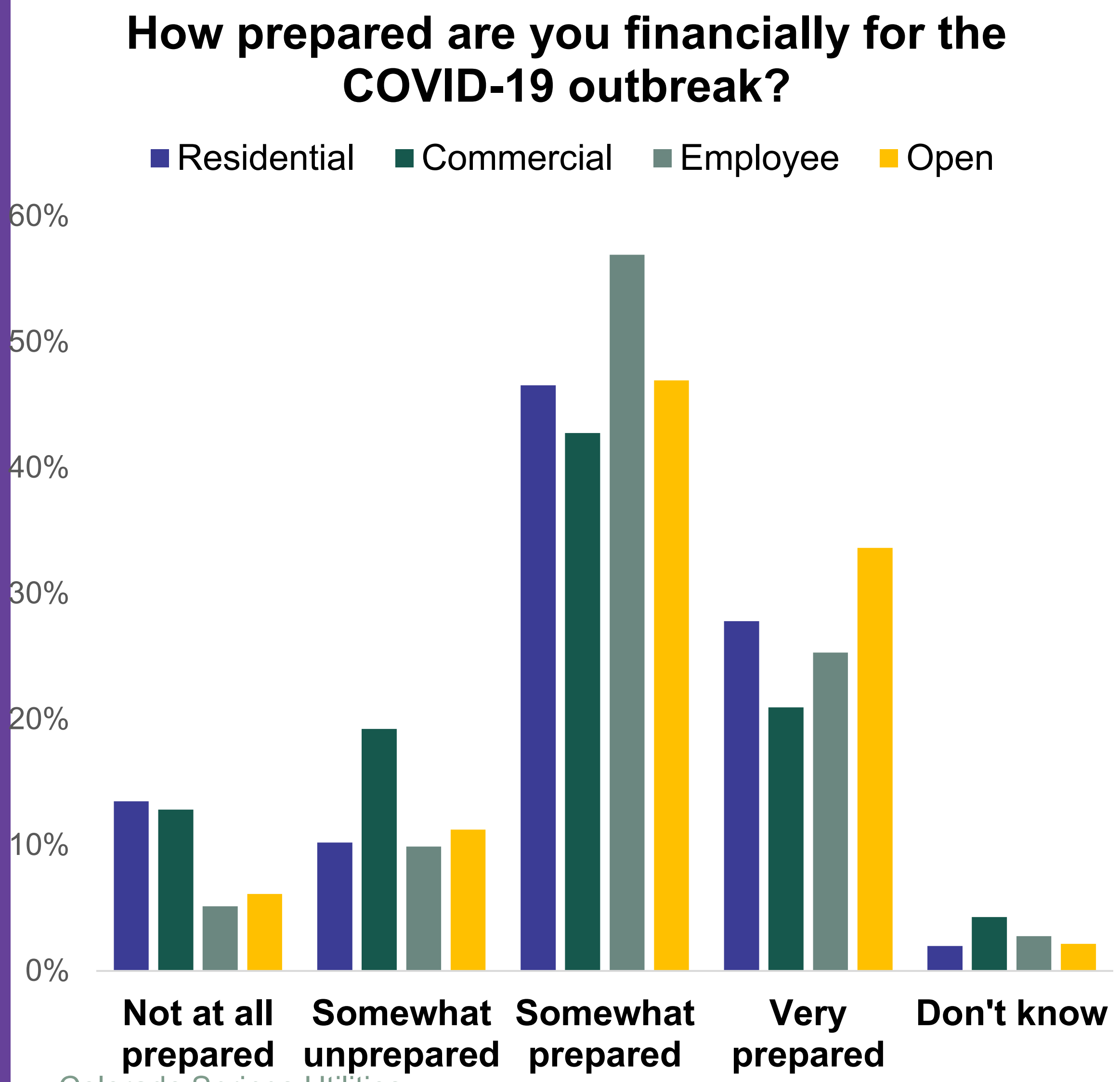
Survey Response Summary

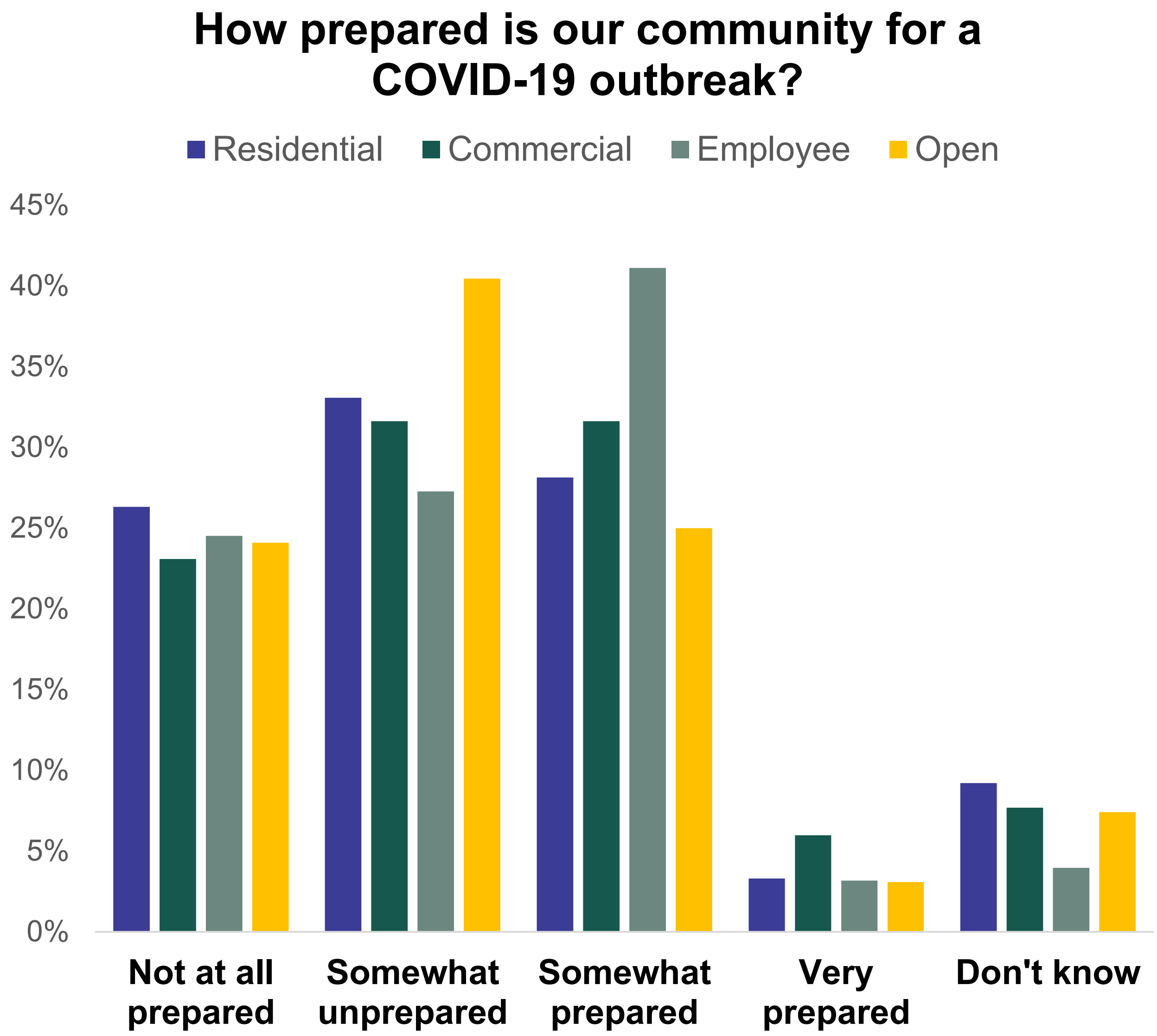
Phase 3 Community Survey Concept



COVID-19 Results

IRP Survey Results





Source: 2020 Integrated Resource Plan Phase 3 Survey – All Segments

Sampling Considerations

Quantitative

Random sampling methodology used

Residential results align with customer population demographics

Qualitative

Random sampling methodology not used

- Open survey results do not align with customer population demographics
- Generation X and Millennials under-represented
- Open respondents self-selected

EIRP Community Outreach

Survey Responses	Phase 3	Phase 2	Energy Vision
Residential	608	619	563
Commercial	234	136	143
Employee	253	350	183
Open	2,019	851	209
Total	**3,116**	**1,956**	**1,098**

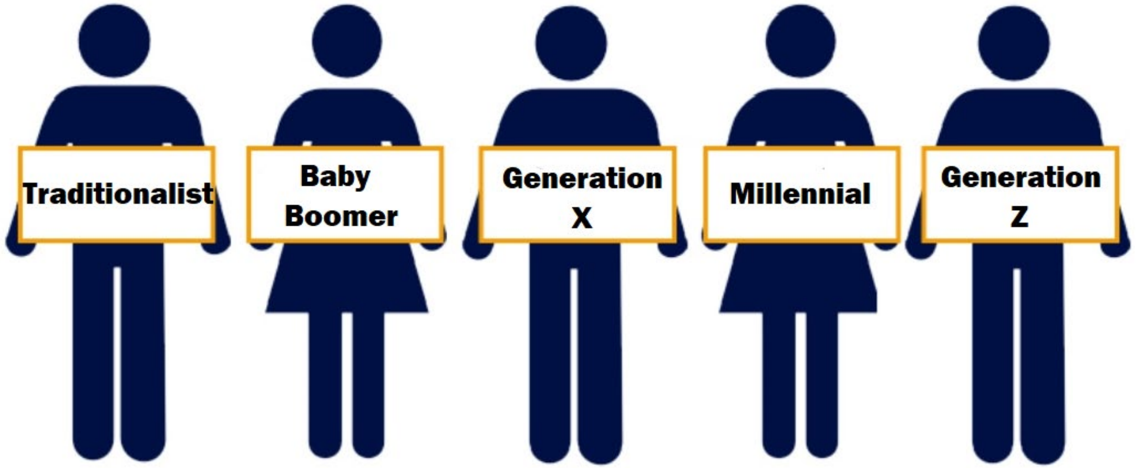
Phase 3 Community Outreach

Residential	Commercial	Employee	Open
n=608	n=234	n=253	n=2,019
Margin of Error ± 4.0%	Margin of Error ± 6.4%	Margin of Error ± 5.7%	Under-coverage Voluntary Response bias

Demographics

Residential Demographics

Quantitative Results

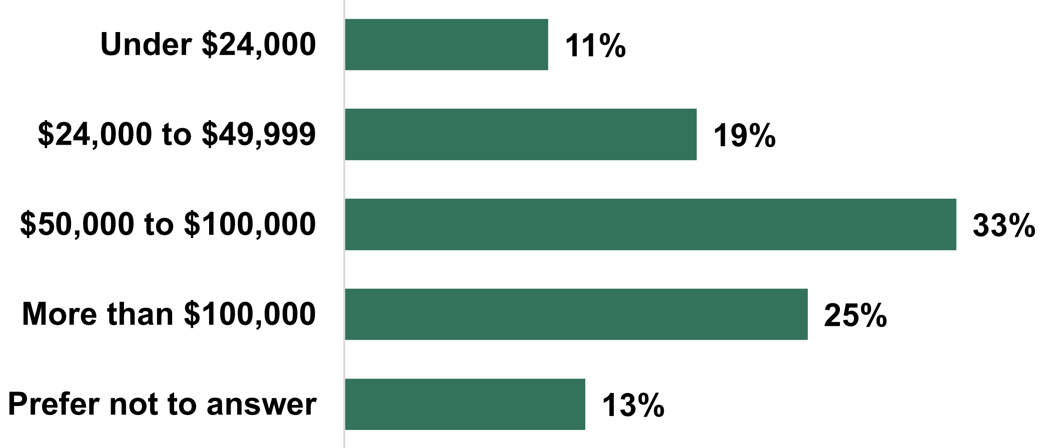


5% 29% 34% 28% 2%

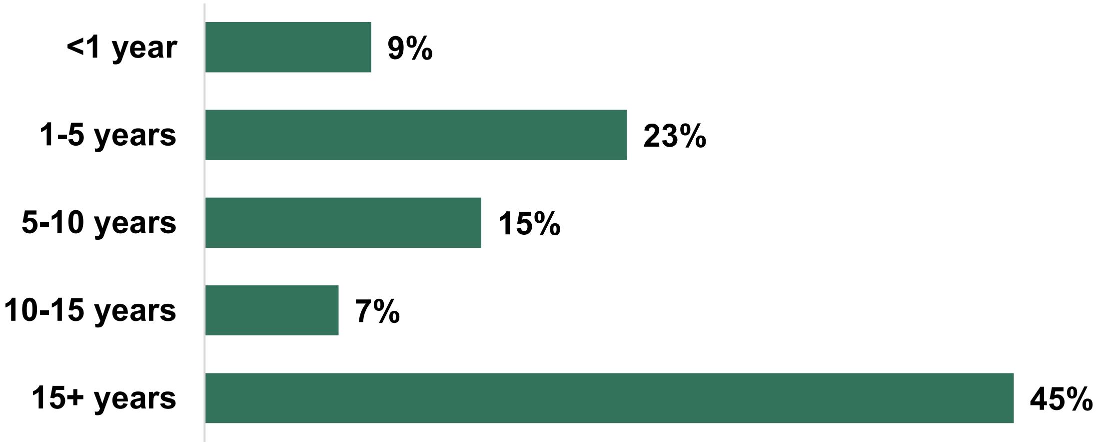
40% Renters
60% Homeowners

Total Respondents: 608

Income



Years In Service Territory

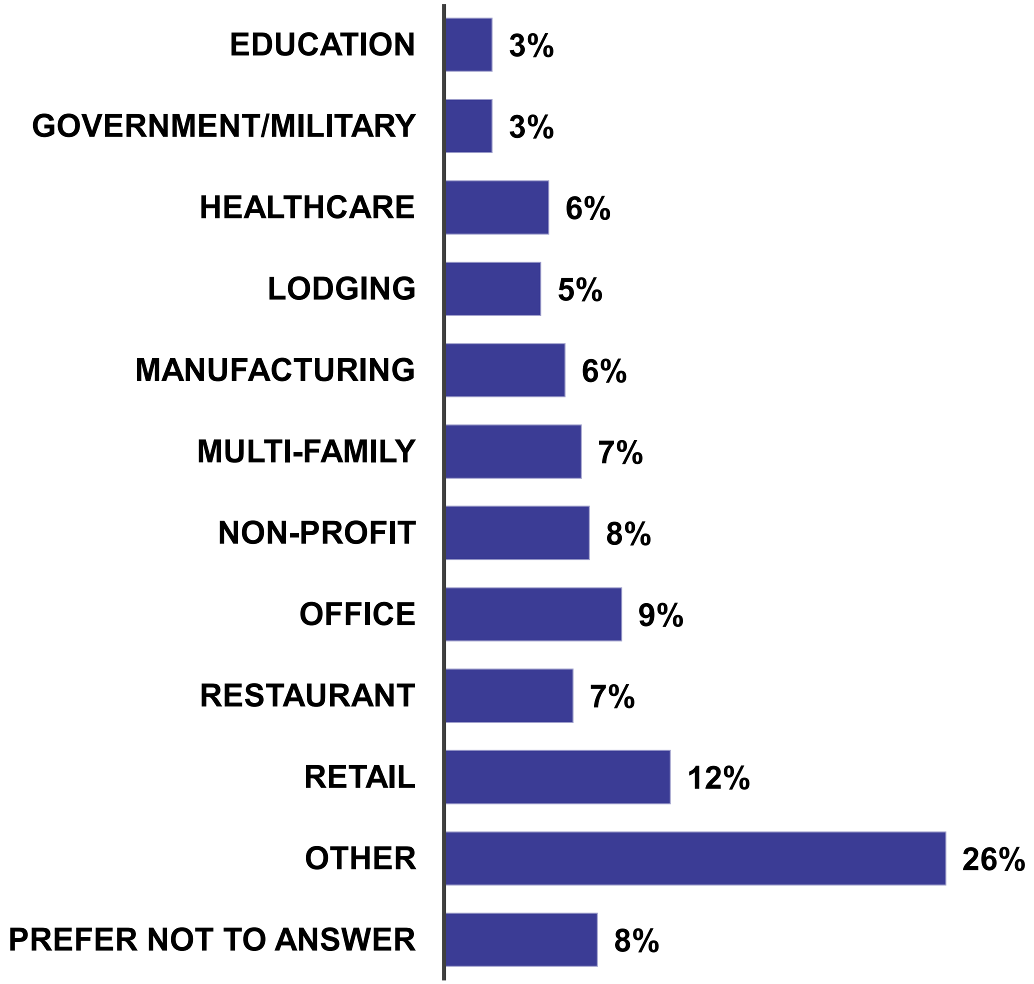


Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

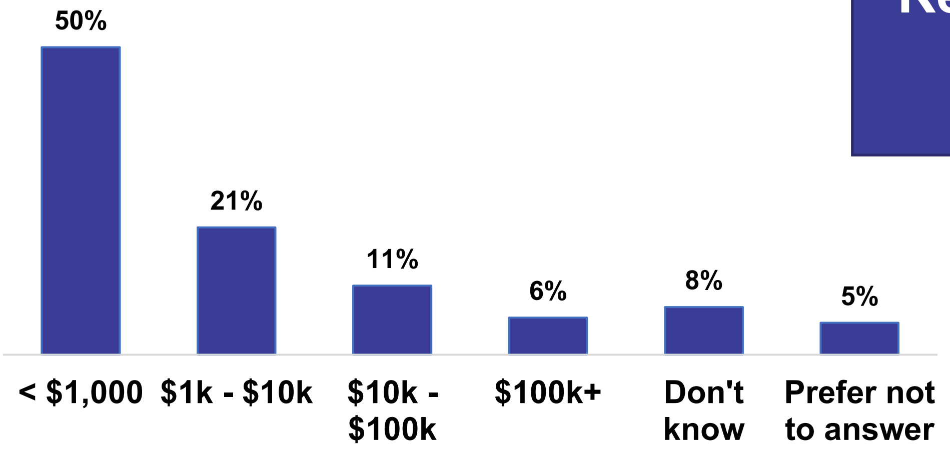
Commercial Demographics

Qualitative Results

Business Type

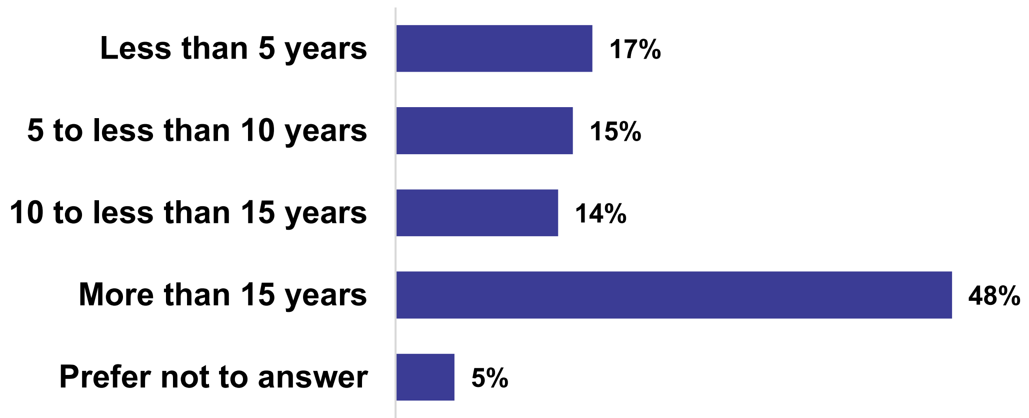


Monthly Bill Amount



Total Respondents: 234

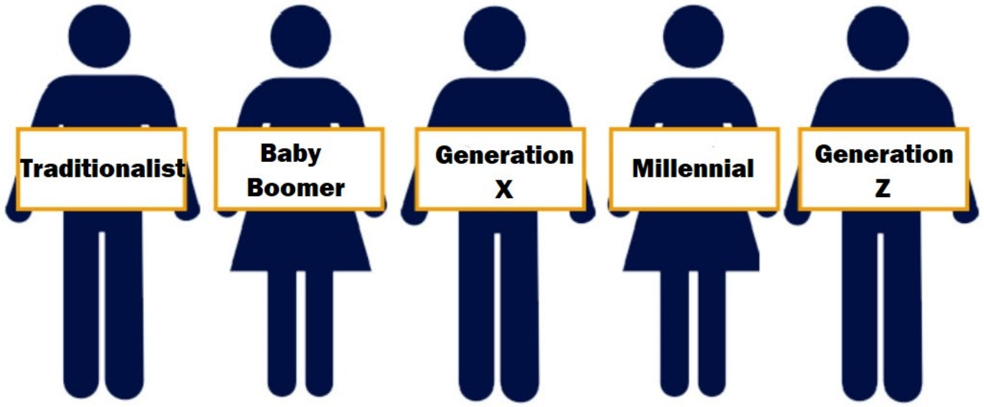
Years In Service Territory



Source: 2020 Integrated Resource Plan Phase 3 Survey – Commercial
n=234

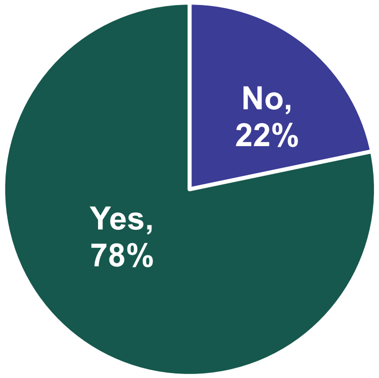
Employee Demographics

Qualitative Results



0% 28% 48% 22% 1%

Lives in Service Territory



Total Respondents: 253

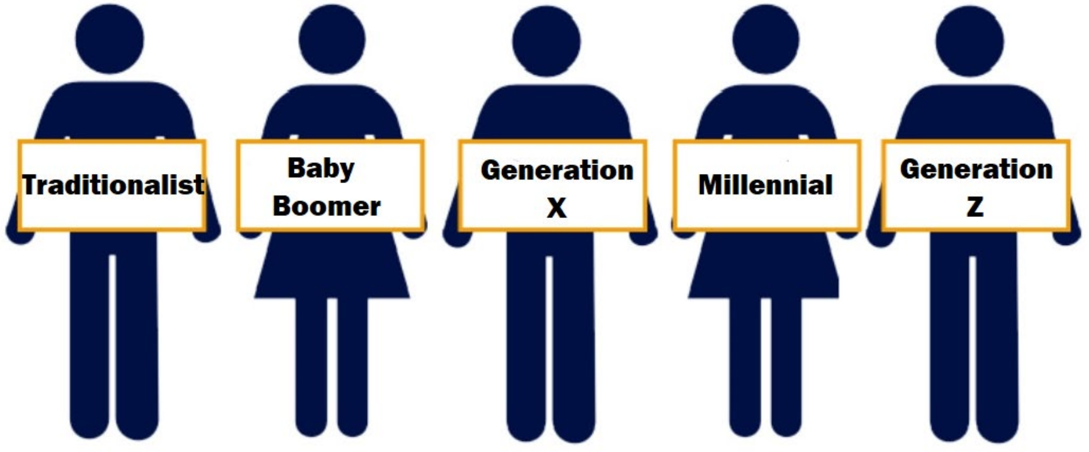
11% Renters

87% Homeowners

Source: 2020 Integrated Resource Plan Phase 3 Survey – Employee
n=253

Open Demographics

Qualitative Results



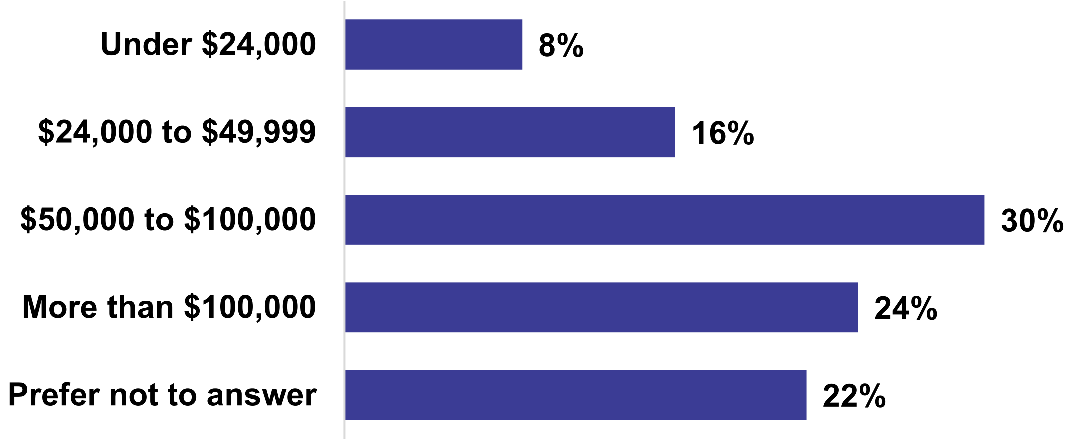
8% 36% 19% 19% 14%

20% Renters

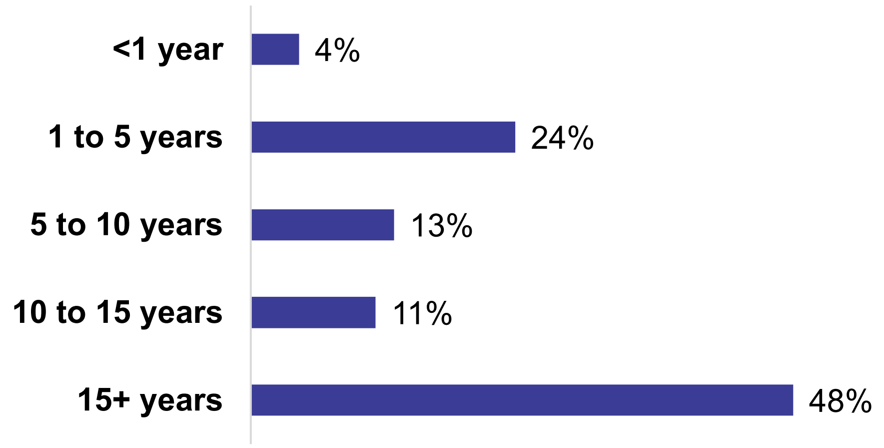
70% Homeowners

Total Respondents: 2,019

Income



Years in Service Territory



Sources: 2020 Integrated Resource Plan Phase 3 Survey – Open, Instagram, Smart Home, Snapchat
n=2,019

Quantitative Results

Key Quantitative Findings

Residential

Preferred Pathway: New Renewable Resources

Environmental Goals and New Energy Resources chosen in three pathways as the influence

Chosen pathway bill impact: 26% not willing to accept an increase; 22% willing to accept $15 or more

Emissions Approach: Moderate

DSM responsibility: Individuals at 40%

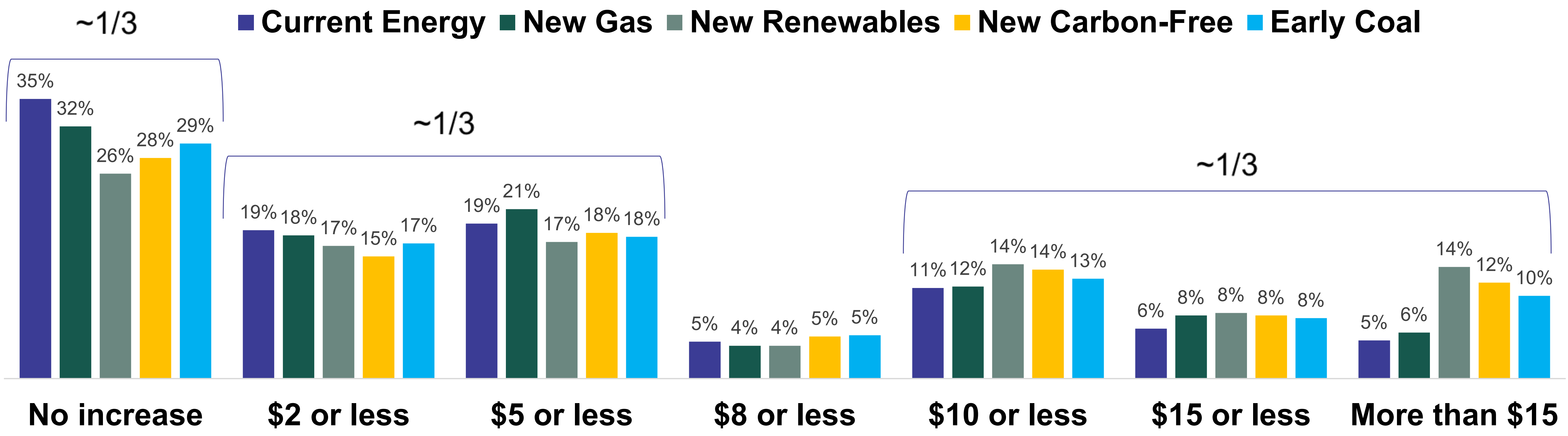
Current Energy Resources Reference Case	New Gas Resources Pathway B	New Renewable Resources Pathway C	New Carbon Free Resources Pathway D	Early Coal Retirement Pathway E
50% carbon reduction by 2030; 90% carbon reduction by 2050	80% carbon reduction by 2030; 90% carbon reduction by 2050	80% carbon reduction by 2030; 100% renewable by 2050	80% carbon reduction by 2030; 100% carbon reduction by 2050	80% carbon reduction by 2023; 100% carbon reduction by 2030
Regulatory Requirements Level: Meets	Regulatory Requirements Level: Exceeds	Regulatory Requirements Level: Exceed	Regulatory Requirements Level: Exceed	Regulatory Requirements Level: Exceeds
Natural gas, renewables and storage, and customer efficiency efforts	Natural gas and customer efficiency efforts	Renewables and storage and customer efficiency efforts	Carbon-free and customer efficiency efforts	Natural gas, renewables and storage, and customer efficiency efforts
All units at Drake retired by 2035	All units at Drake retired by 2026 and all coal-fired units at Nixon retired by 2030	All units at Drake retired by 2026 and all coal-fired units at Nixon retired by 2030. All fossil fuels retired by 2050.	All units at Drake retired by 2026 and all coal-fired units at Nixon retired by 2030. All fossil fuels retired by 2050.	All units at Drake retired by 2023 and coal-fired units at Nixon retired by 2026

Survey Definitions

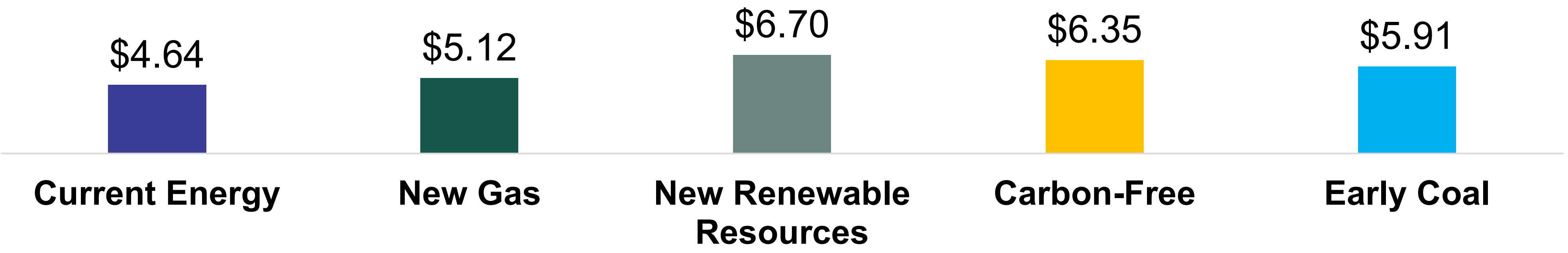
- **Renewables**: Solar, battery storage, wind, geothermal, hydropower, biomass, biogas, landfill gas, and other renewable resources as defined by Colorado statute.
- **Carbon-free:** Resources which have no greenhouse gas emission during operation, like renewables, nuclear, and those which include carbon capture.
- **Customer efficiency/renewable energy efforts:** Energy efficiency, peak demand reduction and distributed resources such as rooftop solar and battery storage owned by the customer.
- **Drake**: The Martin Drake Power Plant located in downtown Colorado Springs. Drake is a coal-fired plant.
- **Fossil fuels:** For the purpose of this survey, coal and natural gas.
- **Nixon:** The Ray D. Nixon Power Plant located south of Colorado Springs. Nixon has both coal-fired and natural gas-fired generation.

Acceptable Bill Increase

Residential Survey Results



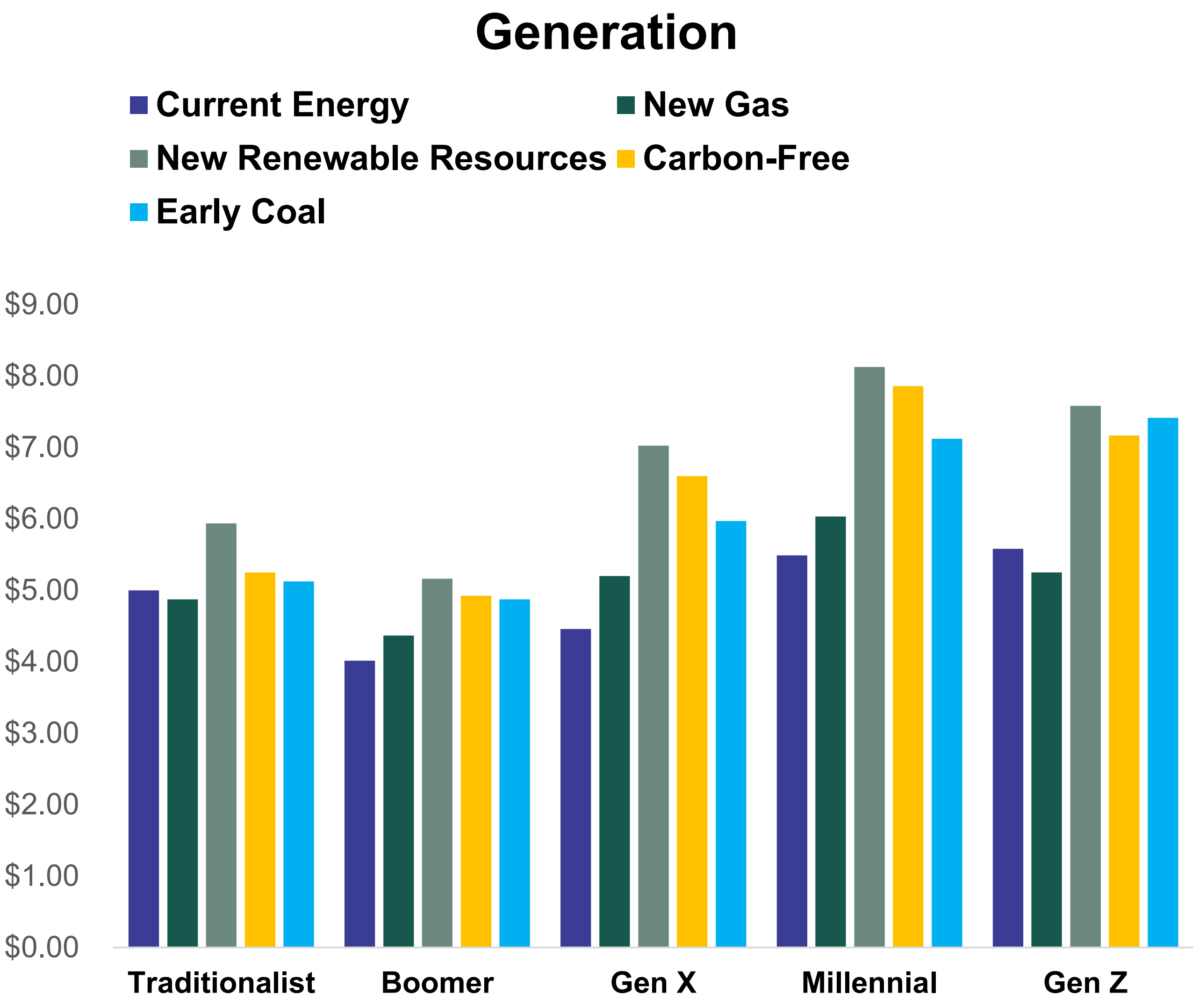
Pathway Averages

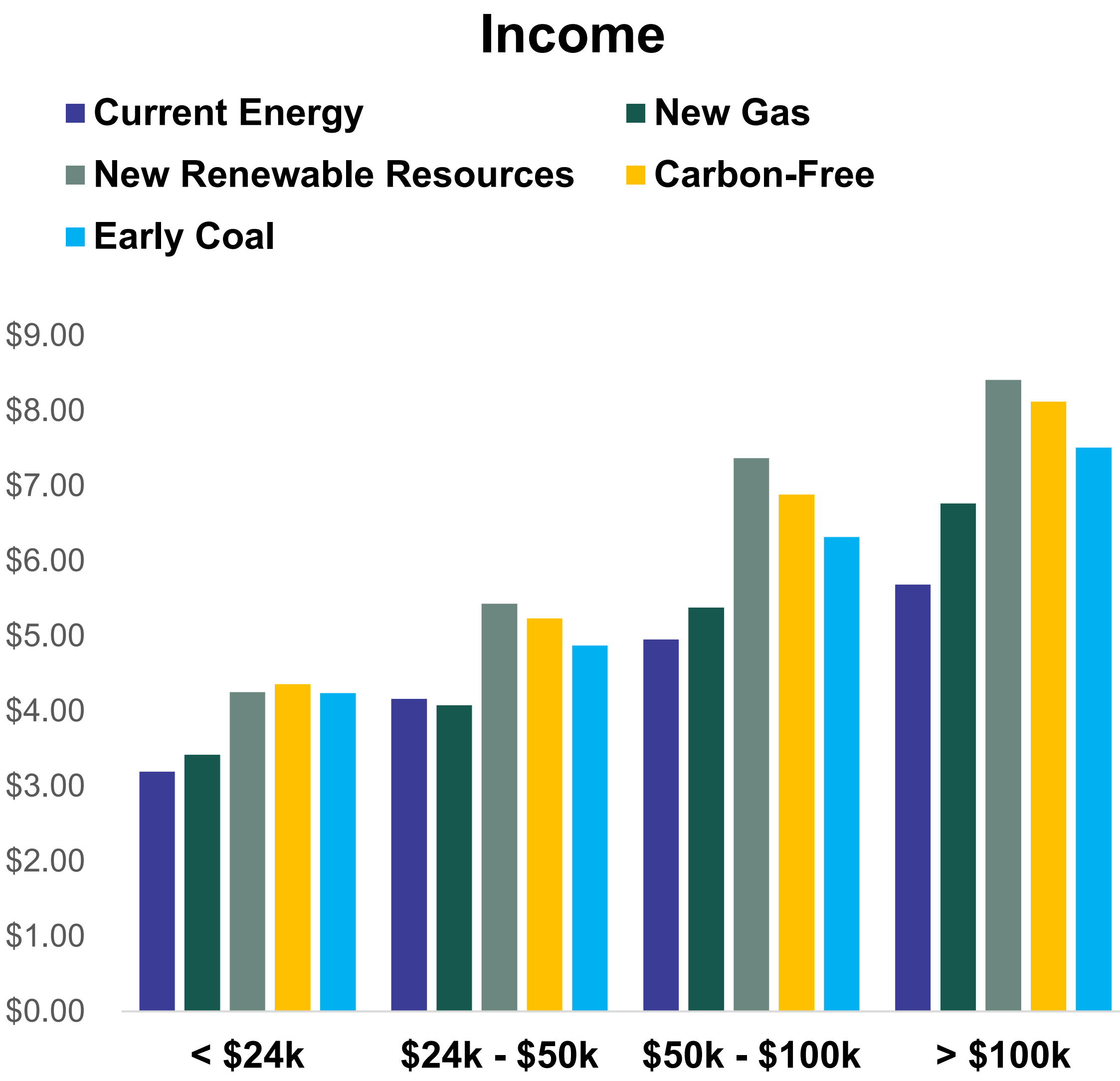


Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Average Acceptable Bill Increase

Residential Survey Results





Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
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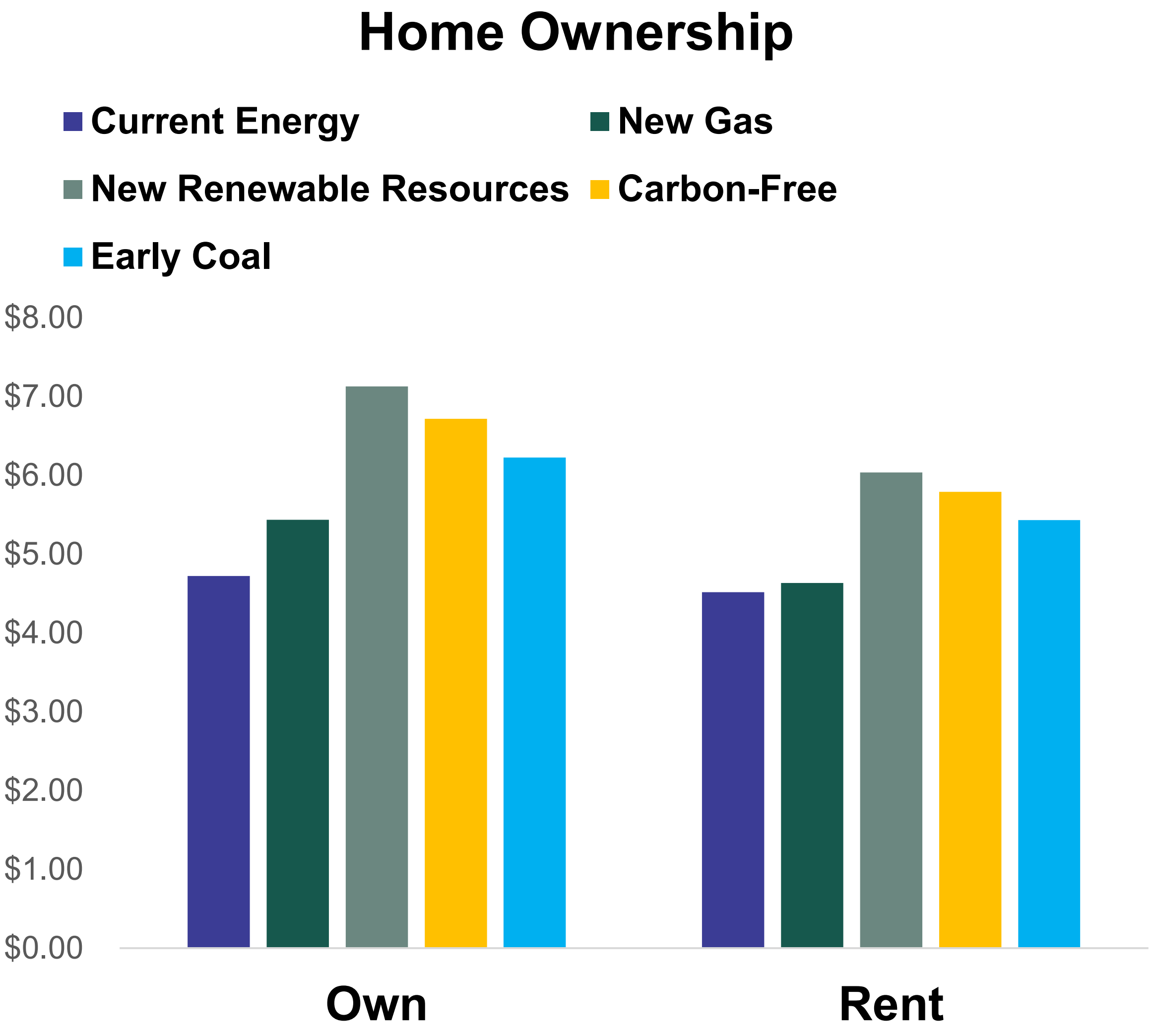
Average Acceptable Bill Increase

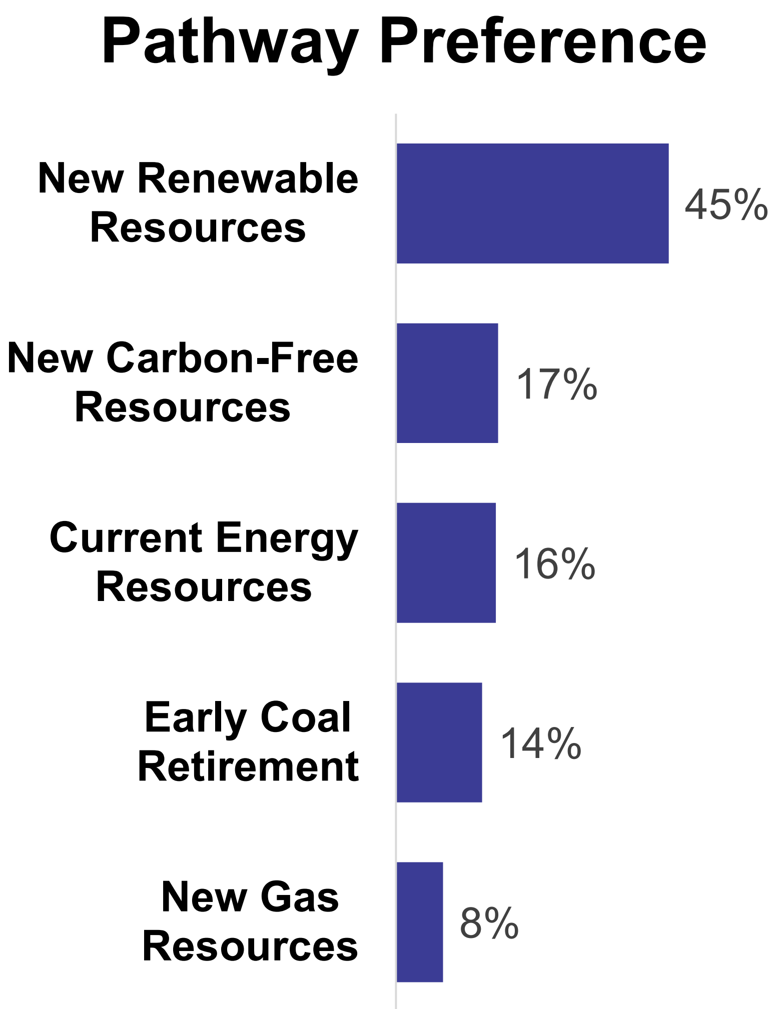
Residential Survey Results

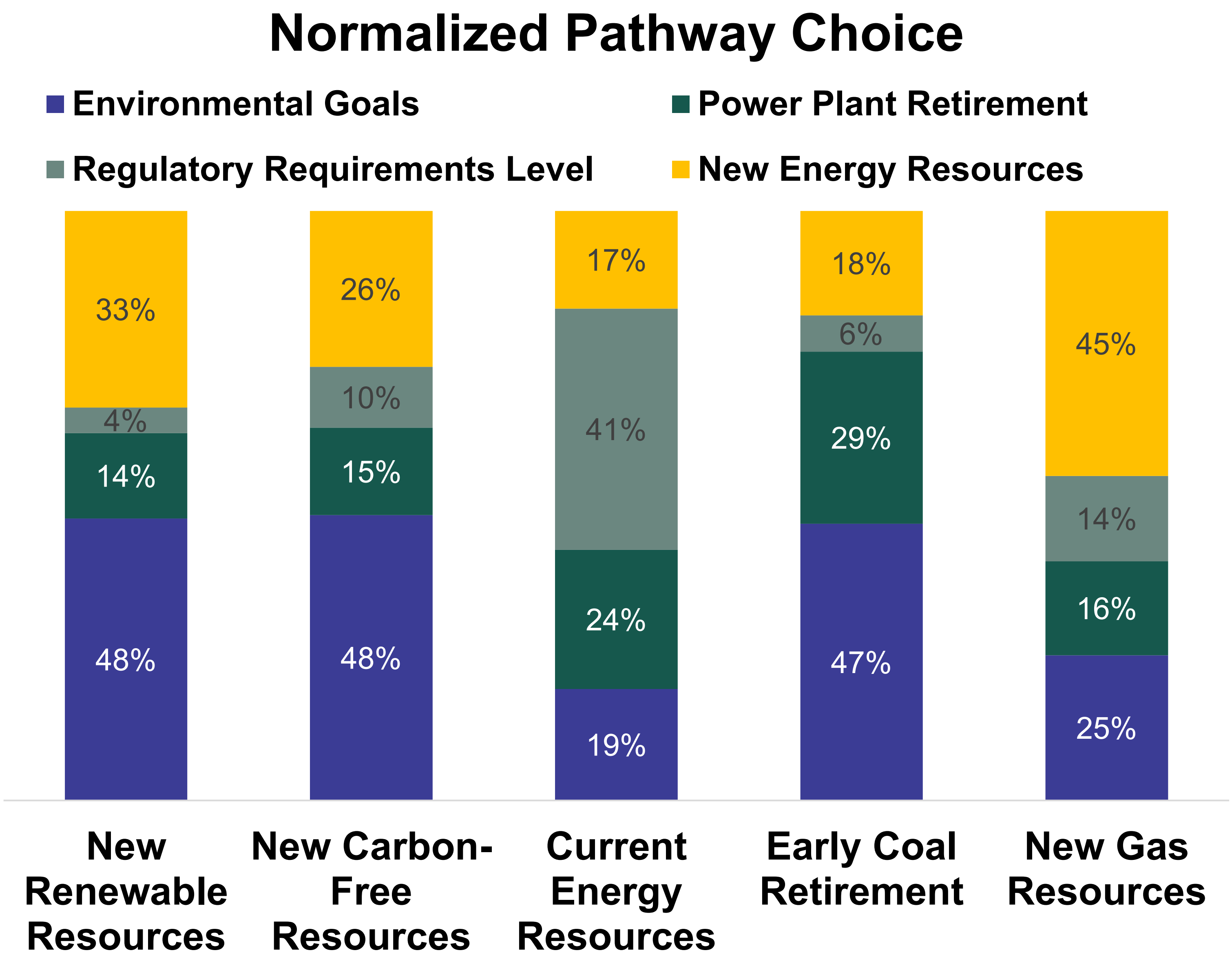


Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Pathway Results

Residential Survey Results

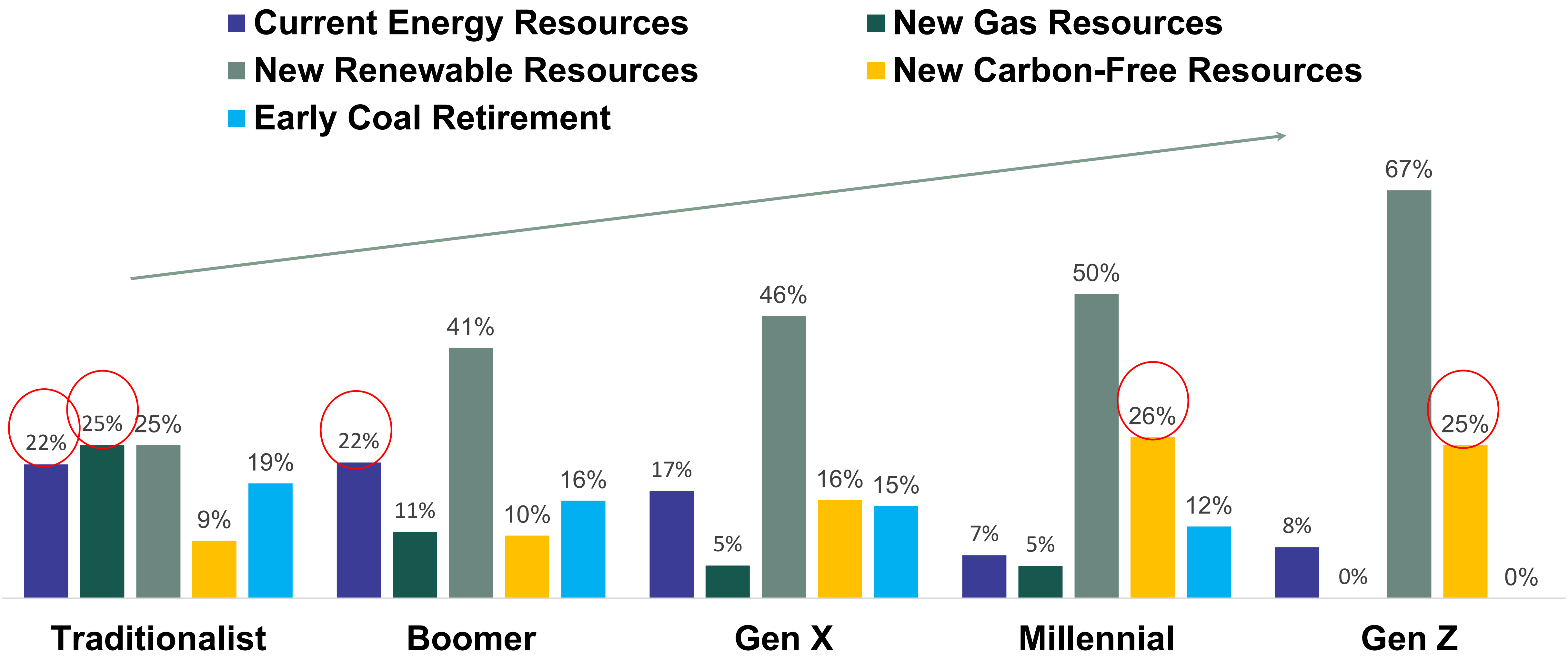




Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Pathway Results By Generation

Residential Survey Results



Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
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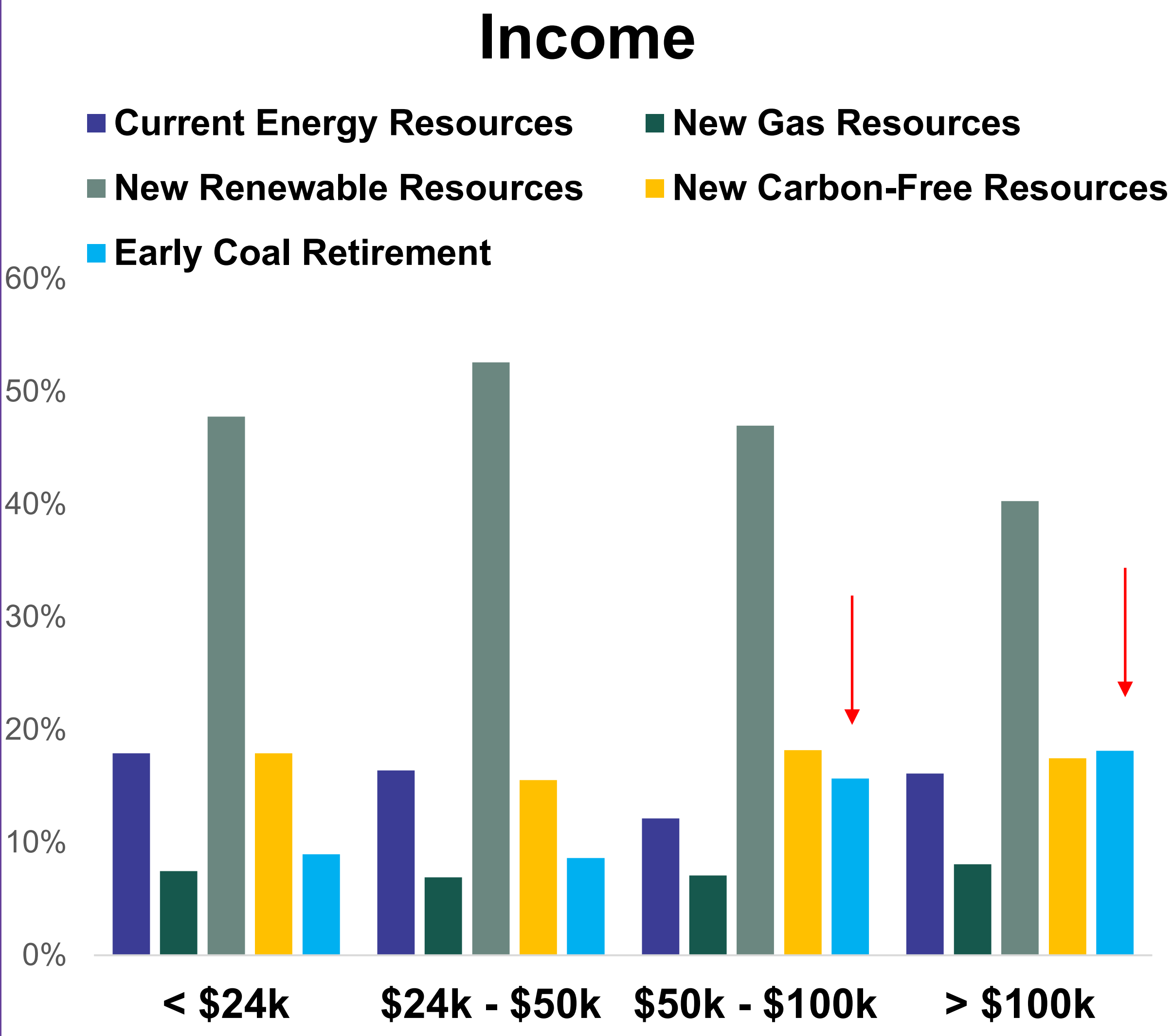
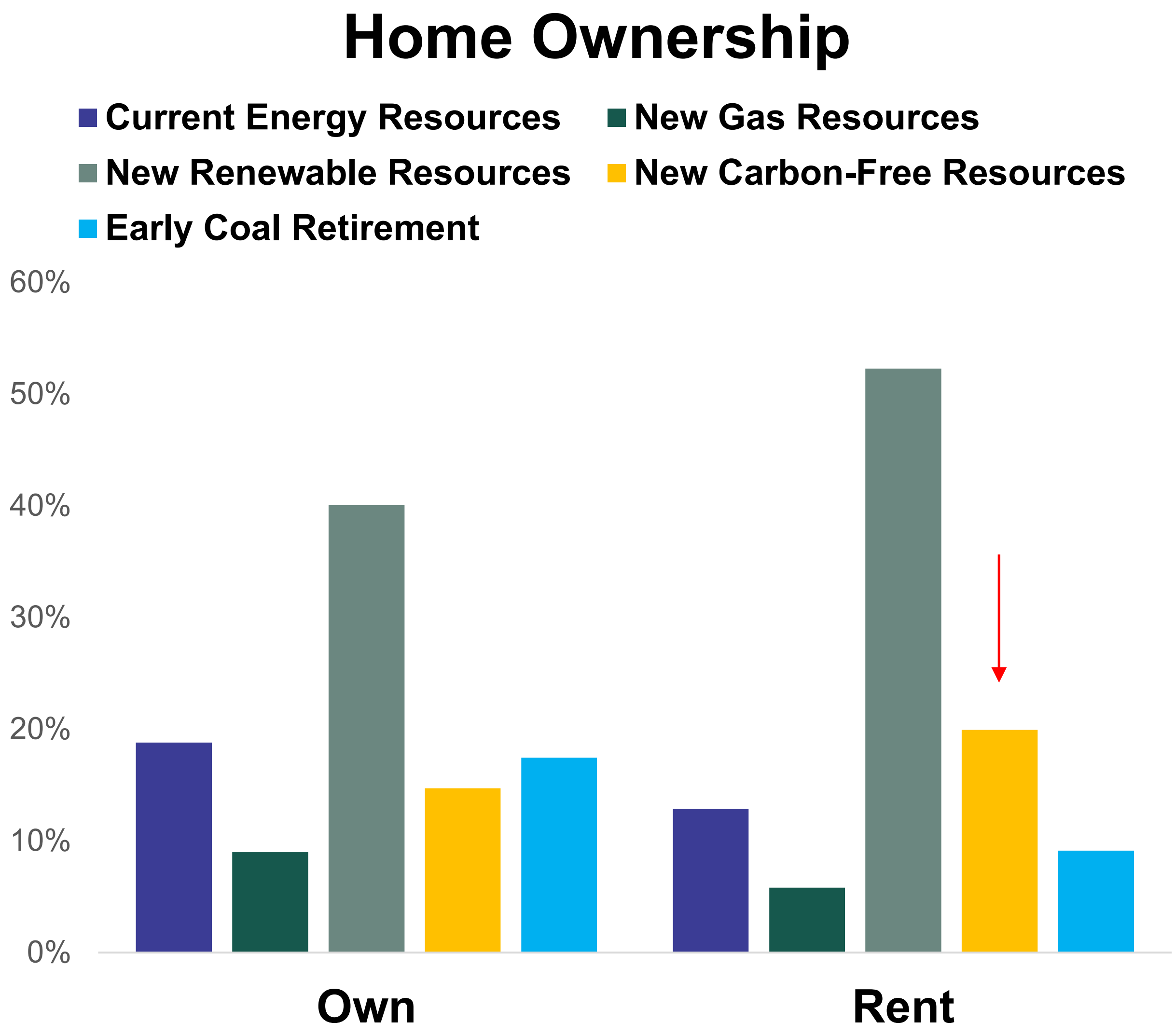
Pathway Results

Residential Survey Results



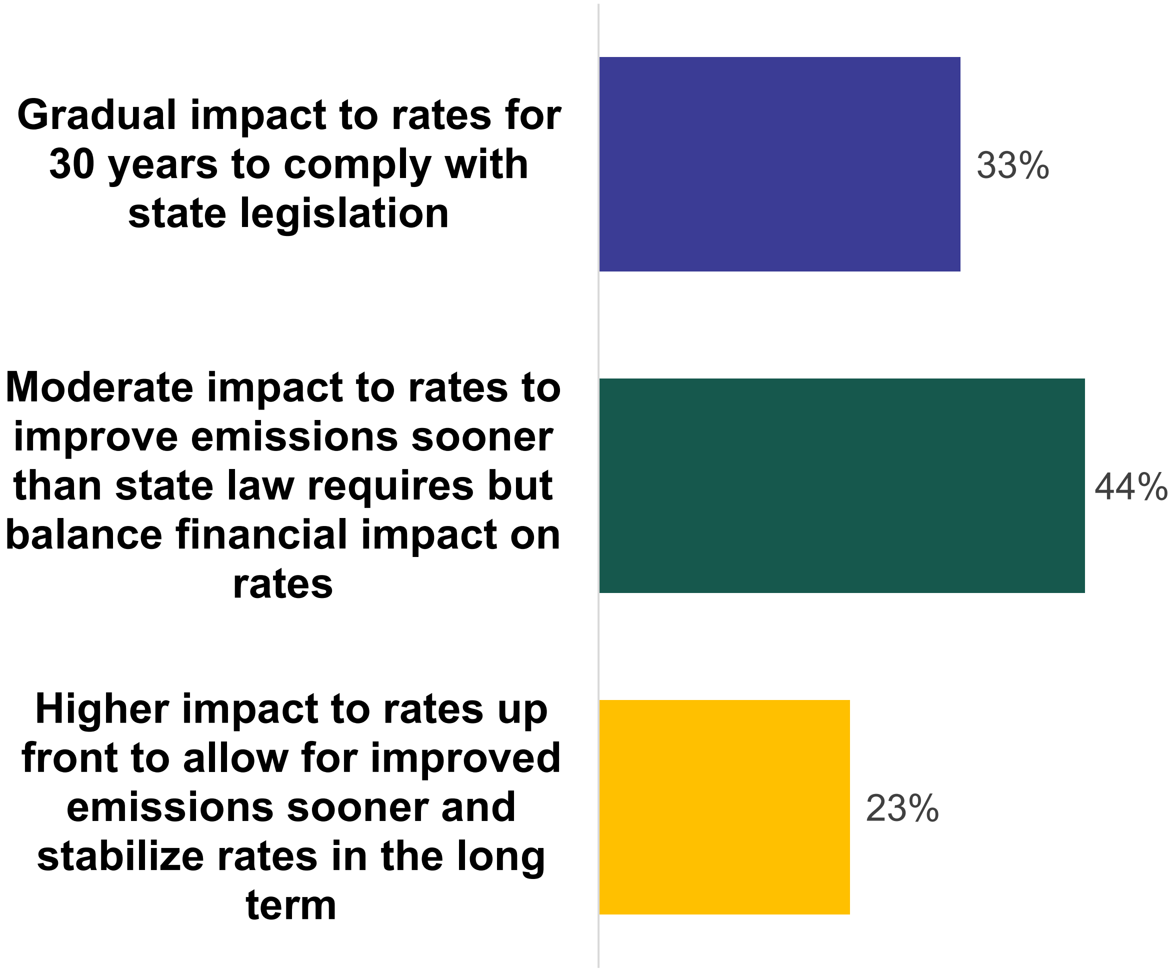


Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

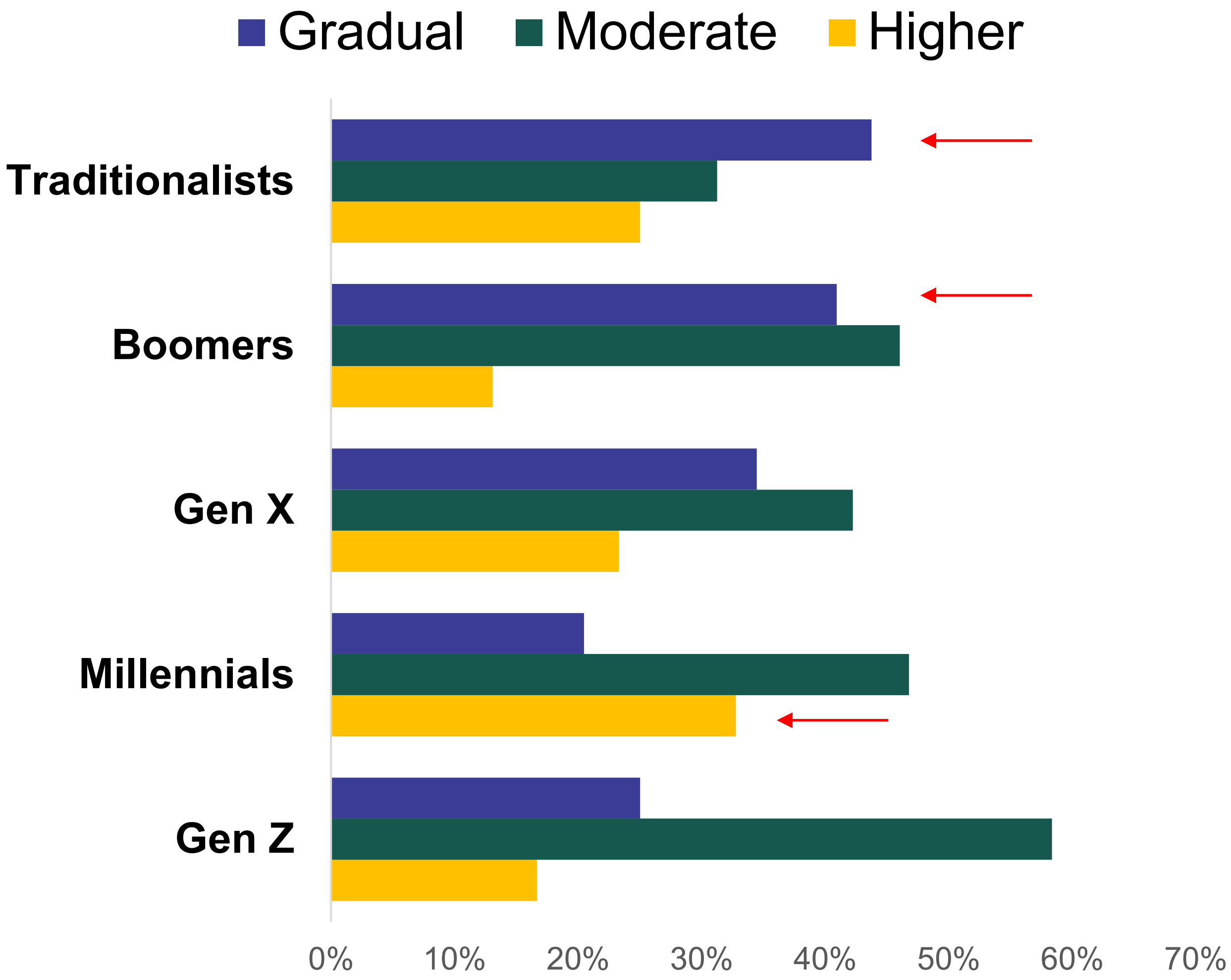
Carbon Emissions

Residential Survey Results

Carbon Emissions Approach

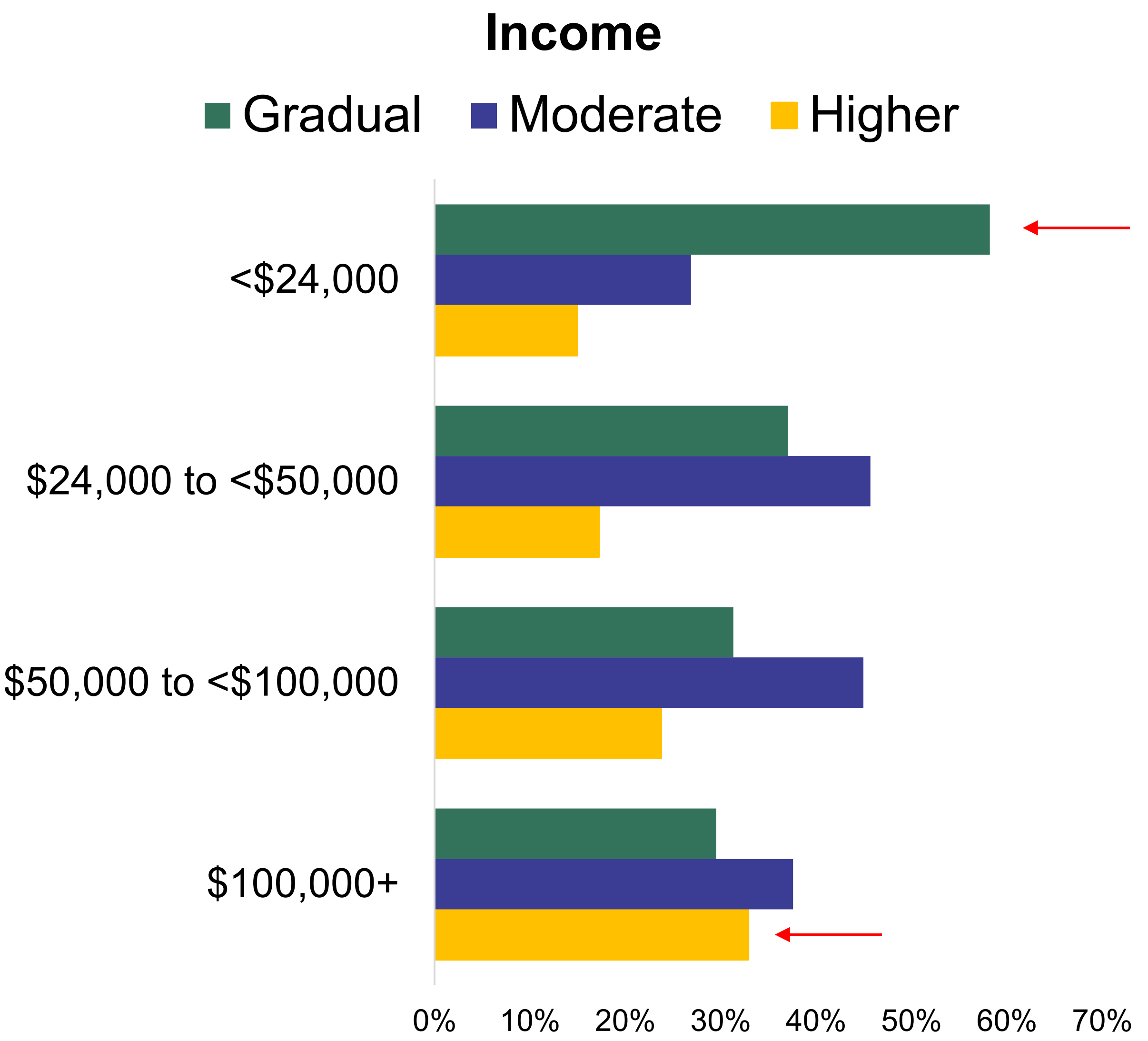


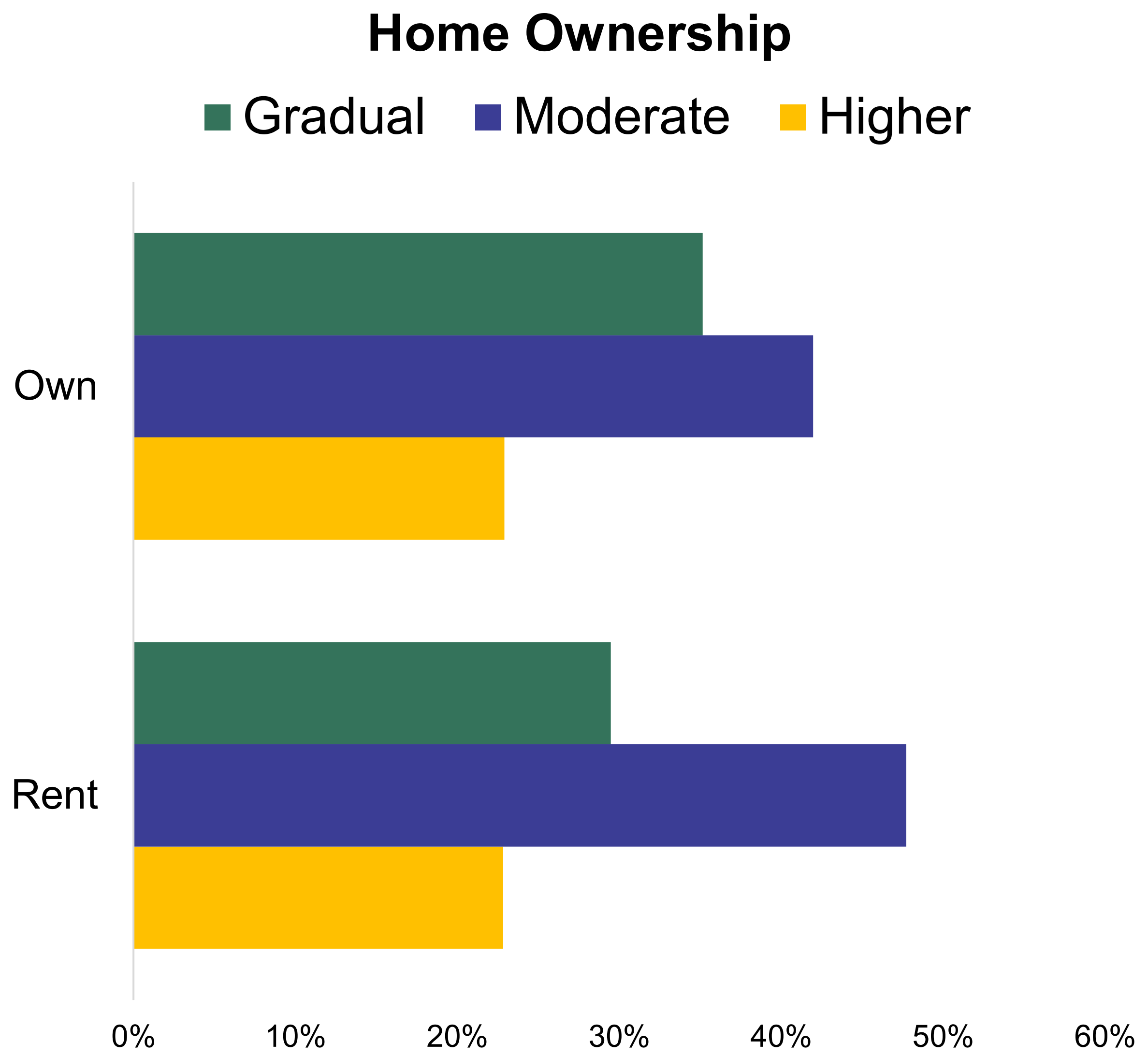
Generation



Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Carbon Emissions
Residential Survey Results

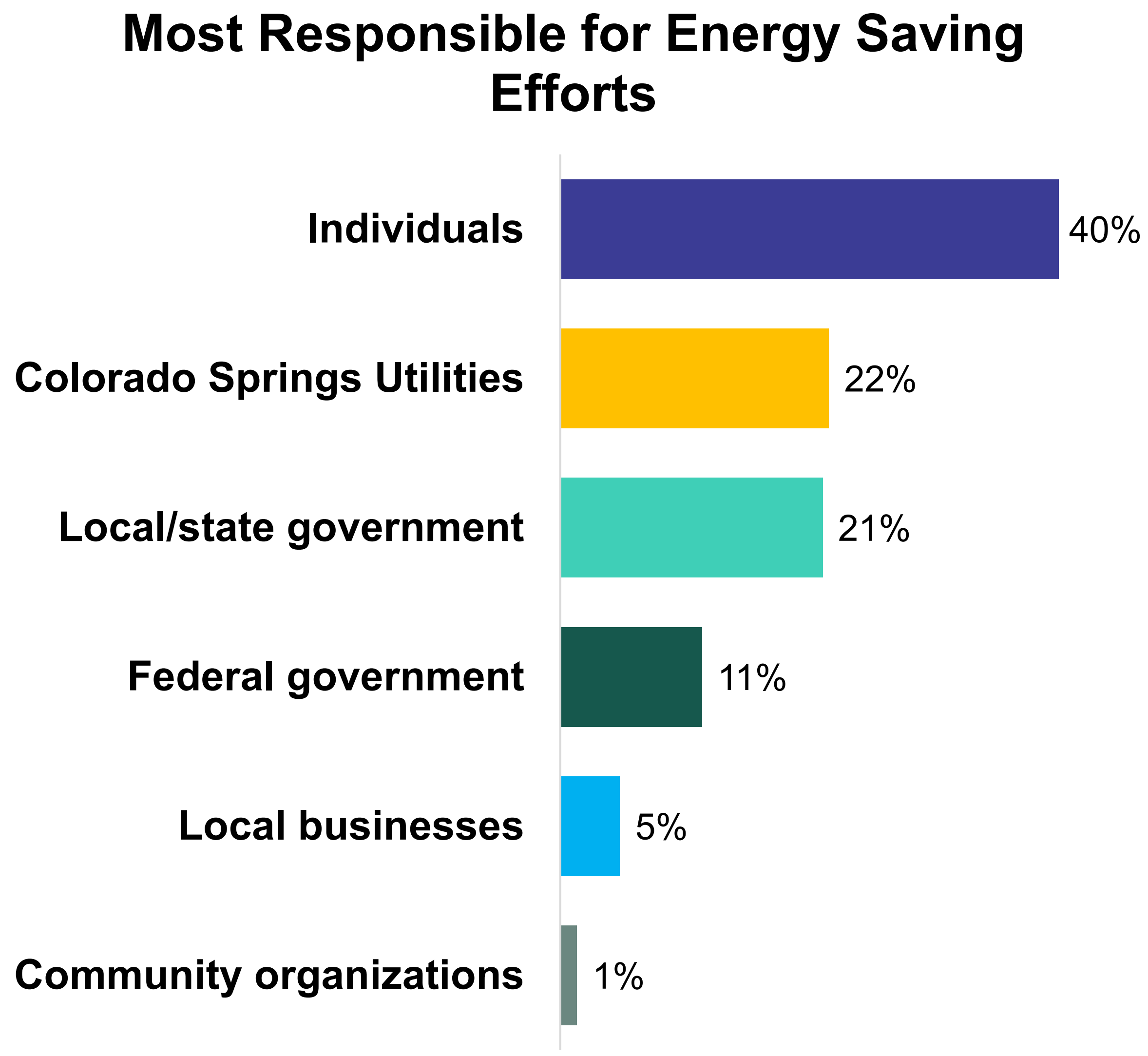


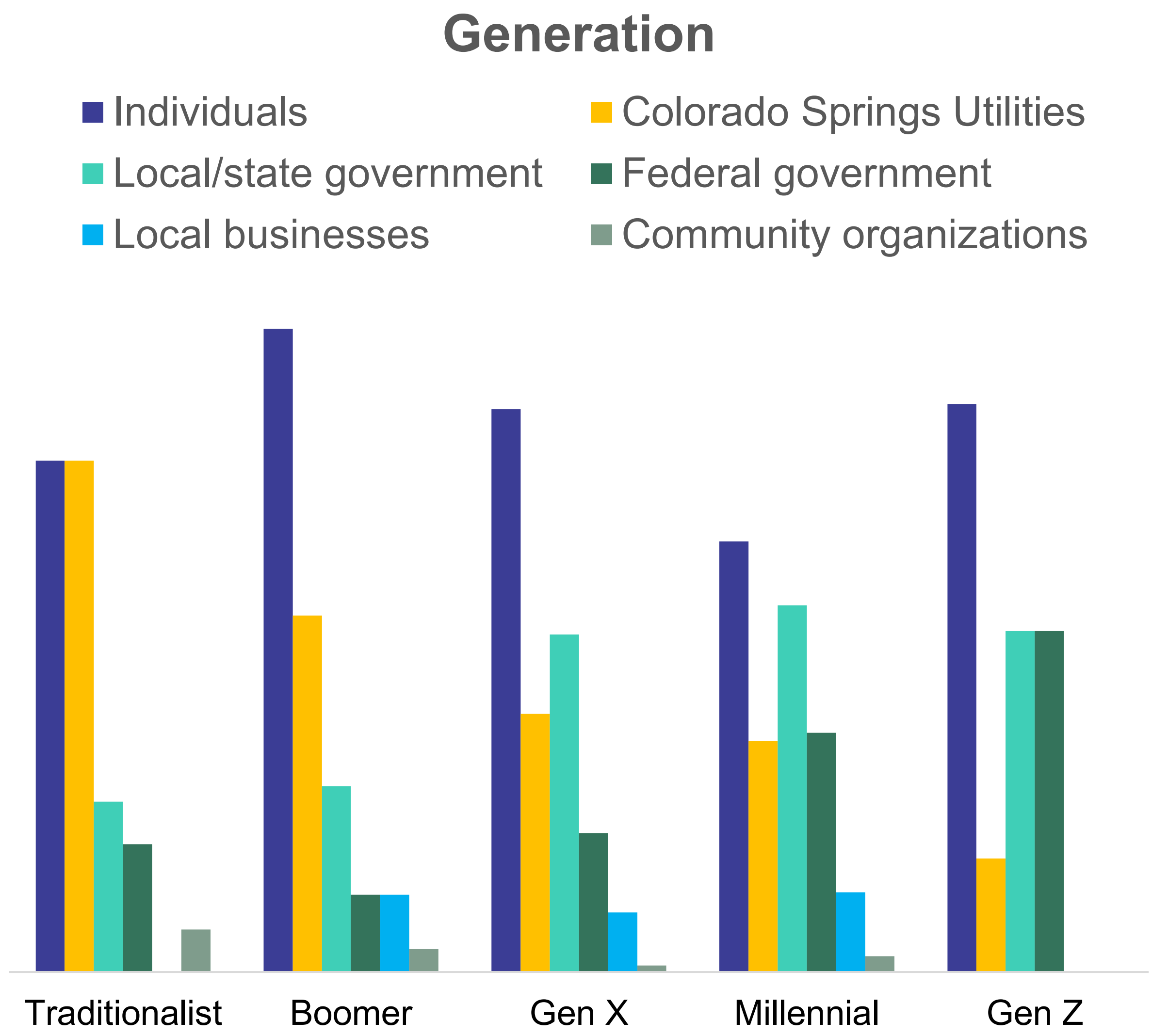


Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Energy Saving Effort Responsibility

Residential Survey Results





Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
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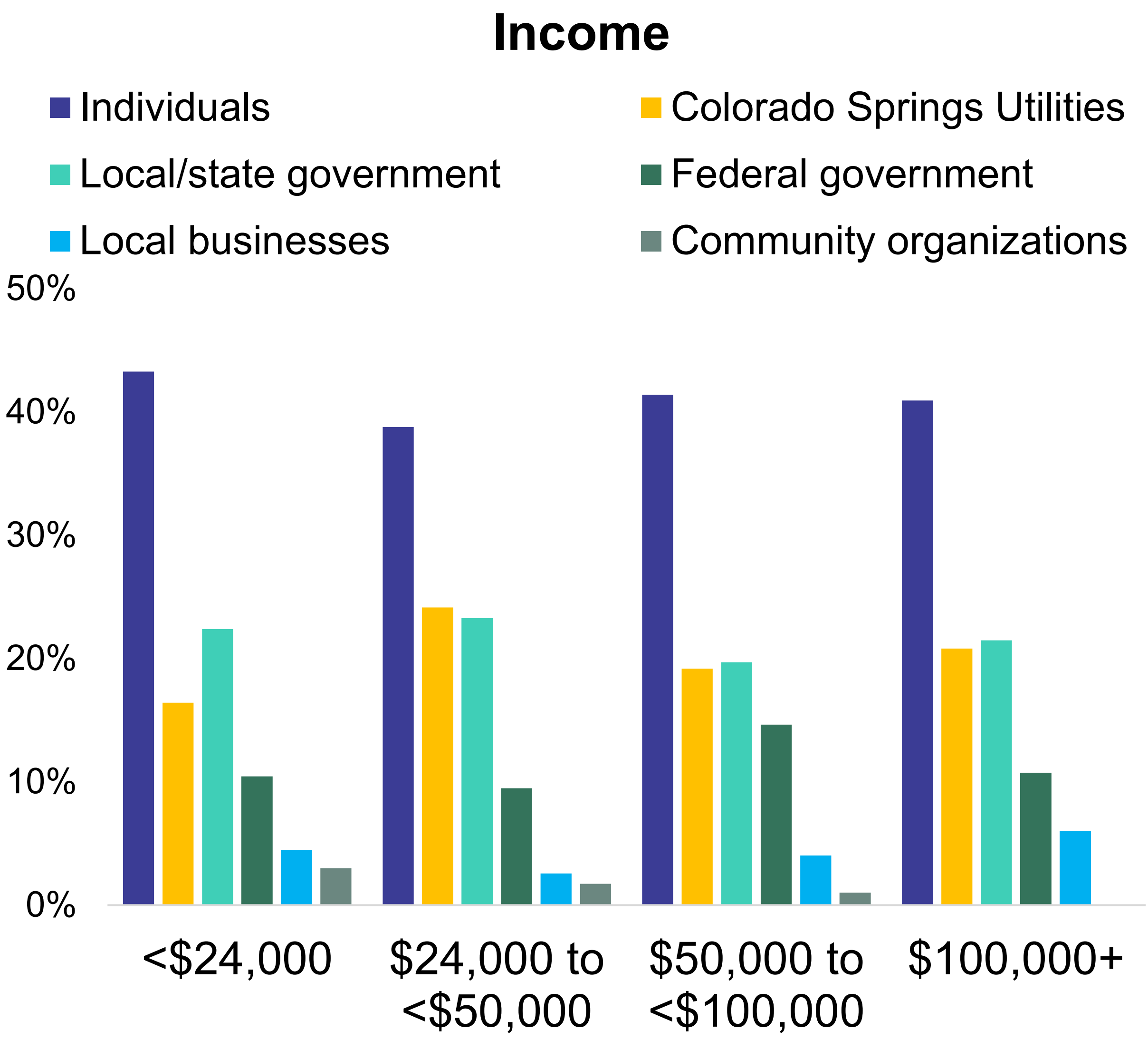
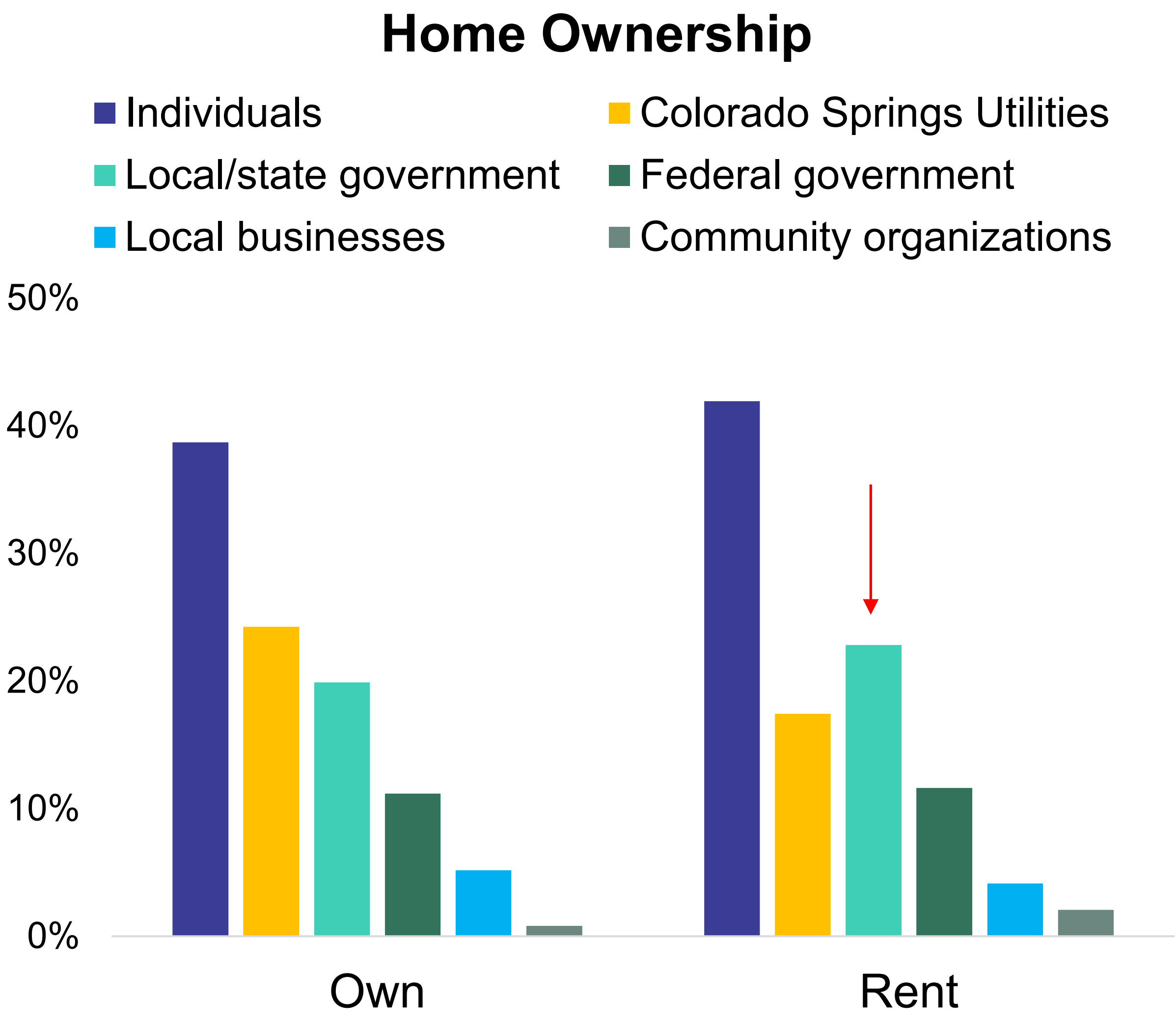
Energy Saving Effort Responsibility

Residential Survey Results

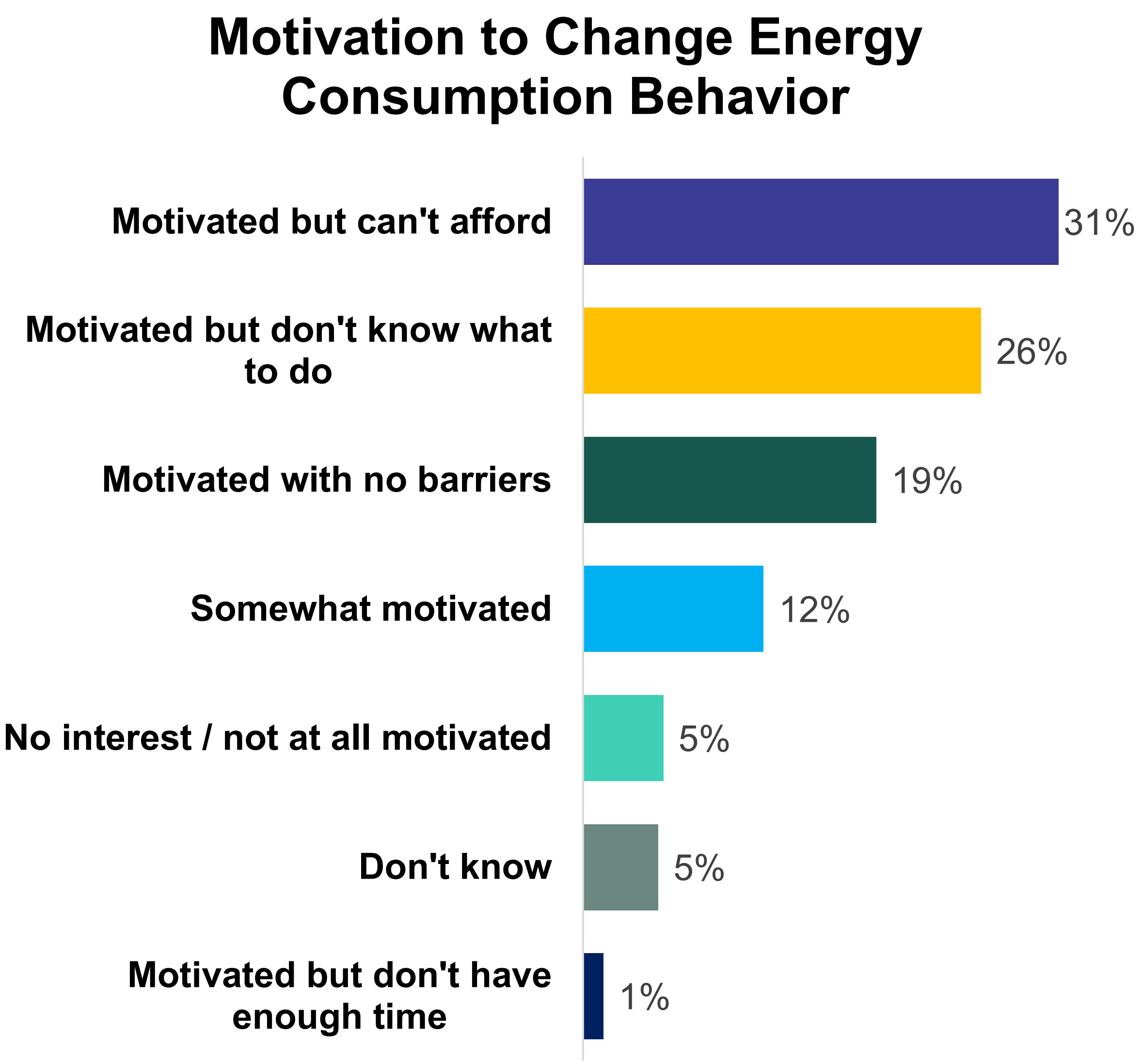


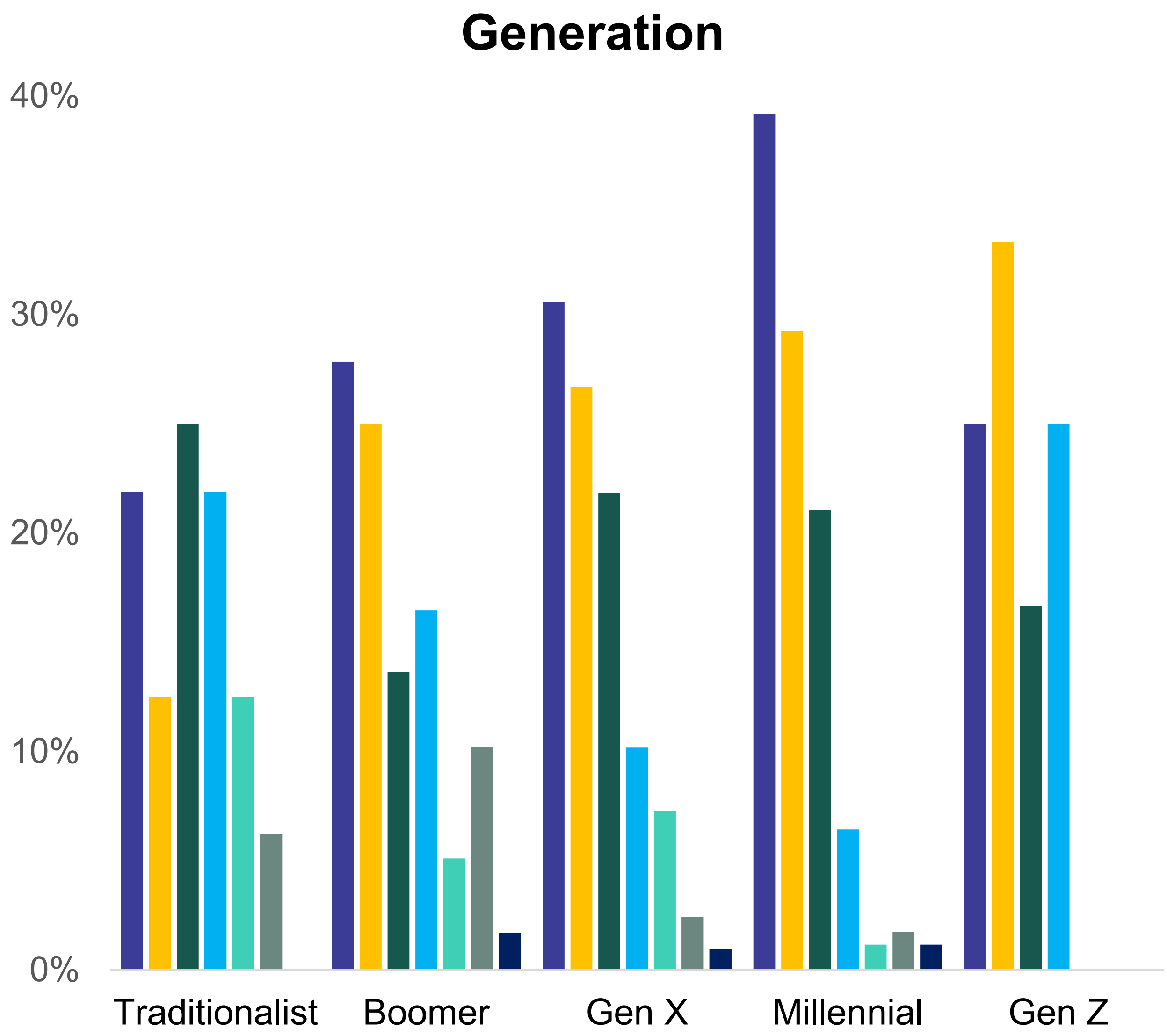


Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Energy Saving Effort Motivation

Residential Survey Results





Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
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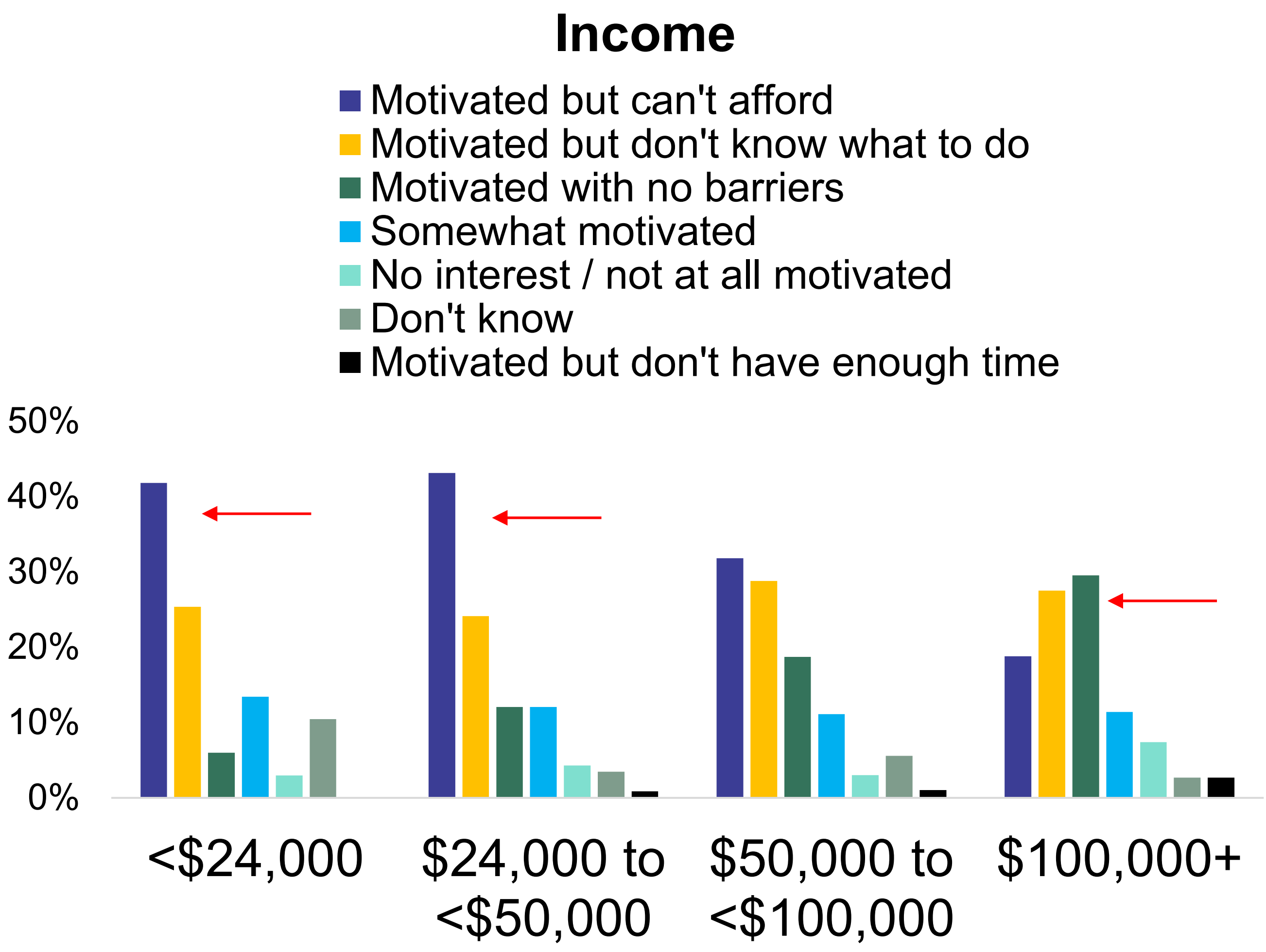
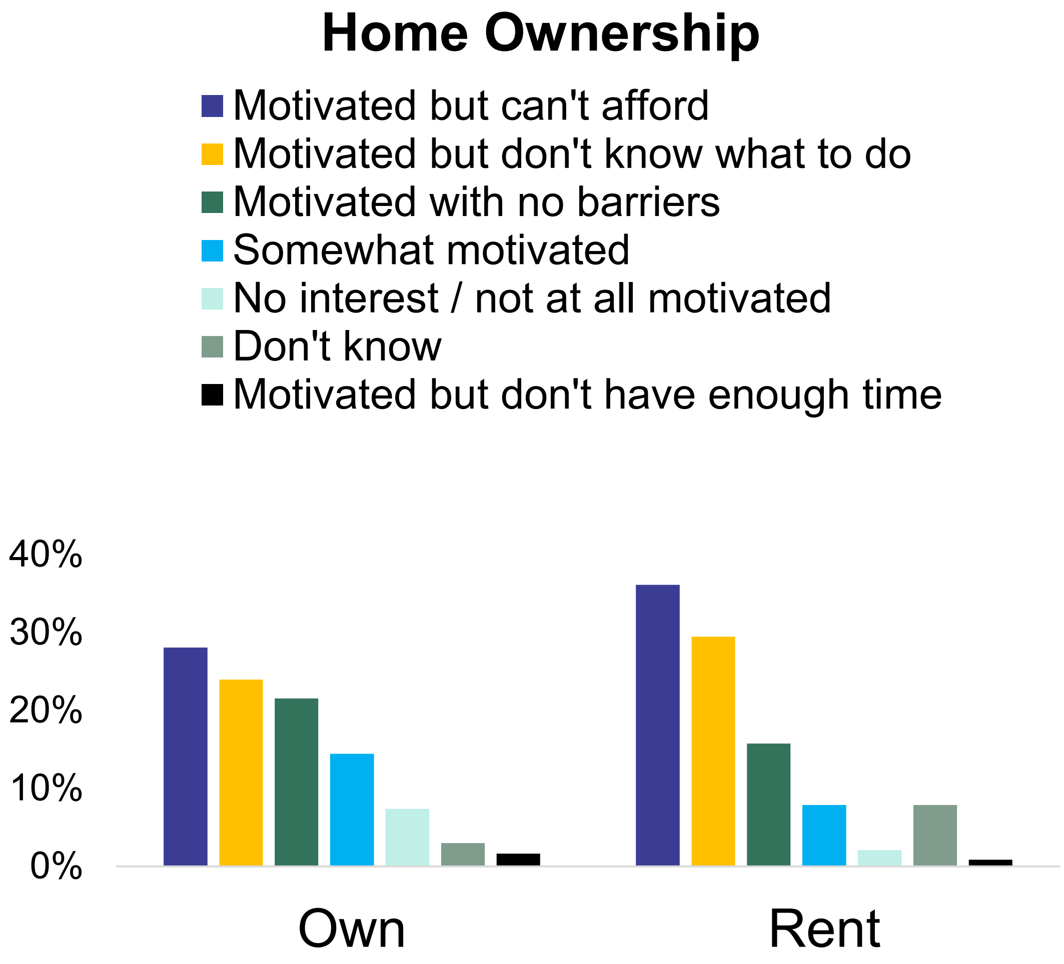
Energy Saving Effort Motivation





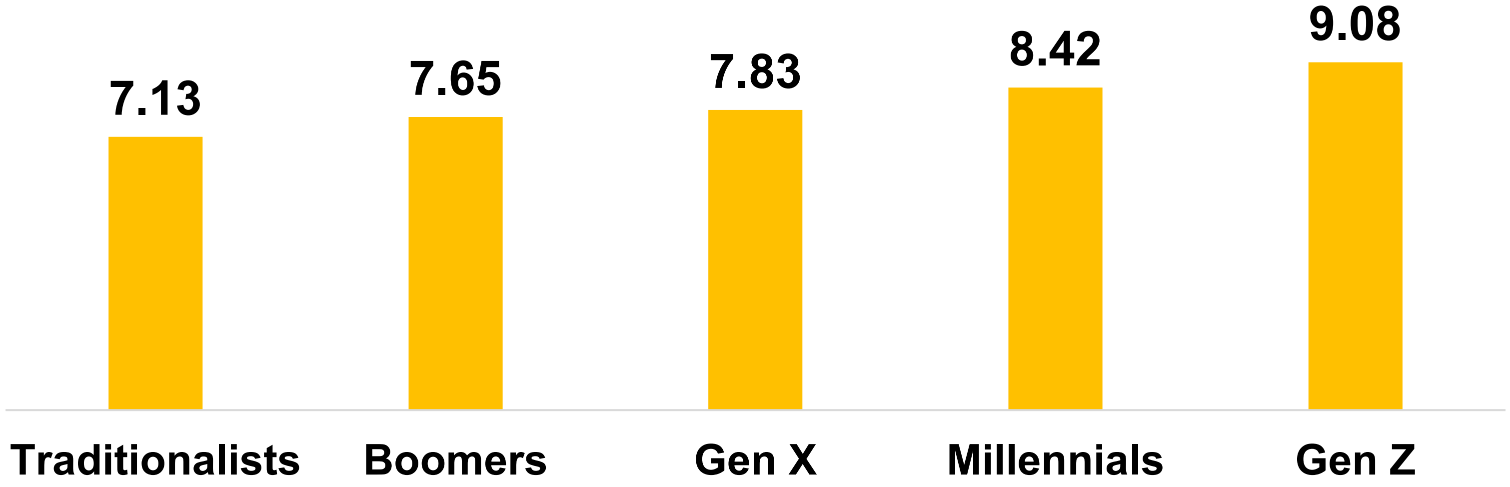
Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Energy Planning Results

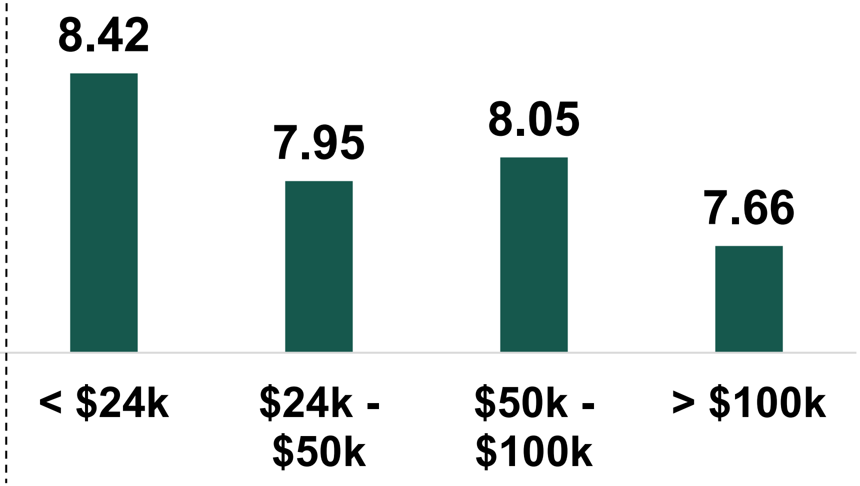
On a scale from 1 to 10, how important is customer efficiency/renewable energy efforts in energy planning?

Average:
7.90

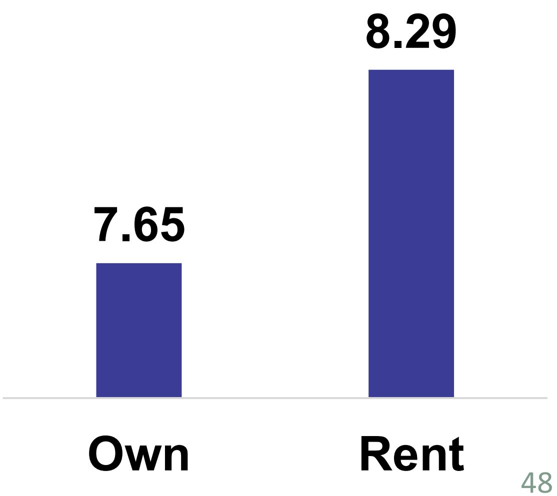
Generation



Income



Home Ownership



Source: 2020 Integrated Resource Plan Phase 3 Survey – Residential
n=608

Qualitative Results

Key Qualitative Findings

Commercial

Preferred Pathway: New Renewable Resources

Chosen Pathway Bill Impact: 39% not willing to accept an increase; 13% 10% or more

Emissions Approach: Moderate

DSM Responsibility: Individuals at 37%

Employee

Preferred Pathway: Current Energy Resources

Chosen Pathway Bill Impact: 32% no increase; 29% $10 or more

Emissions Approach: Gradual

DSM Responsibility: Individuals at 55%

Open

Preferred Pathway: New Renewable Resources

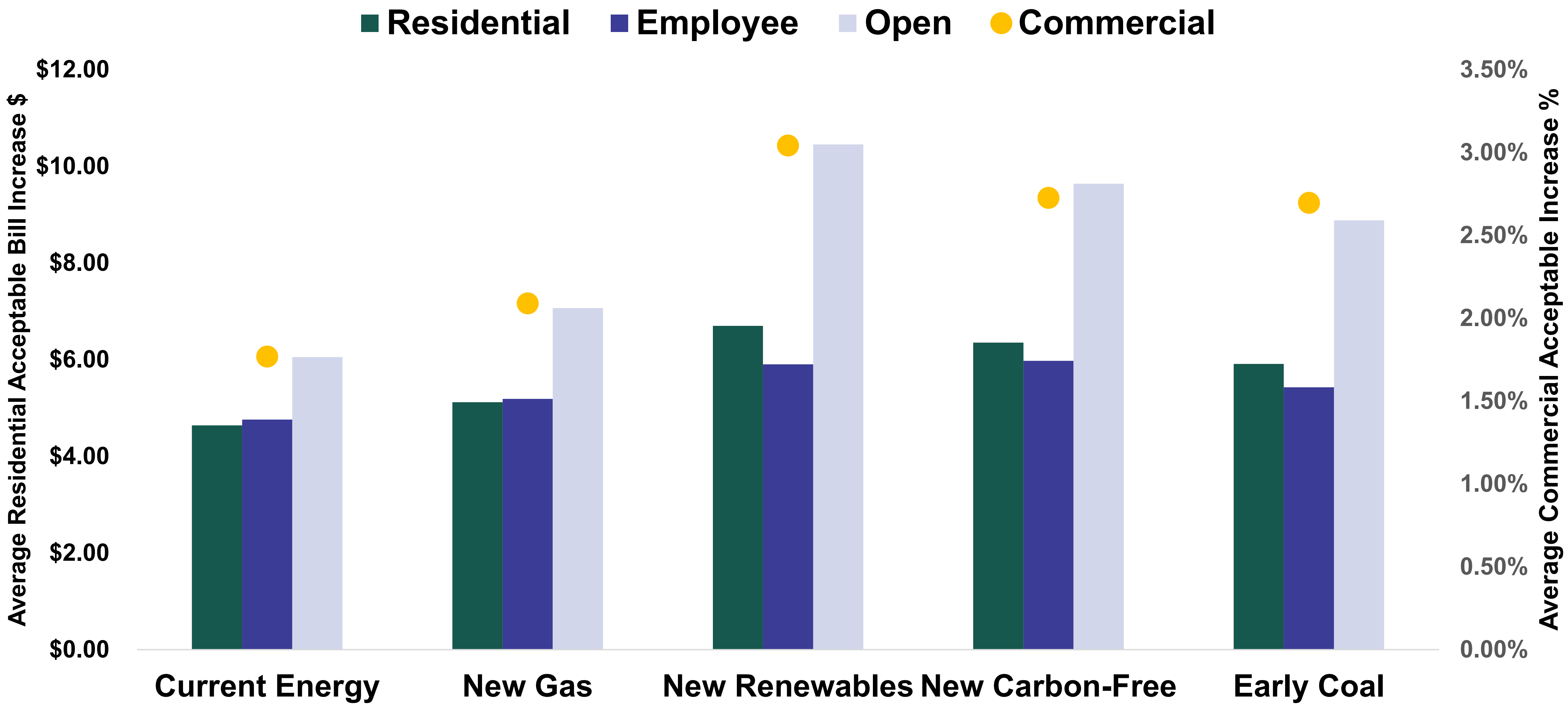
Chosen Pathway Bill Impact: 16% no increase and 31% $15 or more

Emissions Approach: Higher Impact

DSM Responsibility: Colorado Springs Utilities at 33%

Acceptable Bill Increase

IRP Survey Results



Source: 2020 Integrated Resource Plan Phase 3 Survey – All Segments

Pathway Preference

Question: Of the five pathways presented, which do you prefer?

	Residential	Commercial	Employee	Open
Current Energy	16%	27%	35%	12%
New Gas – Pathway B	8%	9%	17%	5%
New Renewable – Pathway C	45%	38%	27%	47%
New Carbon Free – Pathway D	17%	12%	12%	18%
Early Coal Retirement – Pathway E	14%	15%	9%	18%

Similarities:

- New Renewables was most preferred by Residential and Open survey respondents
- New Gas pathway had the lowest preference

Differences:

- Employee respondents chose the Current Energy pathway as most preferred
- Employee respondents have the highest preference for new gas resources
- Commercial respondents chose Current Energy pathways as second preference

Pathway Influence

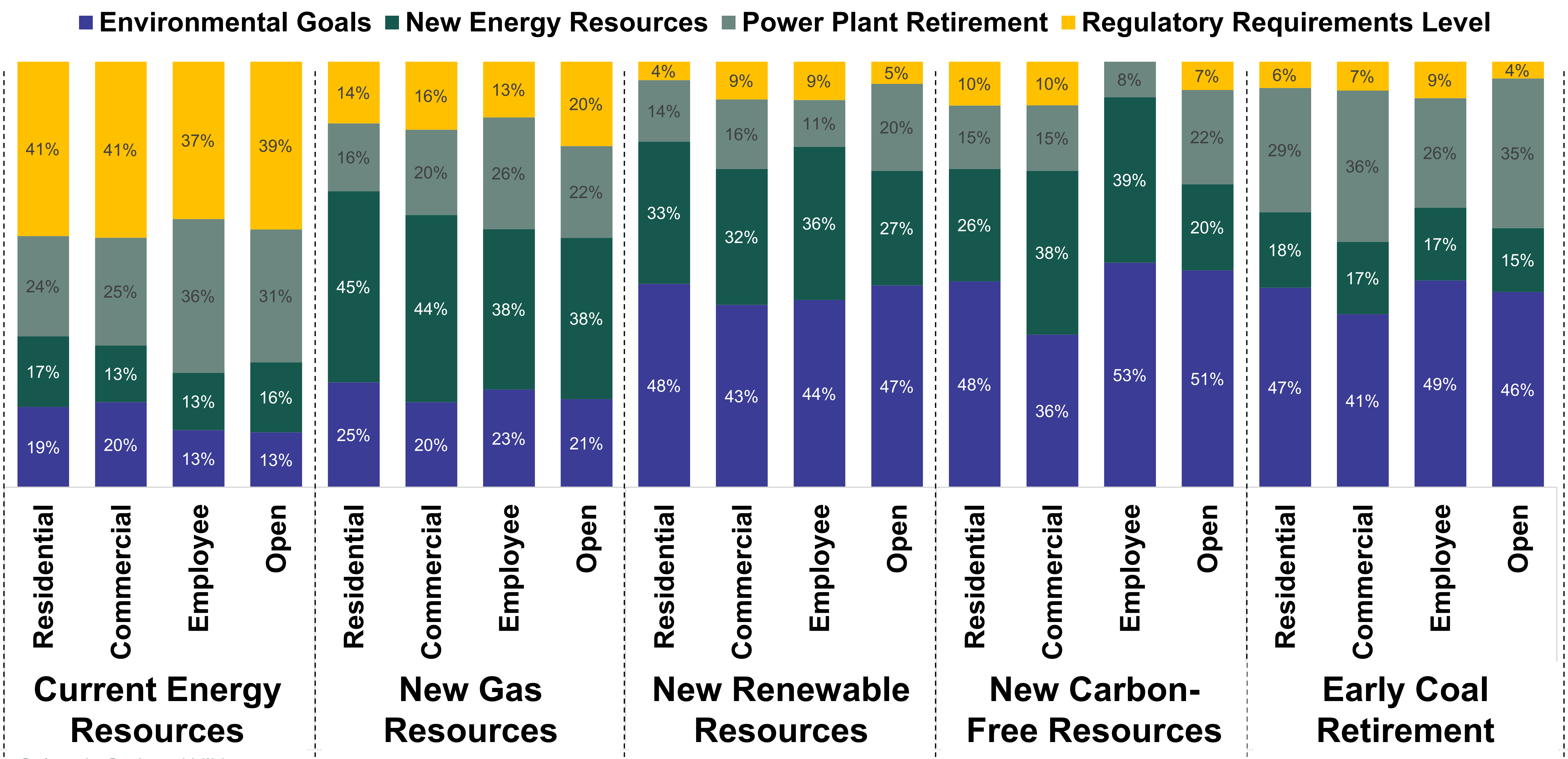
Question: Which of the following influenced you to select this pathway? Please select all that apply.

	Residential	Commercial	Employee	Open
Environmental Goals	62%	52%	43%	72%
New Energy Resources	42%	40%	38%	38%
Power Plant Retirement	27%	32%	32%	40%
Regulatory Requirement Levels	17%	24%	25%	14%

Similarities:
- Environmental Goals had the most influence on respondents' selected pathway

Differences:
- Environmental Goals and Power Plant Retirement had a more significant influence for Open than the other segments

Influence of Preference by Pathway – All Segments



Carbon Emissions Approach

Question: Given the state legislation requirement of decreasing carbon emissions by at least 90% by 2050, what approach should Colorado Springs Utilities take?

	Residential	Commercial	Employee	Open
Gradual Impact	33%	46%	46%	19%
Moderate Impact	44%	34%	40%	30%
High Impact	23%	20%	13%	51%

Similarities:

- Moderate was selected either 1 or 2 in all segments
- Higher Impact approach was chosen as last in 3 out of 4 segments

Differences:

- Commercial and Employee respondents selected a more gradual approach
- Open respondents selected a more aggressive approach

Energy Savings Responsibility

*Question: Please indicate which of the following is **most responsible** for energy saving efforts.*

	Residential	Commercial	Employee	Open
Individuals	40%	37%	55%	26%
Colorado Springs Utilities	22%	29%	22%	33%
Local/State Government	21%	14%	11%	25%
Federal Government	11%	8%	3%	12%
Local Businesses	5%	10%	7%	3%
Community Organization	1%	3%	1%	2%

Similarities:

- Residential, Commercial, and Employees named Individuals

Differences:

- Open said Colorado Springs Utilities is the most responsible
- Employees placed the highest responsibility on the individual

Energy Efficiency and Planning Relationship

Question: Using a scale from 1 to 10, how important is customer efficiency/renewable energy efforts in energy planning?

	Residential	Commercial	Employee	Open
Index	7.90	7.10	7.13	8.20

Similarities:
- All segments believed energy planning should include customer efficiency/renewable efforts

Differences:
- Open segment placed more emphasis on customer efforts
- Commercial placed less emphasis on customer efforts

Post-Survey Events

- Probable state regulations for emission standards by utilities were presented after survey was executed
- Portfolio for 100% renewable was not included in survey
- Net Present Value (NPV) of portfolios was unknown
- UPAC reduced the portfolios from 20 to 12
- Attribute weighting finalized by the Utilities Board

Conclusion

Community Outreach Summary

- When customer evaluated which portfolio they would be willing to accept a larger bill impact, they chose Pathways C, D and E in that order. All segments selected the prioritized in the same order.
- Pathway C was the most favorable pathway for the community.
- Customers are looking for solutions to achieve Environmental Goals and look for New Energy Resources (i.e. Pathways C, D, and E)
- Pathways C and D were selected because of the Environmental Goals and New Energy Resources efforts.
- Pathway E was selected for reasons of Environmental Goals and Power Plant Retirement considerations.
- Customers value the importance of demand side management for energy planning
- A moderate approach to reducing emissions is acceptable to all segments.

Portfolios with Scoring, Financial Results, Sensitivities and Risks

	Portfolio	Carbon Targets	2023	2026	2030	2035	2040	2050
Reference Case *Drake Retired in 2035*	R					Drake & Birdsall Retire Gas		
	1	80% Carbon by 2030 90% Carbon by 2050				Drake & Birdsall Retire Gas/Renewable/Storage		
Pathway A *50% Carbon Reduction by 2030*	2	50% Carbon by 2030 90% Carbon by 2050			Drake 6 & 7 Retire Gas & DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
	6	50% Carbon by 2030 90% Carbon by 2050			Drake 6 & 7 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
Pathway B *Gas & DSM Replacement Generation*	3	50% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Gas & DSM		Birdsall 1-3 Retire Renewable/Storage/DSM		Nixon 1 Retire Gas & DSM
	4	50% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Gas & DSM		Birdsall 1-3 Retire Renewable/Storage/DSM	Nixon 1 Retire Gas & DSM	
	5	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Gas & DSM	Nixon 1 Retire Gas & DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
	13	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Gas & DSM	Nixon 1 Retire Gas & DSM	Birdsall 1-3 Retire Gas & DSM		
Pathway C *Renewable and DSM Replacement Generation*	7	50% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM		Birdsall 1-3 Retire Renewable/Storage/DSM		Nixon 1 Retire Renewable/Storage/DSM
	8	50% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM		Birdsall 1-3 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	
	9	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
	10	80% Carbon by 2030 100% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		Front Range Nixon CT Retire Renewable/Storage/DSM
	14	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
Pathway D *Carbon Free*	11	80% Carbon by 2030 100% Carbon by 2050		Drake 6 & 7 Retire Non-Carbon/Storage/DSM	Nixon 1 Retire Non-Carbon/Storage/DSM	Birdsall 1-3 Retire Non-Carbon/Storage/DSM		Front Range Nixon CT Retire Non-Carbon/Storage/DSM
Pathway E *Early Coal Decommission*	12	80% Carbon by 2030 90% Carbon by 2050	Drake 6 & 7 Retire Aeroderivative Gas	Nixon 1 Retire Gas/Renewable/Storage/DSM		Birdsall 1-3 Retire Gas/Renewable/Storage/DSM		
	16	80% Carbon by 2030 90% Carbon by 2050	Drake 6 & 7 Retire Aeroderivative Gas		Nixon 1 Retire Gas/Renewable/Storage/DSM	Birdsall 1-3 Retire Gas/Renewable/Storage/DSM		
	17	80% Carbon by 2030 90% Carbon by 2050	Drake 6 & 7 Retire Aeroderivative Gas		Nixon 1 Retire Non-Carbon/Storage/DSM	Birdsall 1-3 Retire Non-Carbon/Storage/DSM		
Pathway F *100 % Renewable*	15	100% Renewable by 2030			Drake 6 & 7 Nixon 1,2,3 Retire Front Range Birdsall Renewable/Storage/DSM			
	18	100% Renewable by 2040				Drake 6 & 7 Retire Birdsall Renewable/Storage/DSM	Nixon 1,2,3 Retire Front Range Renewable/Storage/DSM	
	19	100% Renewable by 2050				Drake 6 & 7 Retire Birdsall Renewable/Storage/DSM		Nixon 1,2,3 Retire Front Range Renewable/Storage/DSM

Portfolio	CO2 Target	Retirements	New Resources	Attribute Ranking	Reliability	Cost/ Implementation	Environment/ Stewardship	Flexibility /Diversity	Innovation
4	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2040	Gas/Renewable/Storage/DSM	1	93	100	57	50	60
13*	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/DSM	2	100	96	80	25	30
17	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	3	100	46	69	88	70
16	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	4	93	63	72	75	50
14*	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM	5	73	79	69	75	70
12	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable/Storage/DSM	6	93	63	69	75	50
10	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM	7	80	30	81	100	100
2	50% by 2030 90% by 2050	Drake 2030	Gas/Renewable/Storage/DSM	8	87	100	53	50	40
3	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2050	Gas/Renewable/Storage/DSM	9	80	100	53	38	60
11	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM	10	87	30	84	88	60
6	50% by 2030 90% by 2050	Drake 2030	Renewable/Storage/DSM	11	60	84	46	88	80
7	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2050	Renewable/Storage/DSM	12	60	84	50	100	50
8	50% by 2030 90% by 2050	Drake 2026 Nixon 1 2040	Renewable/Storage/DSM	13	73	67	50	100	50
R	N/A	Drake 2035	Gas	14	80	88	38	75	30
5	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/Renewable/Storage/DSM	15	73	63	76	25	50
15	100% by 2030	Drake/Nixon/Front Range 2030	Renewable/Storage/DSM	16	73	21	100	50	60
9	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM	17	60	30	69	100	50
18	100% by 2040	Drake 2035 Nixon/Front Range 2040	Renewable/Storage/DSM	18	80	30	53	50	60
1	80% by 2030 90% by 2050	Drake 2035	Gas/Renewable/Storage	19	53	55	61	50	40
19	100% by 2050	Drake 2035 Nixon/Front Range 2050	Renewable/Storage/DSM	20	73	38	38	63	30

*Regional Market

Birdsall Retired in 2035 in all Portfolios except Portfolio 15 which is 2030.

Green = Highest Score
Yellow = Lowest Score
Blue = No longer being considered by UPAC

	Portfolio	Carbon Targets	2023	2026	2030	2035	2040	2050
Reference Case *Drake Retired in 2035*	R					Drake & Birdsall Retire Gas		
	1	80% Carbon by 2030 90% Carbon by 2050				Drake & Birdsall Retire Gas/Renewable/Storage		
Pathway B Gas & DSM Replacement Generation	5	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Gas & DSM	Nixon 1 Retire Gas & DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
Pathway C Renewable and DSM Replacement Generation	9	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
	10	80% Carbon by 2030 100% Carbon by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		Front Range Nixon CT Retire Renewable/Storage/DSM
Pathway D *Carbon Free*	11	80% Carbon by 2030 100% Carbon by 2050		Drake 6 & 7 Retire Non-Carbon/Storage/DSM	Nixon 1 Retire Non-Carbon/Storage/DSM	Birdsall 1-3 Retire Non-Carbon/Storage/DSM		Front Range Nixon CT Retire Non-Carbon/Storage/DSM
Pathway E *Early Coal Decommission*	12	80% Carbon by 2030 90% Carbon by 2050	Drake 6 & 7 Retire Aeroderivative Gas	Nixon 1 Retire Gas/Renewable/Storage/DSM		Birdsall 1-3 Retire Gas/Renewable/Storage/DSM		
	16	80% Carbon by 2030 90% Carbon by 2050	Drake 6 & 7 Retire Aeroderivative Gas		Nixon 1 Retire Gas/Renewable/Storage/DSM	Birdsall 1-3 Retire Gas/Renewable/Storage/DSM		
	17	80% Carbon by 2030 90% Carbon by 2050	Drake 6 & 7 Retire Aeroderivative Gas		Nixon 1 Retire Non-Carbon/Storage/DSM	Birdsall 1-3 Retire Non-Carbon/Storage/DSM		
Pathway F *100 % Renewable*	15	100% Renewable by 2030			Drake 6 & 7 Nixon 1,2,3 Retire Front Range Birdsall Renewable/Storage/DSM			
	18	100% Renewable by 2040				Drake 6 & 7 Retire Birdsall Renewable/Storage/DSM	Nixon 1,2,3 Retire Front Range Renewable/Storage/DSM	
	19	100% Renewable by 2050				Drake 6 & 7 Retire Birdsall Renewable/Storage/DSM		Nixon 1,2,3 Retire Front Range Renewable/Storage/DSM

Draft Gas Portfolios to Support EIRP

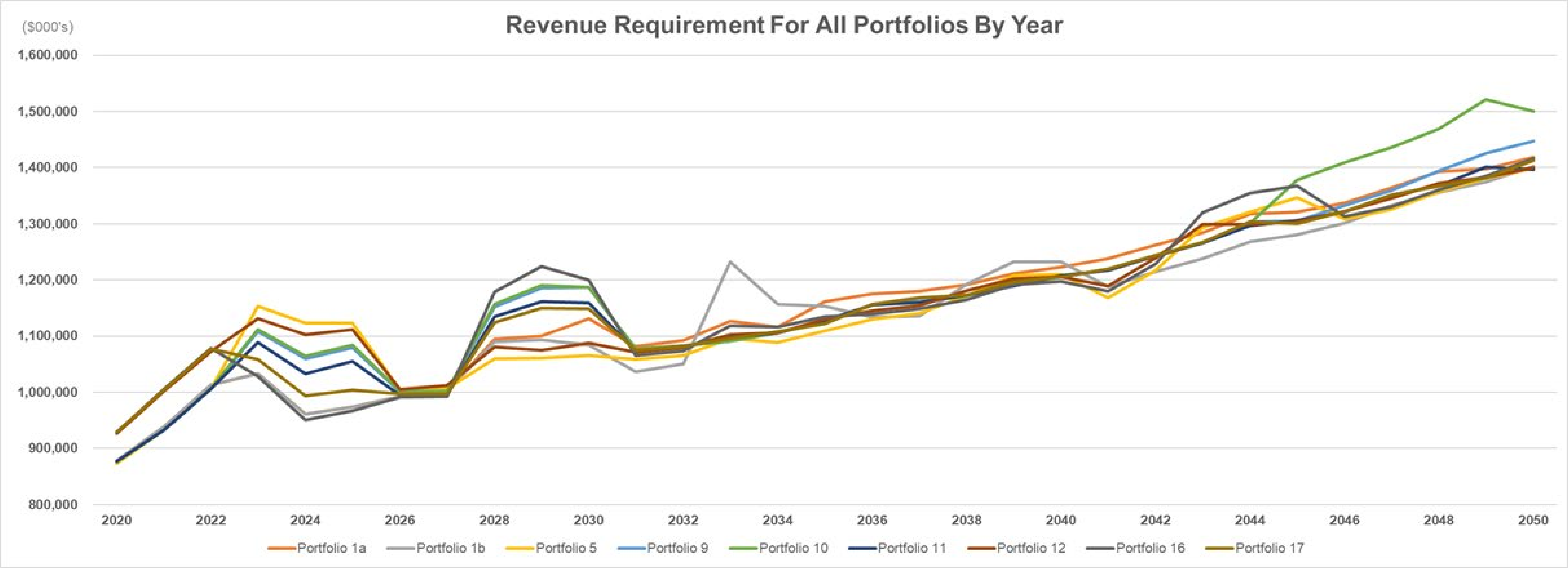
	Portfolio	2022	2025	2030	2032	2034	2035	2040	2043	2050
Gas Reference Case	G1				Propane Air Expansion	Propane Air New		Expand Propane Air		
EIRP Reference Case	G-E1				LDC IT with Oil Backup		Expand/New Pipeline Capacity + NNT			
	G-ER			LDC IT with Oil Backup			Expand / New Pipeline Capacity + NNT	Expand / New Pipeline Capacity + NNT		
EIRP Pathway B	G-E5		LDC IT with Oil Backup Expand / New Pipeline Capacity + NNT							
EIRP Pathway C	G-E9,10									
EIRP Pathway D	G-E11									Expand / New Pipeline Capacity + NNT
EIRP Pathway E	G-E12	LDC IT with Oil Backup	Expand / New Pipeline Capacity + NNT							
	G-E16	LDC IT with Oil Backup	Expand / New Pipeline Capacity + NNT	Expand / New Pipeline Capacity + NNT						
	G-E17	LDC IT with Oil Backup	Expand / New Pipeline Capacity + NNT							
EIRP Pathway F	G-E19			Expand / New Pipeline Capacity + NNT						

IRP Financial Model Results – Revenue Requirements

Red numbers in parentheses indicate lower revenue requirements.

30 Year Average Revenue Requirement Compared to Portfolio 1a	
Portfolios	**30 Year Annual Revenue Requirement ($000's)**
Portfolio 1a 80% by 2030 (Reference Case)	1,171,308
Portfolio 1b No CO2 Reg (Reference Case)	(14,892)
Portfolio 5 (Drake 2026/Nixon 2030 retire, New Gas & DSM)	(6,926)
Portfolio 9 (Drake 2026/Nixon 2030 retire, New Renewables/Storage/DSM)	8,219
Portfolio 10 (Drake 2023/Nixon 2026 retire, New Gas/Renewables/Storage/DSM)	23,830
Portfolio 11 (Drake 2026/Nixon 2030/FR 2050 retire, New Carbon-Free/DSM)	(1,228)
Portfolio 12 (Drake 2023/Nixon 2026 retire, New Gas/Renewables/Storage/DSM)	2,512
Portfolio 15 (100% Renewable by 2030)	TBD
Portfolio 16 (Drake 2023/Nixon 2030 retire, New Gas/Renewables/Storage/DSM)	2,816
Portfolio 17 (Drake 2023/Nixon 2030 retire, New Gas/Carbon-Free/DSM)	(1,087)
Portfolio 18 (100% Renewable by 2040)	TBD
Portfolio 19 (100% Renewable by 2050)	TBD

IRP Financial Model Results – Revenue Requirements



IRP Financial Model Results - Metrics

Red numbers indicate metrics that could require rate increases.

30 Year Average Annual Financial Metrics with Minimum and Maximum 3 Year Average For Each Portfolio						
	30 Year Average	3 Year Average	3 Year Average	30 Year Average	3 Year Average	3 Year Average
	Adjusted Debt Service Coverage	Minimum ADSC	Maximum ADSC	Days Cash On Hand	Minimum DCH	Maximum DCH
Portfolio 1a 80% by 2030 (Reference Case)	1.92	1.73	2.20	157	149	195
Portfolio 1b No CO2 Reg (Reference Case)	2.21	1.66	2.89	163	145	191
Portfolio 5 (Drake 2026/Nixon 2030 retire, New Gas & DSM)	2.43	1.64	3.44	180	144	217
Portfolio 9 (Drake 2026/Nixon 2030 retire, New Renewables/Storage/DSM)	1.75	1.45	1.93	147	115	176
Portfolio 10 (Drake 2023/Nixon 2026 retire, New Gas/Renewables/Storage/DSM)	1.65	1.05	1.93	128	(15)	176
Portfolio 11 (Drake 2026/Nixon 2030/FR 2050 retire, New Carbon-Free/DSM)	2.02	1.69	2.42	152	145	176
Portfolio 12 (Drake 2023/Nixon 2026 retire, New Gas/Renewables/Storage/DSM)	2.20	1.59	2.80	151	144	159
Portfolio 15 (100% Renewable by 2030)	TBD	TBD	TBD	TBD	TBD	TBD
Portfolio 16 (Drake 2023/Nixon 2030 retire, New Gas/Renewables/Storage/DSM)	2.47	1.70	3.47	203	145	269
Portfolio 17 (Drake 2023/Nixon 2030 retire, New Gas/Carbon-Free/DSM)	1.89	1.66	2.04	150	144	160
Portfolio 18 (100% Renewable by 2040)	TBD	TBD	TBD	TBD	TBD	TBD
Portfolio 19 (100% Renewable by 2050)	TBD	TBD	TBD	TBD	TBD	TBD

* Note Average Debt Ratio for all Portfolios meets acceptal levels to maintain Bond Rating

Portfolio	CO2 Target	Retirements	New Resources	Attribute Ranking	Reliability	Cost/ Implementation	Environment /Stewardship	Flexibility /Diversity	Innovation
17	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	1	100	46	69	88	70
16	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	2	93	63	72	75	50
12	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable/Storage/DSM	3	93	63	69	75	50
10	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM	4	80	30	81	100	100
11	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM	5	87	30	84	88	60
R	N/A	Drake 2035	Gas	6	80	88	38	75	30
5	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/Renewable/Storage/DSM	7	73	63	76	25	50
15	100% by 2030	Drake/Nixon/Front Range 2030	Renewable/Storage/DSM	8	73	21	100	50	60
9	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM	9	60	30	69	100	50
18	100% by 2040	Drake 2035 Nixon/Front Range 2040	Renewable/Storage/DSM	10	80	30	53	50	60
1	80% by 2030 90% by 2050	Drake 2035	Gas/Renewable/Storage	11	53	55	61	50	40
19	100% by 2050	Drake 2035 Nixon/Front Range 2050	Renewable/Storage/DSM	12	73	38	38	63	30

Birdsall Retired in 2035 in all Portfolios except Portfolio 15 which is 2030.

Green = Highest Score
Yellow = Lowest Score

Draft Gas Portfolios to Support LDC

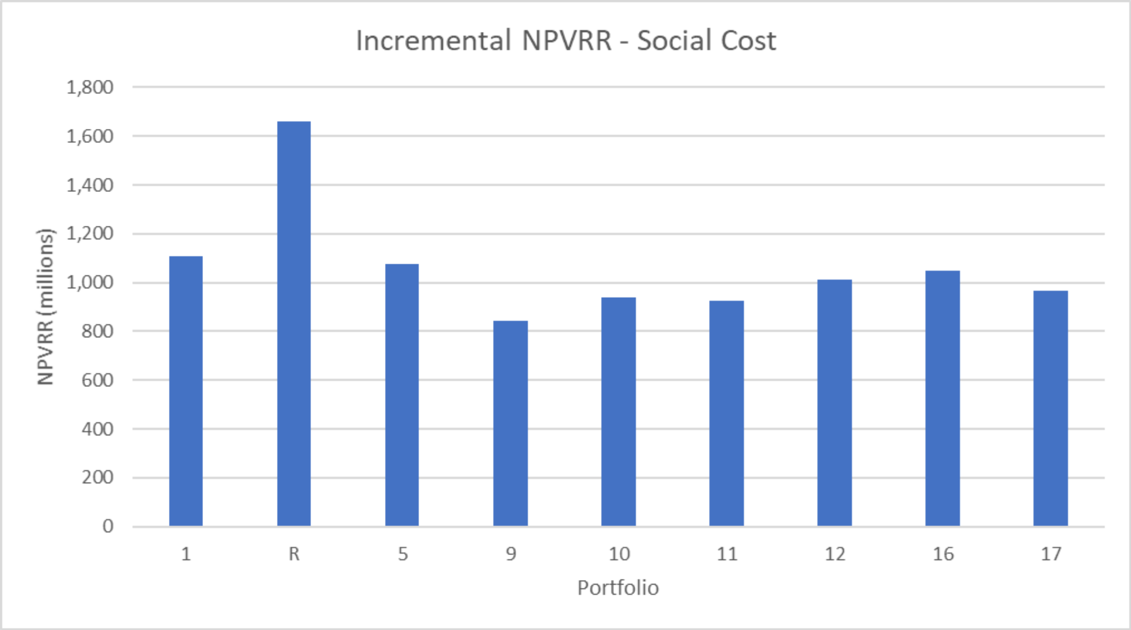
	Portfolio	2022	2025	2030	2032	2034	2035	2040	2043	2050
Gas Reference Case	G-1				Propane Air Expansion - Y2032	Propane Air New Y2034		Expand Propane Air Y2040		
Pathway A New Pipeline Capacity	G-2				Propane Air Expansion - Y2032	Expand/New Pipeline Capacity - Y2034				
Pathway B New Peak Shaving Capacity	G-3				Propane Air Expansion - Y2032	New LNG Plant Y2034			Expand LNG Plant Y2041	
Pathway C DSM + New Peak Shaving Capacity	G-4		Demand Response Y2025 to Y2044		Propane Air Expansion - Y2032			Propane Air New Y2039		Expand Propane Air Y2047
	G-5		Energy Efficiency Y2025 to Y2044		Propane Air Expansion - Y2032	Propane Air New Y2034			Expand Propane Air Y2043	
	G-6		DR + EE Y2025 to Y2044		Propane Air Expansion - Y2032			Propane Air New Y2040		

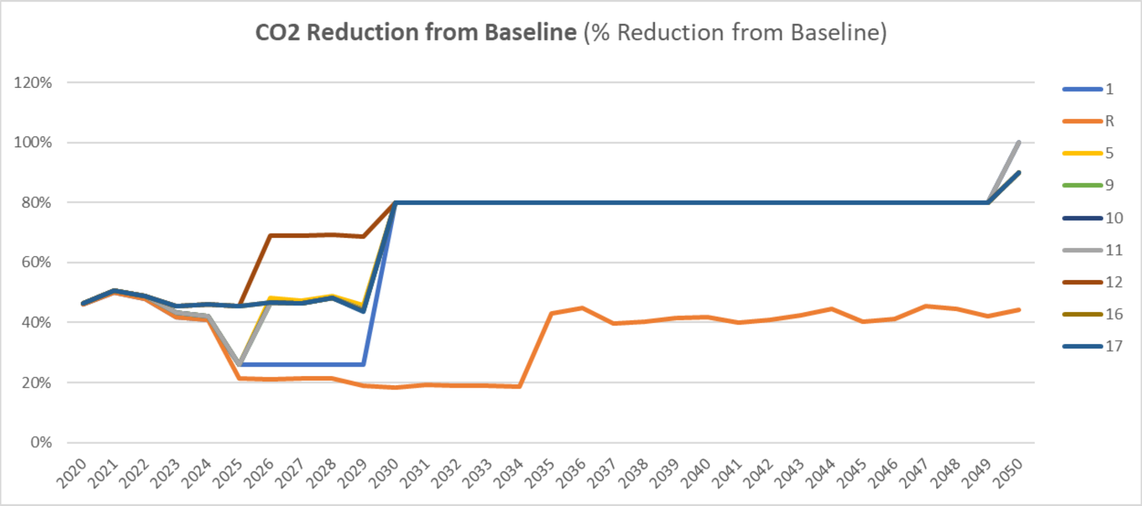
Results of Key Sensitivities

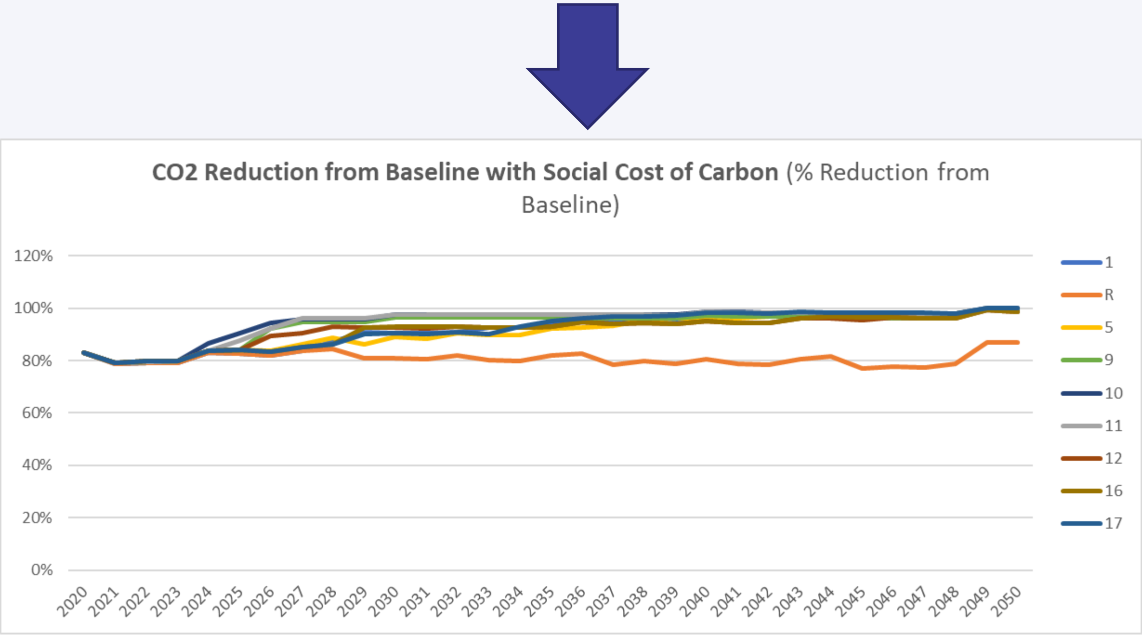
Portfolio	CO2 Target	Retirements	New Resources	High Gas	Low Gas	No Energy Purchases	90x30	100x50	Drake 2022	High Load	Low Load	CO2 on Purchases	Low Renewable Cost
1	80% by 2030 90% by 2050	Drake 2035	Gas/Renewable/Storage	382	-471	269	169	115	N/A	373	-276	194	-39
R	N/A	Drake 2035	Gas	410	-389	58	N/A	N/A	N/A	279	-253	50	N/A
5	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Gas/Renewable/Storage/DSM	492	-498	181	208	117	N/A	306	-283	156	-2
9	80% by 2030 90% by 2050	Drake 2026 Nixon 1 2030	Renewable/Storage/DSM	406	-547	510	140	0	N/A	370	-366	169	-126
10	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM	387	-511	514	162	N/A	N/A	333	-321	223	-174
11	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM	484	-466	336	165	N/A	N/A	401	-374	170	-69
12	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable/Storage/DSM	579	-554	220	183	166	-14	277	-291	231	-8
16	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	535	-482	207	217	193	-13	308	-238	200	-1
17	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	458	-490	163	98	100	-55	330	-317	127	-96

Note: Numbers are incremental NPVRR in millions of dollars.

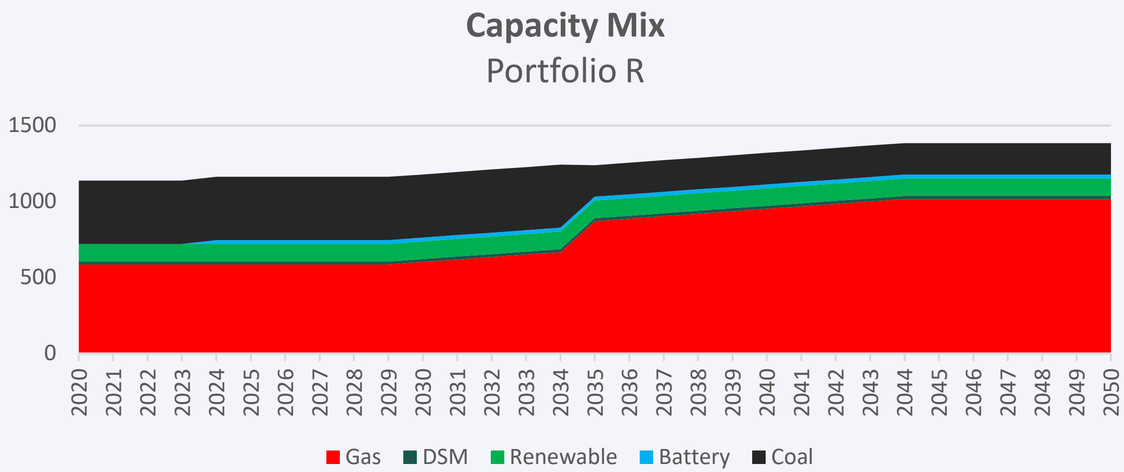
Social Cost Sensitivity

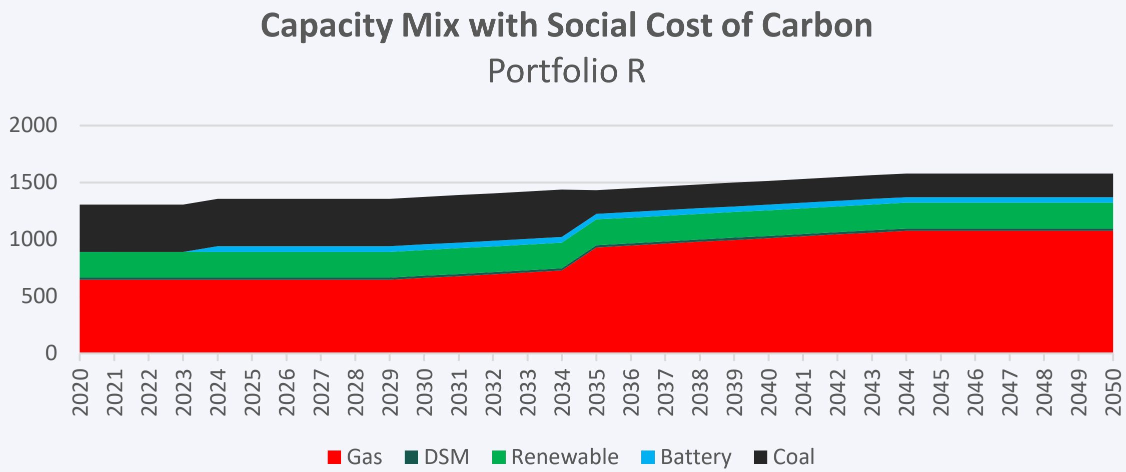


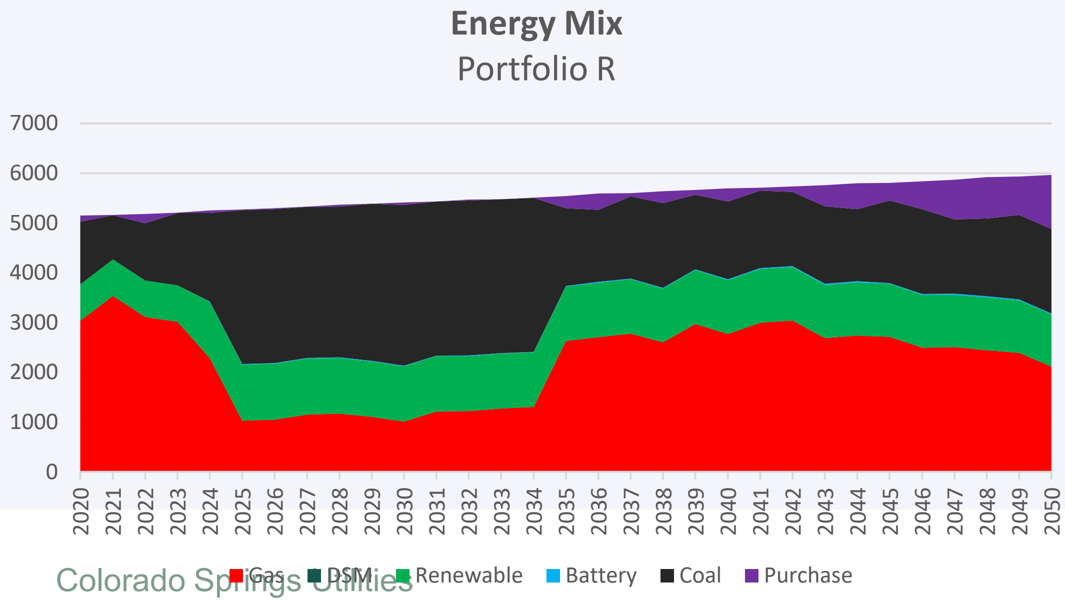


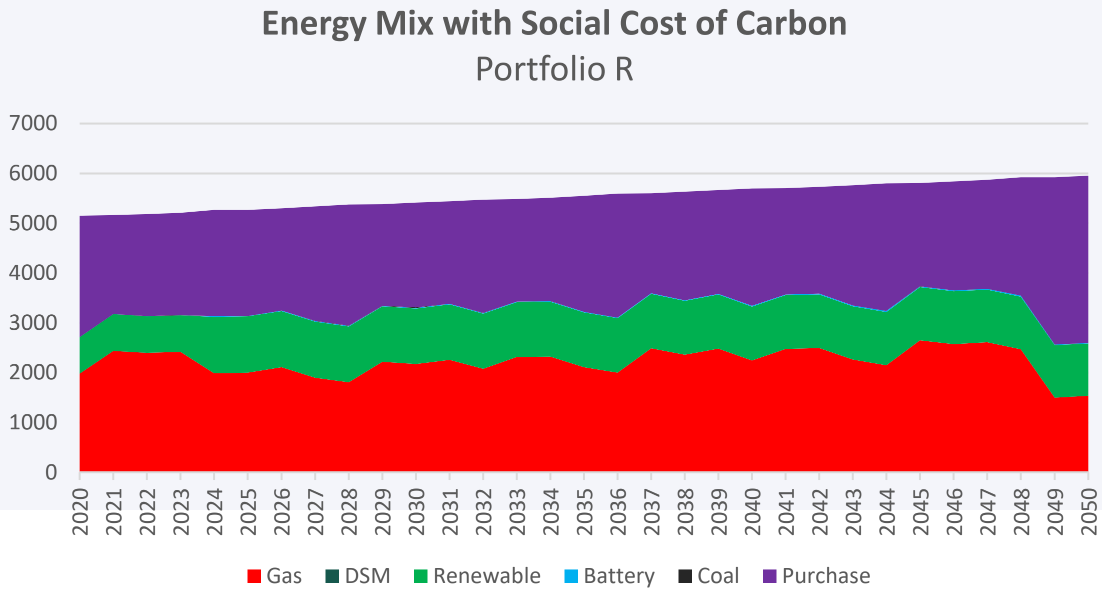


Social Cost Sensitivity (cont'd)









Key EIRP Sensitivities Takeaways

Sensitivity	Takeaway
Gas Prices	Impact not only portfolios with gas but also renewables because it impacts cost of market purchases. Low gas prices help all portfolios. High gas prices hurt all portfolios.
Energy Purchases	Limiting energy purchases increases the cost of portfolios and impacts renewable only portfolios the most because overbuild is required to maintain reliability.
Regional Market	Opportunity to lower costs through regional market that would lower transmission and renewable integration costs.
90% by 2030	All portfolios are more costly and increases reliance on energy market.
100% by 2050	All portfolios are more costly. Model still builds gas generation as a bridge allowing for cost of renewables to continue declining over time.
Drake 2022 retirement	Additional capacity is needed sooner. Can lower costs even more depending on capacity resource.
High load/Electrification /Annexation	All portfolios are more costly but could reduce GIRP costs.
Low load	All portfolios are less costly

Key EIRP Sensitivities Takeaways (cont'd)

Sensitivity	Takeaway
Social Cost of Carbon	Increases cost of all portfolios substantially. Gas resources still built but do not run much. This is still more cost effective than overbuild of renewables to meet capacity requirements.
CO2 rate on energy purchases	All portfolios are more costly. In the base model runs, no CO2 emissions are applied to market purchases so all portfolios rely on them to serve growing load while meeting CO2 targets.
Birdsall early retirement	All portfolios are more costly as that is additional capacity needed on top of Drake and Nixon retirements in short time period.
DSM	There are economic benefits from both Energy Efficiency and Demand Response programs. However, you do reach a point of diminishing returns.
Transmission costs	All portfolios are more costly. If there are increased transmission costs for resources such as wind, the model tends to pick solar over wind because the costs are pretty close otherwise.
Lower Renewable and Storage prices	All portfolios are less costly. Still builds small amounts of gas capacity.

100% Renewable Study Sensitivities

Scenario	Description	NPV ($M)	Takeaways
1a	Reference Case	$3,824	No GHG regulations assumed
2a	100% Renewable Energy for 2030, no energy purchases or sales	$12,467	Current transmission infrastructure is not sufficient to get to 100% renewable energy. Cost of implementing renewable generation targets does not include transmission infrastructure costs. Excess energy and hours of curtailment. Significant amount of battery storage needed exceeding 3,000 MW capacity for each portfolio. Battery storage utilization exceeds 1 cycle per day, which could impact the life time of the battery. Energy curtailment expected between 150 – 900 GWh. An average demand response utilization rate of 5% could be required to maintain reliability.
3a	100% Renewable Energy for 2040, no energy purchases or sales	$9,797	
4a	100% Renewable Energy for 2050, no energy purchases or sales	$5,694	
5a	100% Carbon Free for 2050	$6,184	2,250 MW of battery capacity required. Less utilization rate that 100% portfolios 2-4. Lower DR utilization rate than portfolios 2-4.
6a	100% Renewable Energy for 2050 in an RTO	$5,483	Portfolios have the ability to purchase energy or sell energy in lieu of curtailment will result in a lower cost portfolio. Less nameplate capacity is required as energy purchases can contribute to lowering the loss of load expectation. Regional Transmission Organization (RTO) provide an opportunity to access diverse power supply and transmission reliability coordination.
7a2	100% Renewable Energy for 2030 with No Import / Export Constraints	$6,518	
7a3	100% Renewable Energy for 2040 with No Import / Export Constraints	$6,302	
7a4	100% Renewable Energy for 2050 with No Import / Export Constraints	$4,667	
7a5	100% Carbon Free for 2050 with No Import / Export Constraints	$4,131	
8a	80% Renewable Energy for 2050	$5,276	Less battery and renewable capacity build to comply with renewable/CO2 targets. Lower utilization of demand response.
9a	60% Renewable Energy for 2050	$4,591	
10a	90% CO2 Reduction in 2050	$5,415	

Key GIRP Sensitivities Takeaways

Sensitivity	Takeaway

Pathway Risks

Pathway	Portfolios	Risk	Mitigation
Reference Case	1A, 1B	a) Regulatory Risk b) Potential Stranded Asset	a) Select portfolio that complies with 80% GHG reduction by 2030 b) Decommission Drake and Nixon 1 prior to 2030
Pathway B *Gas & DSM Replacement Generation*	5	a) Electrification will provide a challenge in serving increased load while reducing GHG emissions b) Future regulatory risk (ex. 100% renewables) c) Reliance on the market purchases to reduce GHG d) High Commodity Prices	a) Ramp up renewable, battery, and DSM programs prior to anticipated year of need b) Allow Drake's replacement to include gas resources to limit likelihood of a stranded asset c) Increase energy efficiency and renewable generation d) Increase energy efficiency and renewable generation
Pathway C *Renewable and DSM Replacement Generation*	9, 10	a) Overbuild needed to maintain reliability b) Reliance on energy purchases to maintain reliability c) Transmission import limitations for wind generation d) Reliance on Demand Response	a) Consider backup/firming resources such as gas and battery b) Consider backup/firming resources such as gas and battery, Perform a renewable potential study to determine potential for Hydro, Biomass, Geothermal, Pump Storage near Colorado Springs c) Perform transmission study to determine projects needed to facilitate increasing wind generation. Ramp up solar, battery, and energy efficiency in the interim. Evaluate regional market opportunities. d) Plan to displace future capacity once demand response programs have been tested and validated for availability
Pathway D *Carbon Free*	11	a) Carbon Capture may not be ideal for CSU's location b) Modular Nuclear resources have limited operation in the US c) Regulatory risk permitting modular nuclear	a) Potential study to determine feasibility of Carbon Capture b) Allow time for technology to mature, do not plan for the Drake or Nixon to be replaced by modular nuclear. Near-term resources will should include wind, solar, battery, and demand side management c) Start permitting process far in advance of anticipated need
Pathway E *Early Coal Decommission*	12, 16,17	a) Tight on capacity with early drake decommissioning b) Electrification will provide a challenge in serving increased load while reducing GHG emissions c) Future regulatory risk (ex. 100% renewables) d) Transmission import limitations for wind generation	a) Market purchase, add another aeroderivative resource, or increase pike battery to 50 MW b) Ramp up renewable, battery, and DSM programs prior to anticipated year of need c) Allow Drake's replacement to include gas resources to limit likelihood of a stranded asset d) Perform transmission study to determine projects needed to allow for the delivery of wind generation. Evaluate regional market opportunities. e) Increase energy efficiency and renewable generation
Pathway F *100% Renewable*	15, 18, 19	a) Project coordination and implementation b) Transmission import limitations for wind generation c) Low availability for certain resources d) Reliance on Demand Response e) Overbuild needed to maintain reliability f) Reliance on energy purchases to maintain reliability	a) Allow for time to implementation and analysis. b) Perform transmission study to determine projects needed to allow for the delivery of wind generation. Evaluate regional market opportunities. Ramp up solar, battery, and energy efficiency in the interim. c) Perform a renewable potential study to determine potential for Hydro, Biomass, Geothermal, Pump Storage near Colorado Springs d) Plan to displace future capacity once demand response programs have been tested and validated for availability. e) Consider backup/firming resources such as gas and battery, Perform a renewable potential study to determine potential for Hydro, Biomass, Geothermal, Pump Storage near Colorado Springs

Risk by Attribute

Pathway	Portfolio	Reliability	Cost/Implementation	Environmental/Stewardship	Flexibility/Diversity	Innovation
Reference Case	1A	L	L	H	H	H
	1B	L	L	H	H	H
Pathway B *Gas & DSM Replacement Generation*	5	L	L	M	M	L
Pathway C *Renewable and DSM Replacement Generation*	9	M	M	M	M	L
	10	H	M	M	M	L
Pathway D *Carbon Free*	11	M	M	M	M	M
Pathway E *Early Coal Decommission*	12	M	L	M	L	L
	16	M	L	M	L	L
	17	M	M	L	M	L
Pathway F *100% Renewable*	15	H	H	L	H	H
	18	H	H	L	H	M
	19	M	M	L	L	L

More groundwork is needed to increase renewable and non-carbon generation

Solar	Wind	Hydro / Pump Storage	Biomass / Biogas / Landfill Gas / Geothermal	Nuclear / CC with Carbon Capture
Additional Battery or quick response resources	Transmission Study[1] RFP for that includes wind delivery strategy Additional Battery or quick response resources To ramp up large quantities of wind, either enter into a Regional Transmission Organization (RTO) or complete transmission projects identified in transmission study	Evaluate implications of hydro and pump storage to water supply through Water Integrated Resource Plan (WIRP) Use learnings to from WIRP to develop assumptions in future EIRP	Potential study to determine the availability of each resource in Colorado Springs and surrounding arear Potential location dependent resources, either enter into a Regional Transmission Organization (RTO) or complete transmission projects identified in transmission study Use learnings from potential Study to develop assumptions in future EIRP	Allow for time for modular nuclear resources to mature Commission feasibility study to determine if carbon can be stored or reasonable be transported from Colorado Springs Potential location dependent resources, either enter into a Regional Transmission Organization (RTO) or complete transmission projects identified in transmission study

Seek partnership opportunities to develop renewable and import projects outside of Colorado Springs

1. Transmission study could be focused on wind, or it could include transmission needed once locations determined from biomass/biogas/landfill gas/geothermal/carbon capture potential studies are completed

IRP Workshop and Workbook

Workshop Agenda (draft)

- Welcome by Jill Gaebler
- Summary of UPAC Energy Vision and IRP Assignments by Rex Adams
- Legislative Overview by Andy Colosimo
- Detailed IRP Review including UPAC Recommendations
- Board Discussion
- Future Discussion Topics after IRP

Virtual Workbook

- History
  - All past presentations in date order
  - Summary of activity for each meeting held related to IRP (for example, Energy Vision was approved at x meeting on x date)
- Summary of each portfolio
  - 1 page description (example in next slide)
  - All graphs/charts
- Public process information, including survey results
  - Dates/activity/etc.

Portfolio Single Page Summary

- Description – high level in simple language
- Attribute scores and total score
  - Listed in order, high score to low
- Resource Mix
- CO_2 reduction
- Financial Results
- Key Sensitivities Results
- Gas Capacity Expansion Plan
- Risks

Recommendation to Utilities Board

	Portfolio	Attainable Carbon Goals	2023	2026	2030	2035	2040	2050
Reference Case	1A	80% Carbon by 2030 90% Carbon by 2050				Drake & Birdsall Retire Gas/Renewable/Storage		
	1B					Drake & Birdsall Retire Gas		
Pathway B Gas & DSM Replacement Generation	5	80% Carbon by 2030 90% Carbon by 2050		Drake 6 & 7 Retire Gas & DSM	Nixon 1 Retire Gas & DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
Pathway C Renewable and DSM Replacement Generation	9	80% Carbon by 2030 100% Renewable by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		
	10	80% Carbon by 2030 100% Renewable by 2050		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1 Retire Renewable/Storage/DSM	Birdsall 1-3 Retire Renewable/Storage/DSM		Front Range Nixon CT Retire Renewable/Storage/DSM
Pathway D *Carbon Free*	11	80% Carbon by 2030 100% Carbon 2050		Drake 6 & 7 Retire Non-Carbon & DSM	Nixon 1 Retire Non-Carbon & DSM	Birdsall 1-3 Retire Non-Carbon & DSM		Front Range Nixon CT Retire Non-Carbon & DSM
Pathway E *Early Coal* *Decommission*	12	50% Carbon by 2023 80% Carbon by 2030 90% Carbon 2050	Drake 6 & 7 Retire Aeroderivative Gas	Nixon 1 Retire Gas/Renewable/Storage/DSM		Birdsall 1-3 Retire Gas/Renewable/Storage/DSM		
	16	50% Carbon by 2023 80% Carbon by 2030 90% Carbon 2050	Drake 6 & 7 Retire Aeroderivative Gas		Nixon 1 Retire Gas/Renewable/Storage/DSM	Birdsall 1-3 Retire Gas/Renewable/Storage/DSM		
	17	50% Carbon by 2023 80% Carbon by 2030 90% Carbon 2050	Drake 6 & 7 Retire Aeroderivative Gas		Nixon 1 Retire Non-Carbon & DSM	Birdsall 1-3 Retire Non-Carbon & DSM		
Pathway F *100 %* *Renewable*	15	100% Renewable by 2030		Drake 6 & 7 Retire Renewable/Storage/DSM	Nixon 1,2,3 Retire Front Range Birdsall Renewable/Storage/DSM			
	18	100% Renewable by 2040				Drake 6 & 7 Retire Birdsall Renewable/Storage/DSM	Nixon 1,2,3 Retire Front Range Renewable/Storage/DSM	
	19	100% Renewable by 2050				Drake 6 & 7 Retire Birdsall Renewable/Storage/DSM		Nixon 1,2,3 Retire Front Range Renewable/Storage/DSM

Top 5 Portfolios (on Attribute Scoring)

Portfolio	Pathway	CO2 Target	Retirements	New Resources	Attribute Ranking	Total Score Normalized
17	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	1	100
16	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	2	99
12	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable/Storage/DSM	3	98
10	C	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM	4	98
11	D	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM	5	93

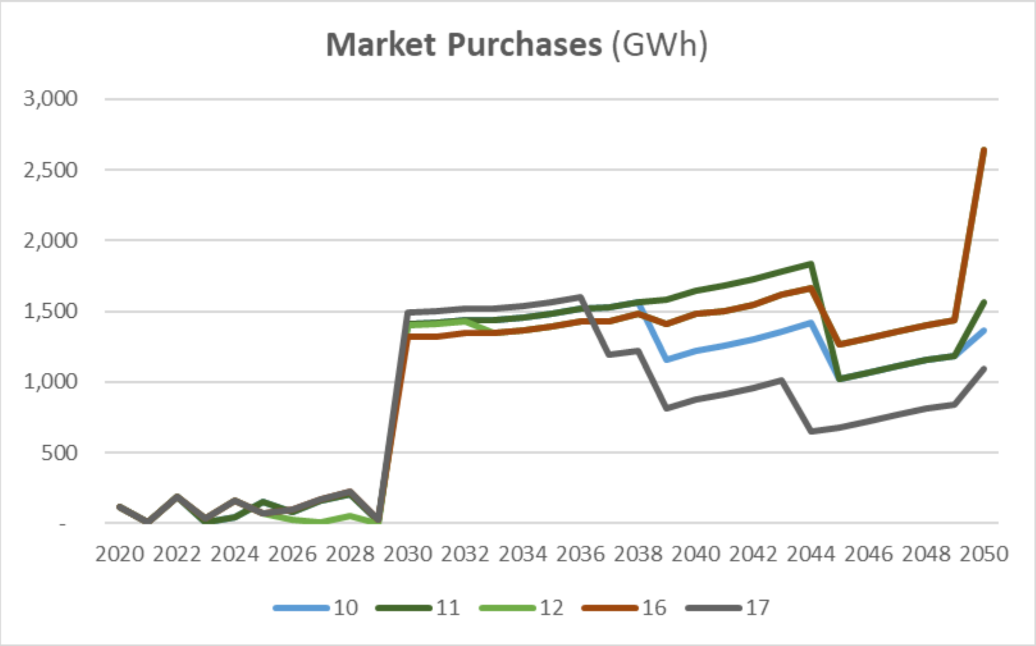
Note: These are the only 5 portfolios that scored above 90 on normalized scoring.

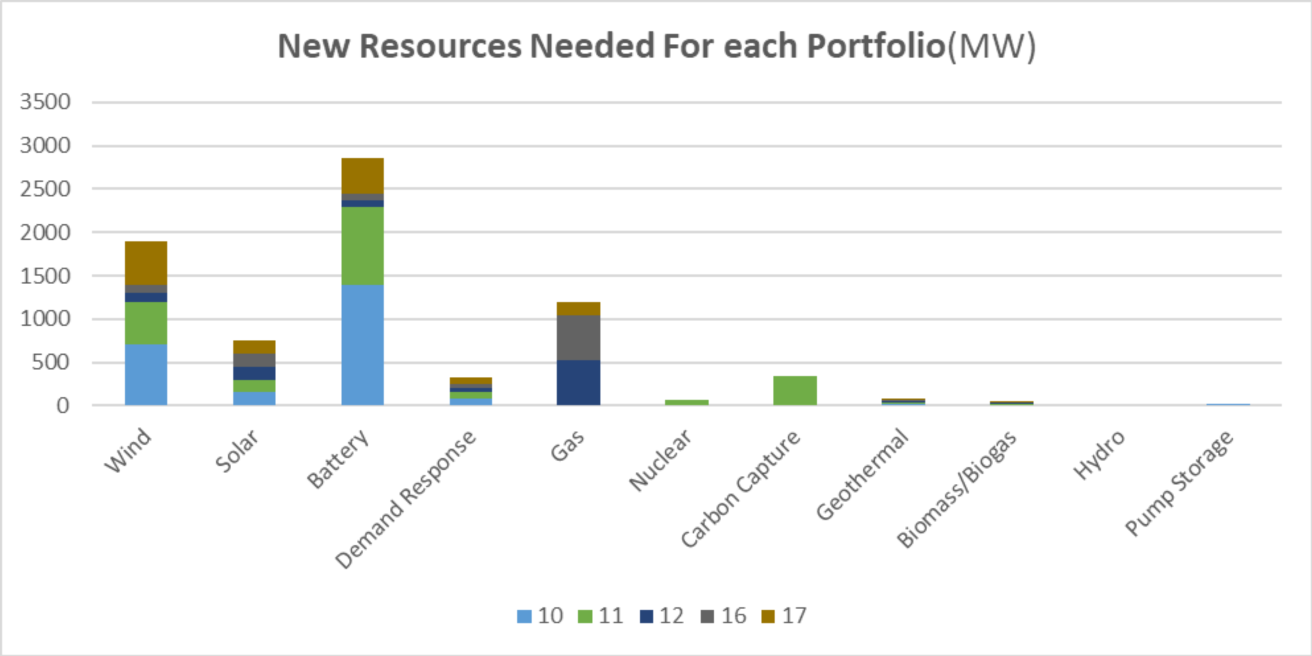
Financial Results of Top 5

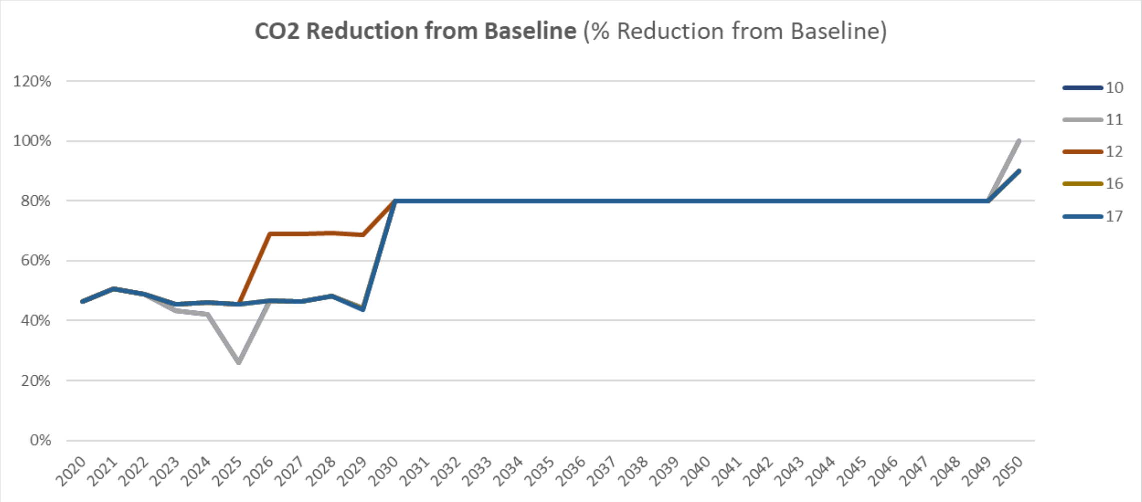
Top 5 Portfolio Sensitivity Results

Portfolio	CO2 Target	Retirements	New Resources	High Gas	Low Gas	No Energy Purchases	90x30	100x50	Drake 2022	High Load	Low Load	CO2 on Purchases	Low Renewable Cost
10	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Renewable/Storage/DSM	387	-511	514	162	N/A	N/A	333	-321	223	-174
11	80% by 2030 100% by 2050	Drake 2026 Nixon 1 2030 Front Range/Nixon 2,3 2050	Non-Carbon/Storage/DSM	484	-466	336	165	N/A	N/A	401	-374	170	-69
12	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2026	Aeroderivative/Gas/Renewable/Storage/DSM	579	-554	220	183	166	-14	277	-291	231	-8
16	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	535	-482	207	217	193	-13	308	-238	200	-1
17	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	458	-490	163	98	100	-55	330	-317	127	-96

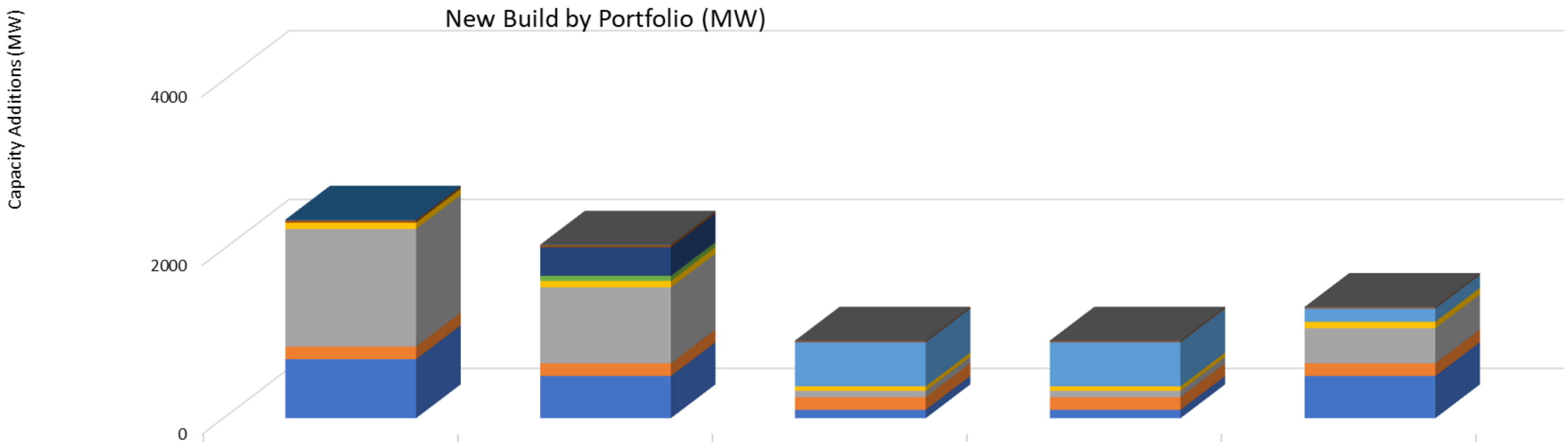
Top 5 Portfolio Market Purchases, New Resources and CO2 Reduction







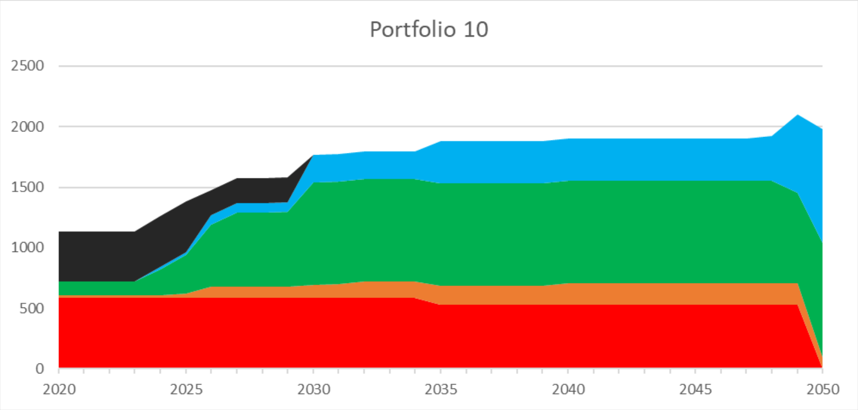
Top 5 Portfolio New Capacity Additions

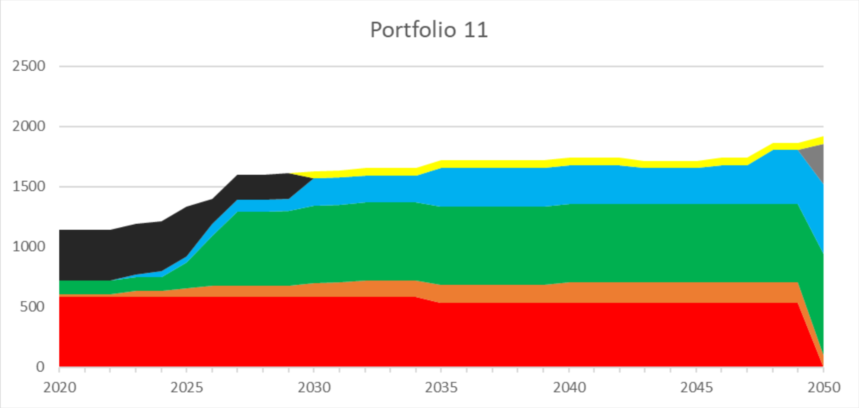


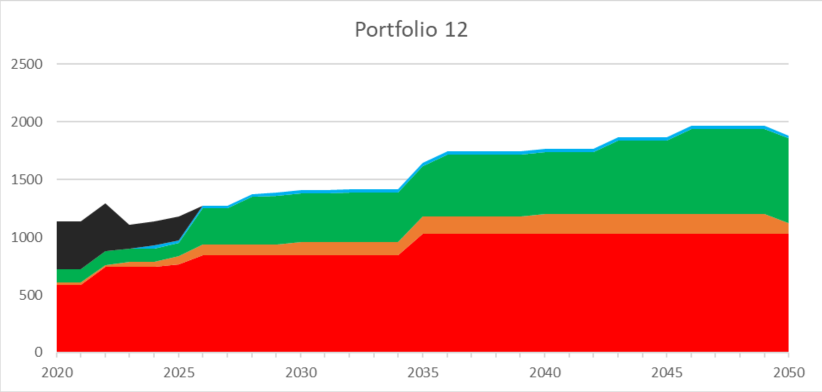
	10	11	12	16	17
Pump Storage	5				
Hydro					
Biomass/Biogas	10	10	10	10	10
Geothermal	20	20	10	10	10
Carbon Capture		340			
Nuclear		60			
Gas			523	523	156
Demand Response	76	76	52	52	76
Battery	1392	900	75	75	417
Solar	150	150	150	150	150
Wind	700	500	100	100	500

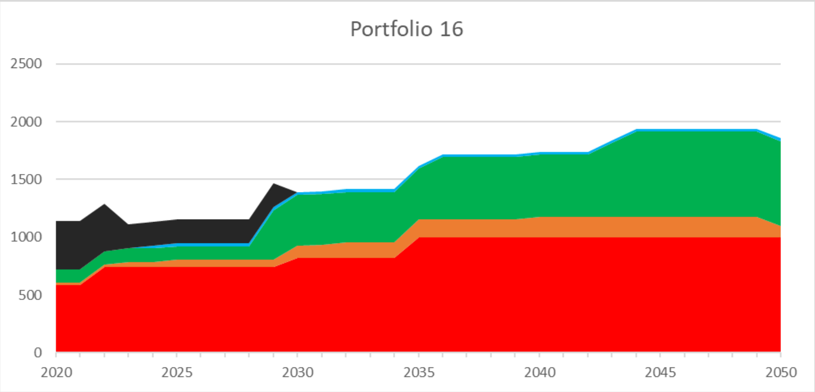
Top 5 Portfolio Capacity Mix

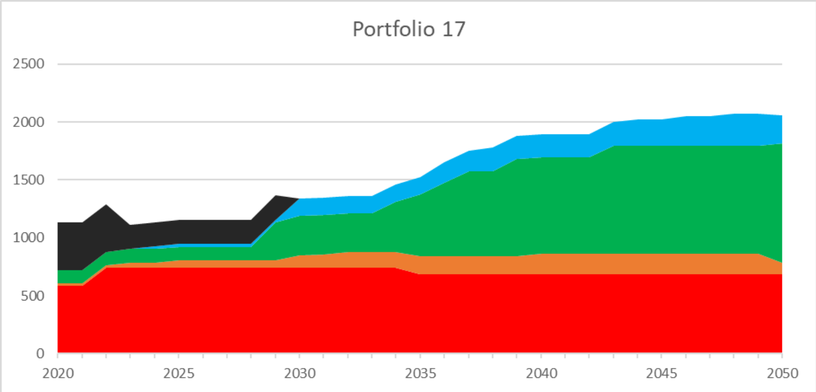
Gas DSM Renewable Battery Coal





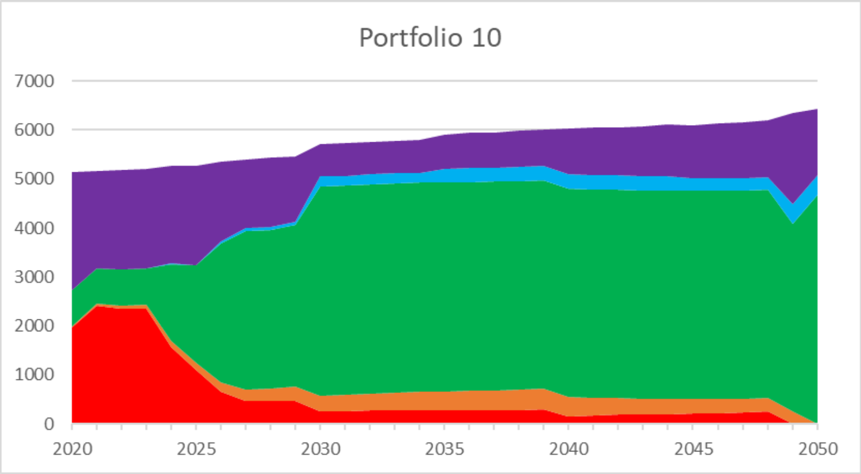


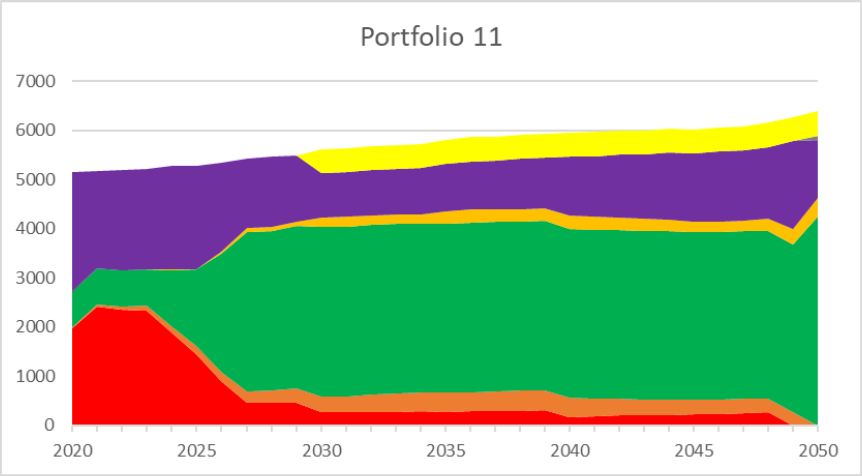


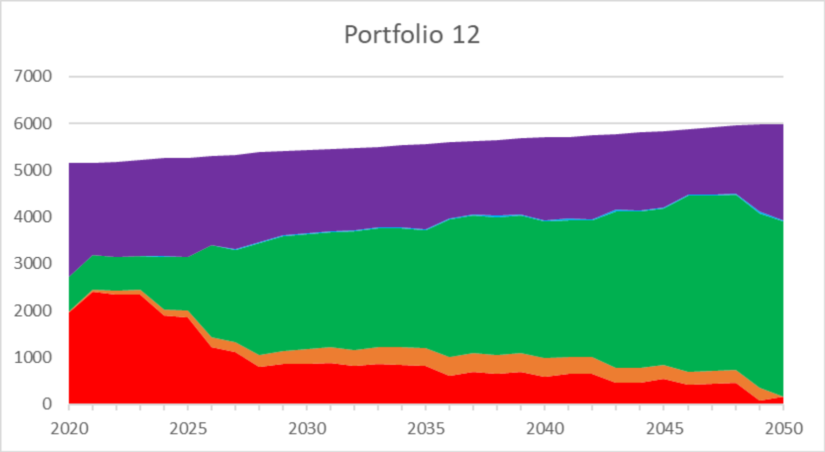


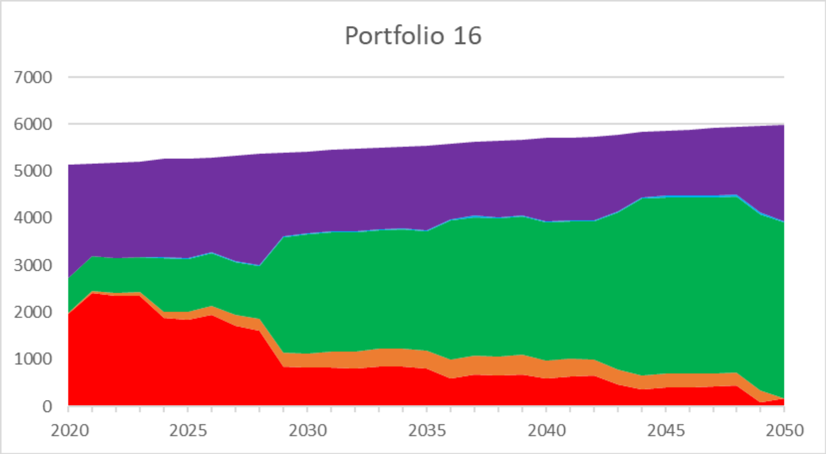
Top 5 Portfolio Energy Mix

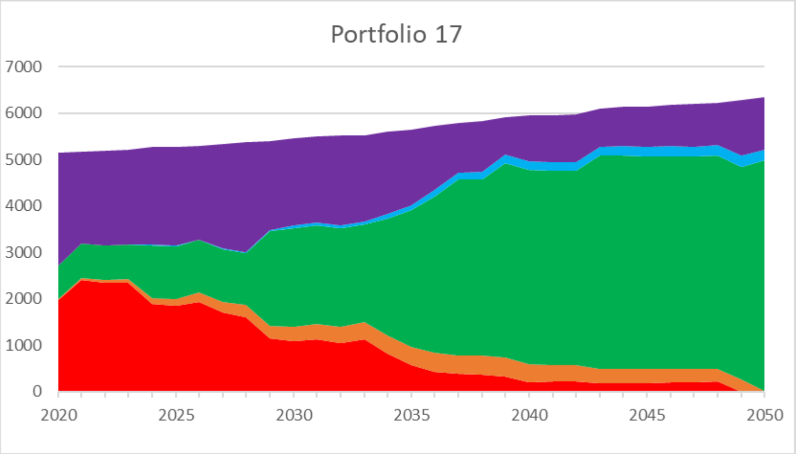
Gas | DSM | Renewable | Battery | Coal | Purchase











Top 5 Portfolio Gas Capacity Expansion Plans

Workforce Impacts and Plan

Utilities Board Presentation

THANK YOU, UPAC!!!

UPAC next assignment

UPAC Next Assignment

- Potential assignment discussion
  - June 11 -- Strategic Planning Committee
  - June 17 – Utilities Board
- UPAC assignment draft scope
  - July 16 – Strategic Planning Committee
  - July 22 – Utilities Board approval
- Assignment to UPAC
  - August 5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Electric and Gas Integrated Resource Plans

Utilities Board Special Meeting for Approval

June 26, 2020

Agenda

- Welcome and Introduction
- Summary of UPAC Recommendations
- Portfolios 16 and 17 Comparison
- Customer Comment
- Board Discussion and Decision

Public Process Update

Public Engagement Summary

Public Comment Summary

Emails to energyvision@csu.org

- 38 received 5/29-6/15
- 37 received 6/15-6/17

Public Meetings Speakers

28 people spoke at the Utilities Board June 17 meeting

- 6 Stakeholder Groups
- 22 Citizens/Customers

Summary of UPAC Recommendations

EIRP Recommendation

Pathway	Portfolio	Carbon targets	2022	2023	2025	2026	2030	2035	2040	2050
Pathway E	Portfolio 16	2030 80% 2050 90%		Drake retire Small, mobile, natural gas generator			Nixon 1 retire Gas/renewable/ storage/DSM	Birdsall retire Gas/renewable/ Storage/DSM		
Gas	G-E16		LDC IT with oil backup		Expand/new pipeline capacity with NNT		Expand/new pipeline capacity with NNT			

Reasons for UPAC's recommendation of Portfolio 16:

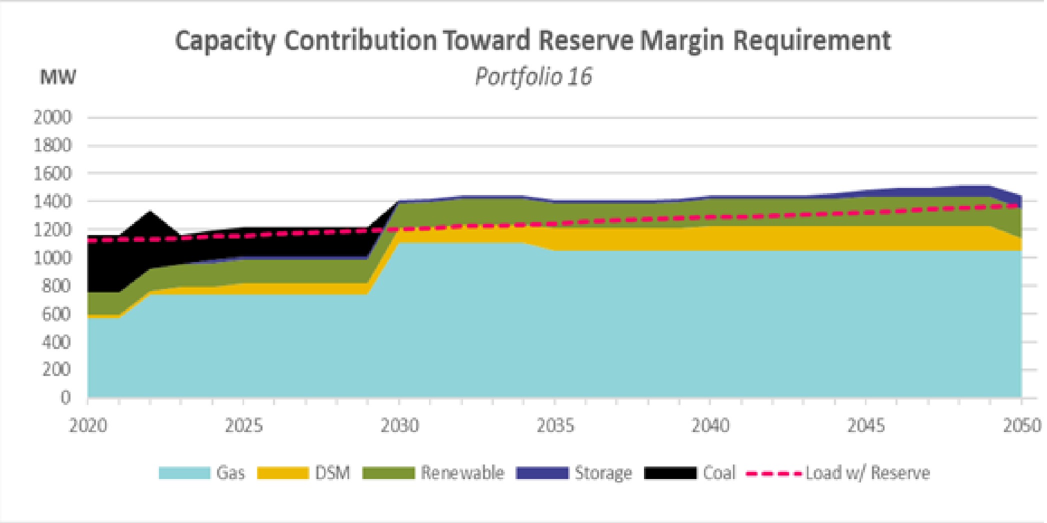
- High Attribute ranking
- Meets state regulatory carbon reduction
- Solid financial results
- Reasonable risk profile
- Uses proven innovative technology
- Earliest Drake decommissioning
- Provides flexibility on Nixon 1 replacement

EIRP PORTFOLIO 16

Overview

- Carbon reduction goals: 80% by 2030, 90% by 2050
- Coal retirement: Drake Power Plant no later than 2023, Nixon Power Plant no later than 2030
- Other retirement: Birdsall Power Plant no later than 2035
- Replacement: Small, mobile natural gas generators, renewable energy, storage and other natural gas generation plus energy efficiency initiatives

Pathway	Portfolio	Carbon targets	2022	2023	2025	2026	2030	2035	2040	2050
Pathway E	Portfolio 16	2030 80%; 2050 90%		Drake retire; Small, mobile, natural gas generator			Nixon 1 retire; Gas/renewable/ storage/DSM	Birdsall retire; Gas/renewable/ Storage/DSM		
Gas	G-E16		LDC IT with oil backup		Expand/new pipeline capacity with NNT		Expand/new pipeline capacity with NNT			



Resource Change 2021-2050 (MW)	
Drake (2023)	-208
Nixon 1 (2030)	-207
Nixon 2-3	0
Birdsall (2035)	-54
Front Range	0
New Gas	523
DSM	52
Storage	75
Solar	150
Wind	100
Hydro	0
Geothermal	10
Biomass/ Biogas	10
Carbon Capture	0
Nuclear	0

Financial Metrics	
30 Year Revenue Requirement	$36.27B
Average Annual Revenue Requirement	$1.21B
Average Adjusted Debt Service Coverage	2.09
Average Adjusted Days Cash on Hand	179
30 Year Electric Revenue	$18.0B

Attribute Score	
Reliability	93
Cost/ Implementation	63
Environment/ Stewardship	72
Flexibility/ Diversity	75
Innovation	50
Total score (normalized)	98.7

Sensitivities ($ incremental)	
Social Cost	$1.05B
High Load	$308M
Low Load	($238)M
High Gas	$535M
Low Gas	($482)M
90x30	$217M
100x50	$193M
Drake 2022	($13)M

Risks

- Tight on capacity with early Drake decommissioning
- Electrification will provide a challenge in serving increased load while reducing GHG emissions
- Future regulatory risk (ex. 100% renewables)
- Transmission import limitations for wind generation

2 Attribute rank

1 Financial rank

GIRP Recommendation

Portfolio	2022	2025	2030	2032	2034	2035	2040	2043	2050
G-6		DR + EE		Propane Air Expansion			Propane Air New		

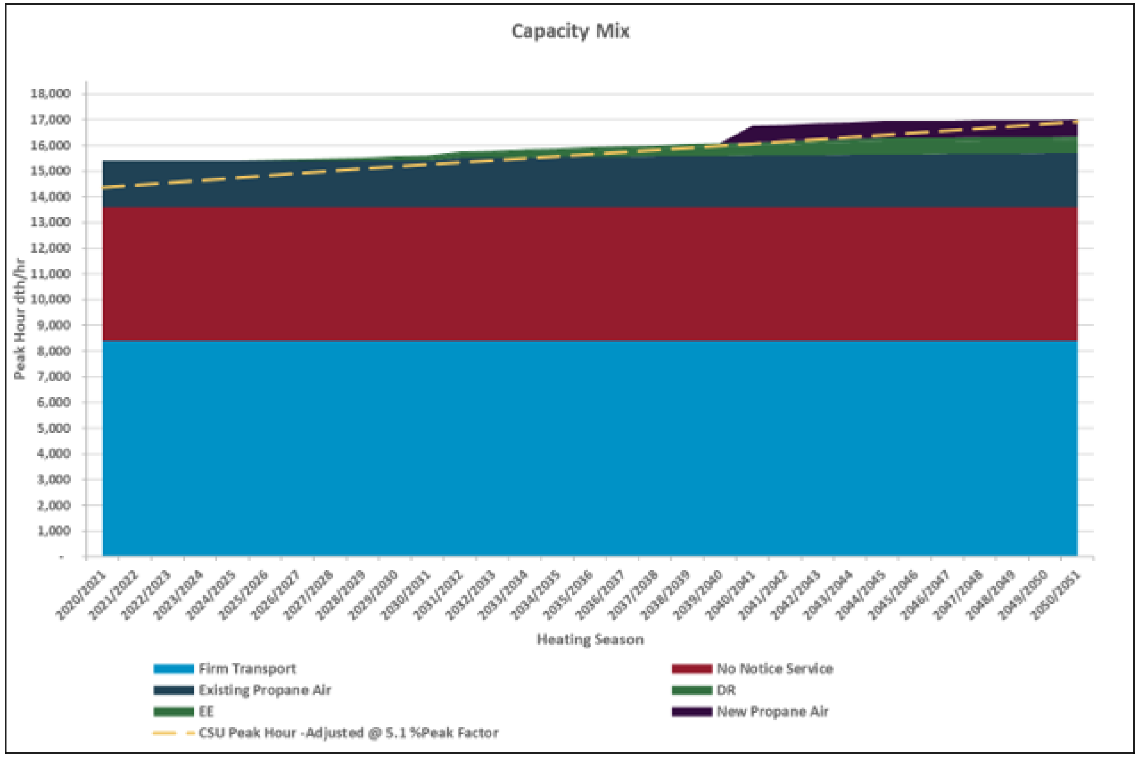
Reasons for UPAC's recommendation of Portfolio 6:

- Best attribute score
- Lowest revenue requirement
- Contains both DR and EE features
- Controllable risk profile
- Defers new infrastructure requirements

GIRP PORTFOLIO 6

Overview
Addition: Demand response, energy efficiency, new propane air, existing propane air expansion

	Portfolio	2022	2025	2030	2032	2034	2035	2040	2043	2050
Pathway C DSM + new peak shaving capacity	G-6		Demand response and energy efficiency		Propane air expansion			Propane air new		



Resource Change 2021-2050 (Dth/hr)	
Existing PA	300
New PA	650
New Pipeline Capacity	0
New LNG	0
Demand Response	500
Energy Efficiency	150

Financial Metrics	
30 Year Revenue Requirement	$35.71B
Average Annual Revenue Requirement	$1.190B
30 Year Gas Revenue	$5.73B

Attribute Score	
Reliability	83.5
Cost/ Implementation	100.0
Environment/ Stewardship	100.0
Flexibility/ Diversity	86.8
Innovation	72.7
Total score (normalized)	100.0

Sensitivities ($ incremental)	
High Growth	$7.79M
Low Growth	($12.54M)
Renewable Natural Gas (voluntary)	$64.10M
Non-firm Options	Included in EIRP Portfolios
Peaking Capacity Options	Requires Study
High DR	NA
High EE	NA
High DSM	($1.70M)
Distributed Generation on LDC System	Increases EIRP New Fixed Gas Costs by 86%

Risks

- High growth advances capital plan by 5 years, increases fixed gas costs
- Potential public push back on new PA Plant
- Electrification reduces load growth/revenue
- Regulatory risk mandating RNG
- Non-firm options require oil backup for DG
- DSM needs proof of concept, program development

1
Attribute rank

Portfolios 16 and 17 Comparison

Why Consider Portfolio 17

- Community input
- Board interest
- CEO/ Leadership/ Employee Recommendation

EIRP PORTFOLIO 17

Pathway	Portfolio	Carbon targets	2022	2023	2025	2026	2030	2035	2040	2050
Pathway E	Portfolio 17	2030 80% 2050 90%		Drake retire Small, mobile, natural gas generator			Nixon 1 retire Non-carbon, storage & DSM	Birdsall retire Non-carbon, storage & DSM		
Gas	G-E17		LDC IT with oil backup		Expand/new pipeline capacity with NNT					

EIRP PORTFOLIO 17

Overview

- Carbon reduction goals: 80% by 2030, 90% by 2050
- Coal retirement: Drake Power Plant no later than 2023, Nixon Power Plant no later than 2030
- Other retirement: Birdsall Power Plant no later than 2035
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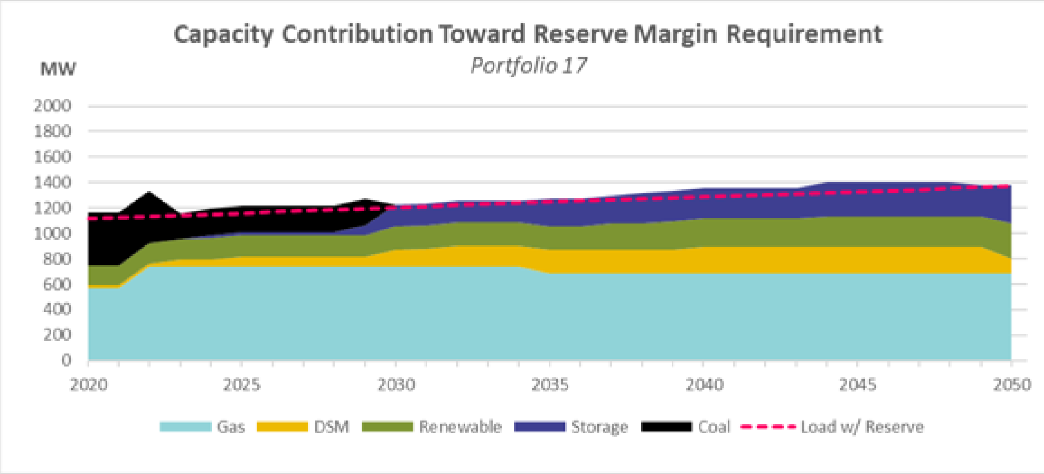

1 Attribute rank

4 Financial rank

Resource Change 2021-2050 (MW)	
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Birdsall (2035)	-54
Front Range	0
New Gas	156
DSM	76
Storage	417
Solar	150
Wind	500
Hydro	0
Geothermal	10
Biomass/ Biogas	10
Carbon Capture	0
Nuclear	0

Financial Metrics	
30 Year Revenue Requirement	$36.47B
Average Annual Revenue Requirement	$1.22B
Average Adjusted Debt Service Coverage	1.85
Average Adjusted Days Cash on Hand	154
30 Year Electric Revenue	$18.21B

Attribute Score	
Reliability	100
Cost/ Implementation	46
Environment/ Stewardship	69
Flexibility/ Diversity	88
Innovation	70
Total score (normalized)	100

Sensitivities ($ incremental)	
Social Cost	$0.97B
High Load	$330M
Low Load	($317)M
High Gas	$458M
Low Gas	($491)M
90x30	$98M
100x50	$100M
Drake 2022	($55)M

Risks

- Tight on capacity with early Drake decommissioning
- Electrification will provide a challenge in serving increased load while reducing GHG emissions
- Future regulatory risk (ex. 100% renewables)
- Transmission import limitations for wind generation

EIRP PORTFOLIO 16

Pathway	Portfolio	Carbon targets	2022	2023	2025	2026	2030	2035	2040	2050
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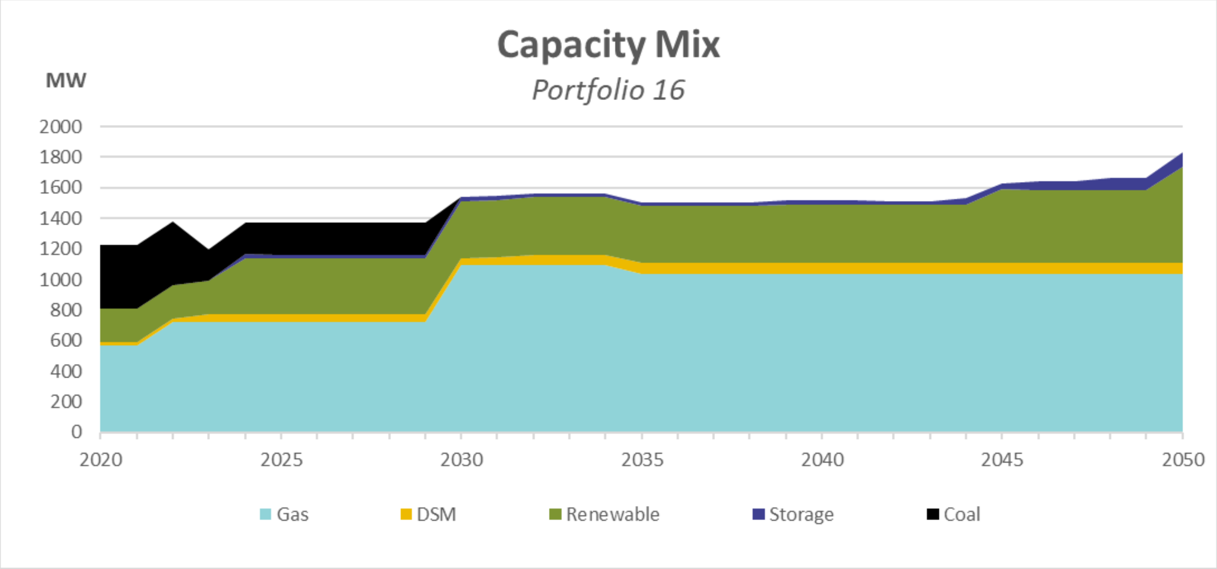
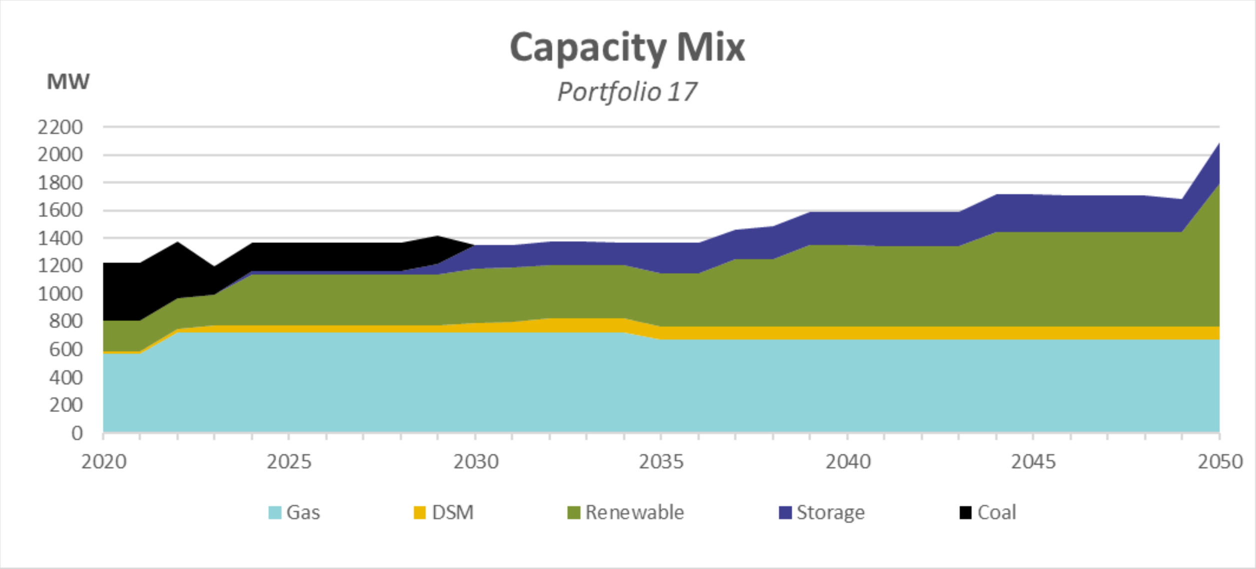
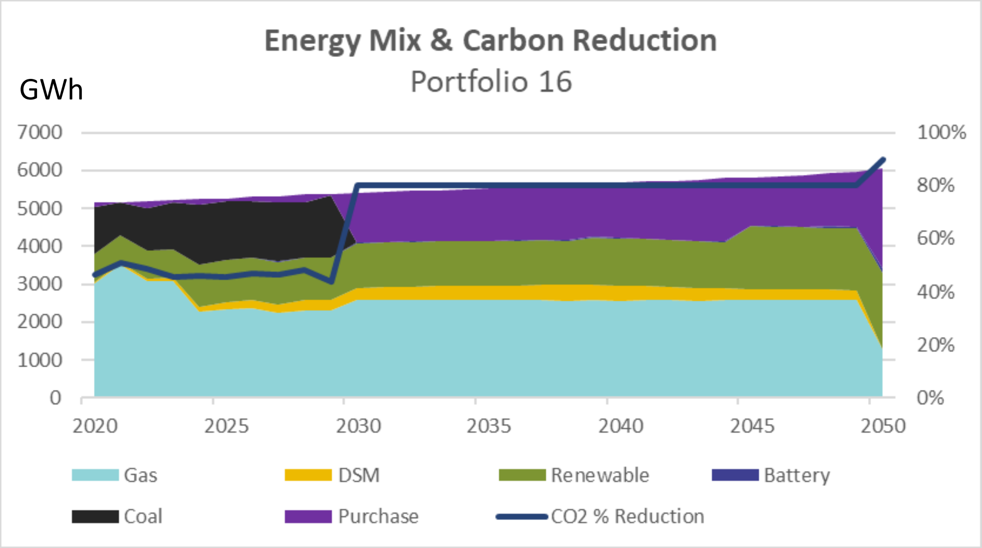
EIRP PORTFOLIO 17

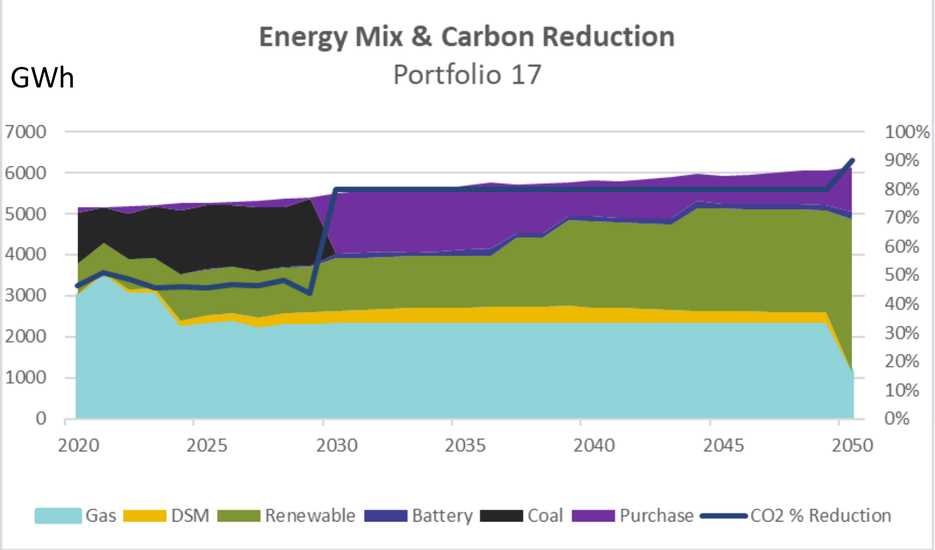
Pathway	Portfolio	Carbon targets	2022	2023	2025	2026	2030	2035	2040	2050
Pathway E	Portfolio 17	2030 80% 2050 90%		Drake retire Small, mobile, natural gas generator			Nixon 1 retire Non-carbon, storage & DSM	Birdsall retire Non-carbon, storage & DSM		
Gas	G-E17		LDC IT with oil backup		Expand/new pipeline capacity with NNT					

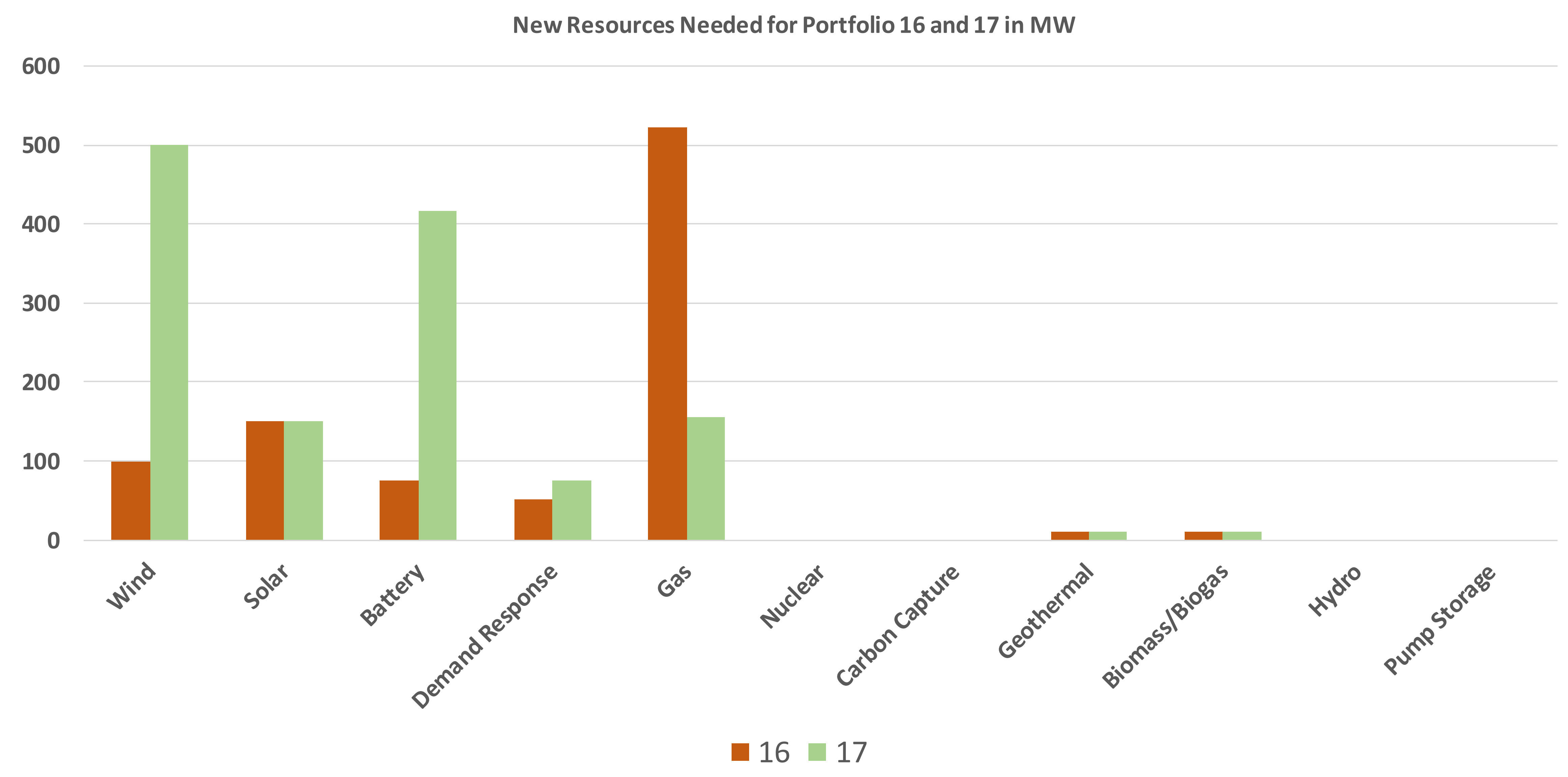
Portfolios 16 and 17 Capacity and Energy










New Resources Needed for Portfolio 16 and 17 in MW
600
500
400
300
200
100
0
Wind
Solar
Battery
Demand Response
Gas
Nuclear
Carbon Capture
Geothermal
Biomass/Biogas
Hydro
Pump Storage
16
17

IRP Goals (Phase 1)

Resilient and reliable

- Industry leading reliability and resiliency while avoiding potential stranded assets
- Support economic growth of the region

Cost-effective energy

- Maintain competitive and affordable rates
- Further advance energy efficiency and demand response

Environmentally sustainable

- Grow renewable portfolio
- Establish timelines for decommissioning of assets

Reduces our carbon footprint

- Meet all environmental regulations with specific metrics that include reducing our carbon footprint
- Reduce reliance on fossil fuels

Uses proven state-of-the-art technologies

- Proactively and responsibly integrate new technologies

to enhance our quality of life for generations to come

Attribute Scoring (Phase 2)

	Reliability	Cost / Implementation	Environment / Stewardship	Flexibility / Diversity	Innovation	Total
Weighting	32%	22%	22%	14%	10%	
Criteria	1. Quick Ramp 2. Quick Start 3. Market Purchases 4. Availability	1. NPVRR 2. Decommission timeframe	1. GHG Reduction 2. Land Use 3. Water Use	1. Average Capacity 2. Generation Sources	1. Demand Reduction 2. State of the Art Technology use	
Portfolio 16 - Score	1.12	0.66	0.70	0.42	0.25	**3.15**
Portfolio 17 - Score	1.20	0.49	0.66	0.49	0.35	**3.19**

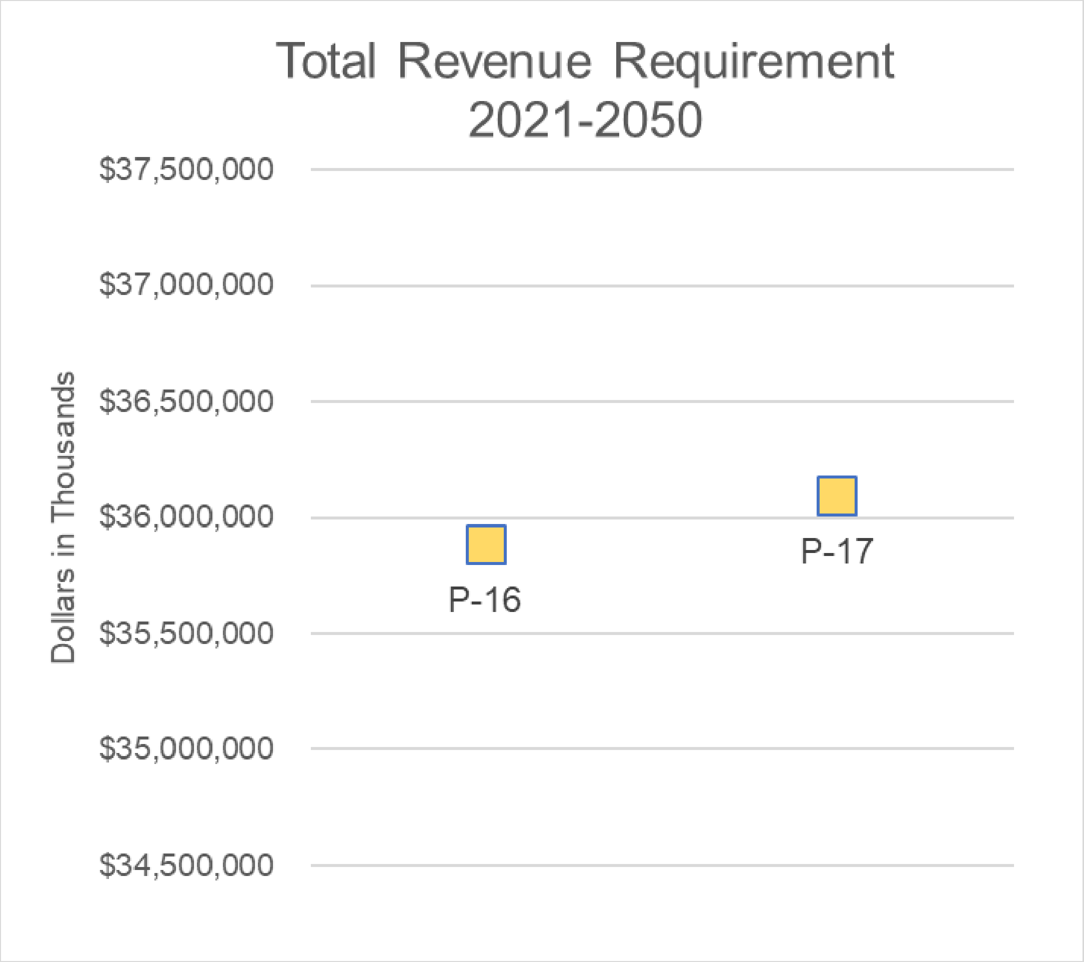
Note: Final Score is normalized against score of all other portfolios on 100 point scale.

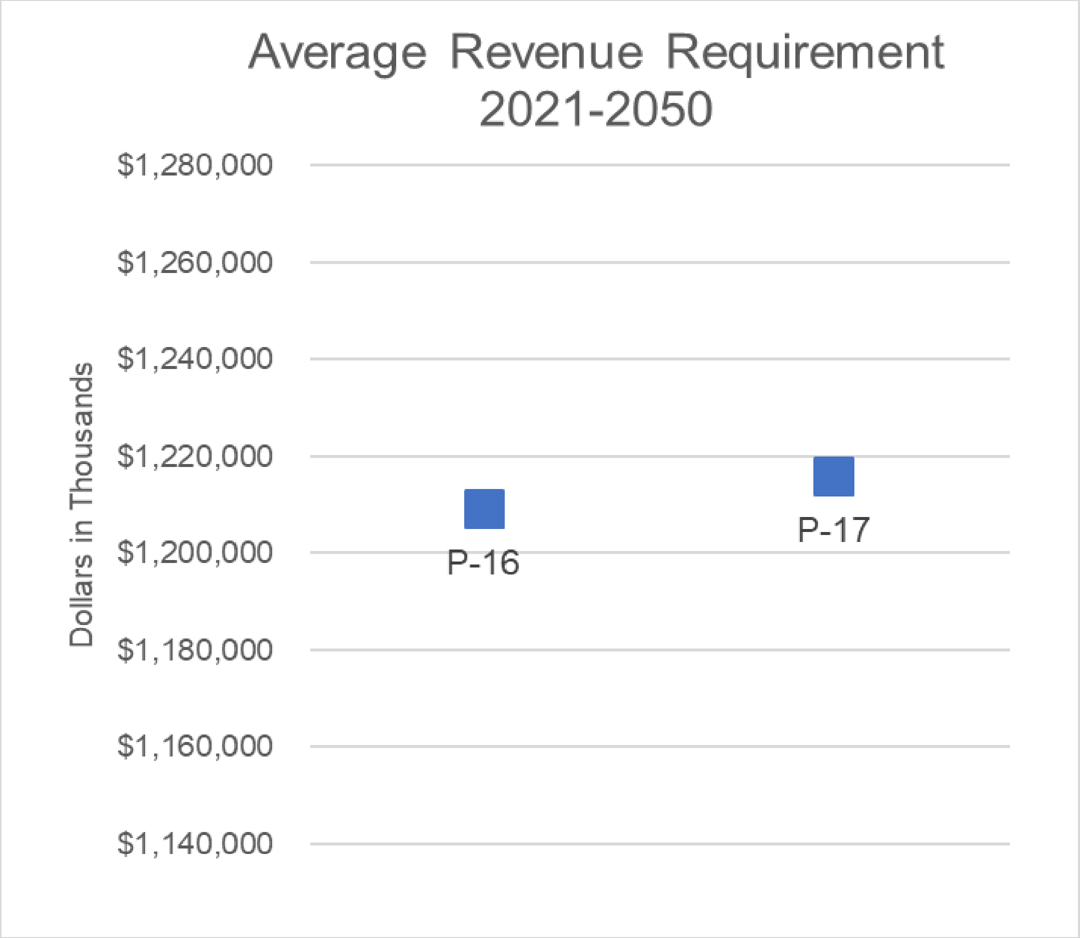
Portfolio 16 and 17 Scoring Slide

Portfolio	Pathway	CO2 Target	Retirements	New Resources	Attribute Ranking	Total Score Normalized	Financial Ranking	Total RR	% Increase to Portfolio R	% Increase to Portfolio 1
17	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Non-Carbon/Storage/DSM	1	100	4	$36.47B	2.10%	-0.21%
16	E	80% by 2030 90% by 2050	Drake 2023 Nixon 1 2030	Aeroderivative/Gas/Renewable/Storage/DSM	2	98.7	1	$36.27B	1.53%	-0.76%

Note: Total RR is total revenue requirement for all 4 services for 30 years in billions of dollars. It represents total cost to run Colorado Springs Utilities.

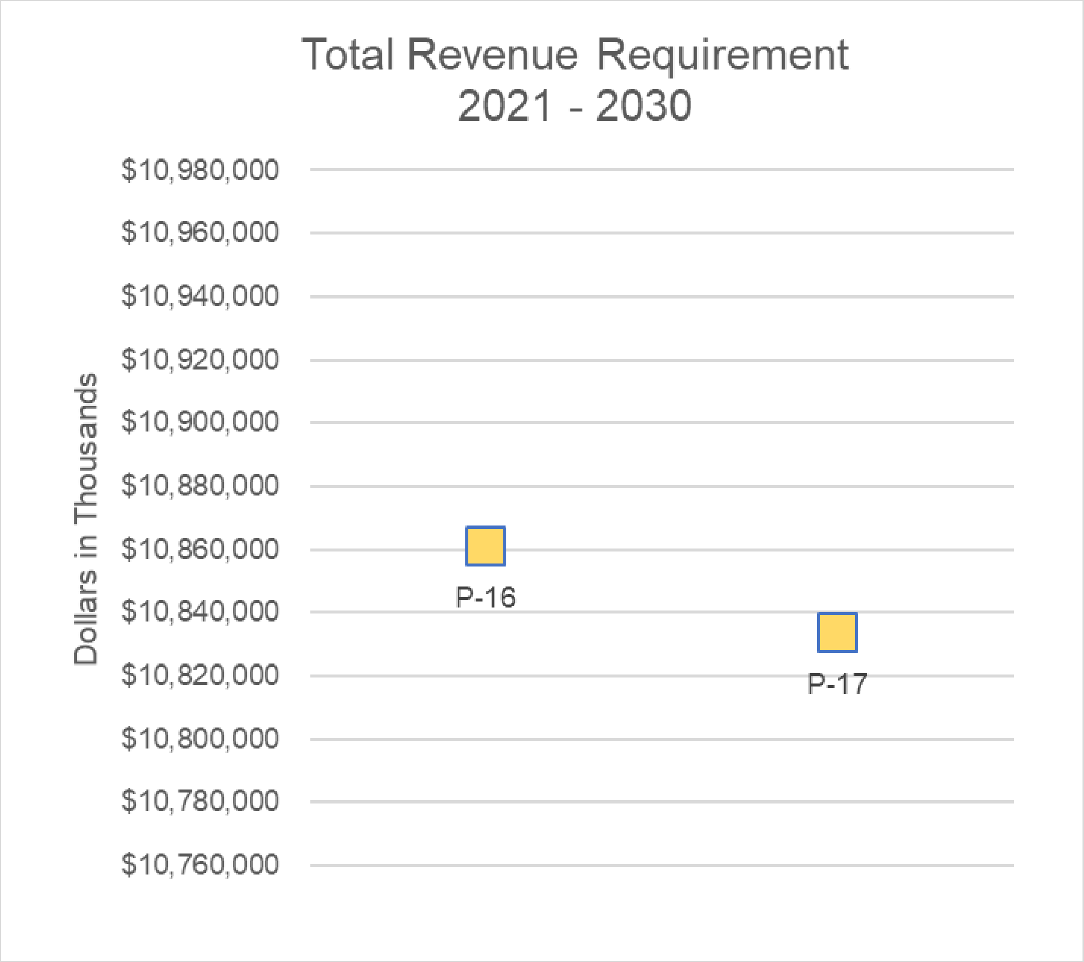
Portfolio 16 & 17 Financial Results (30 year)

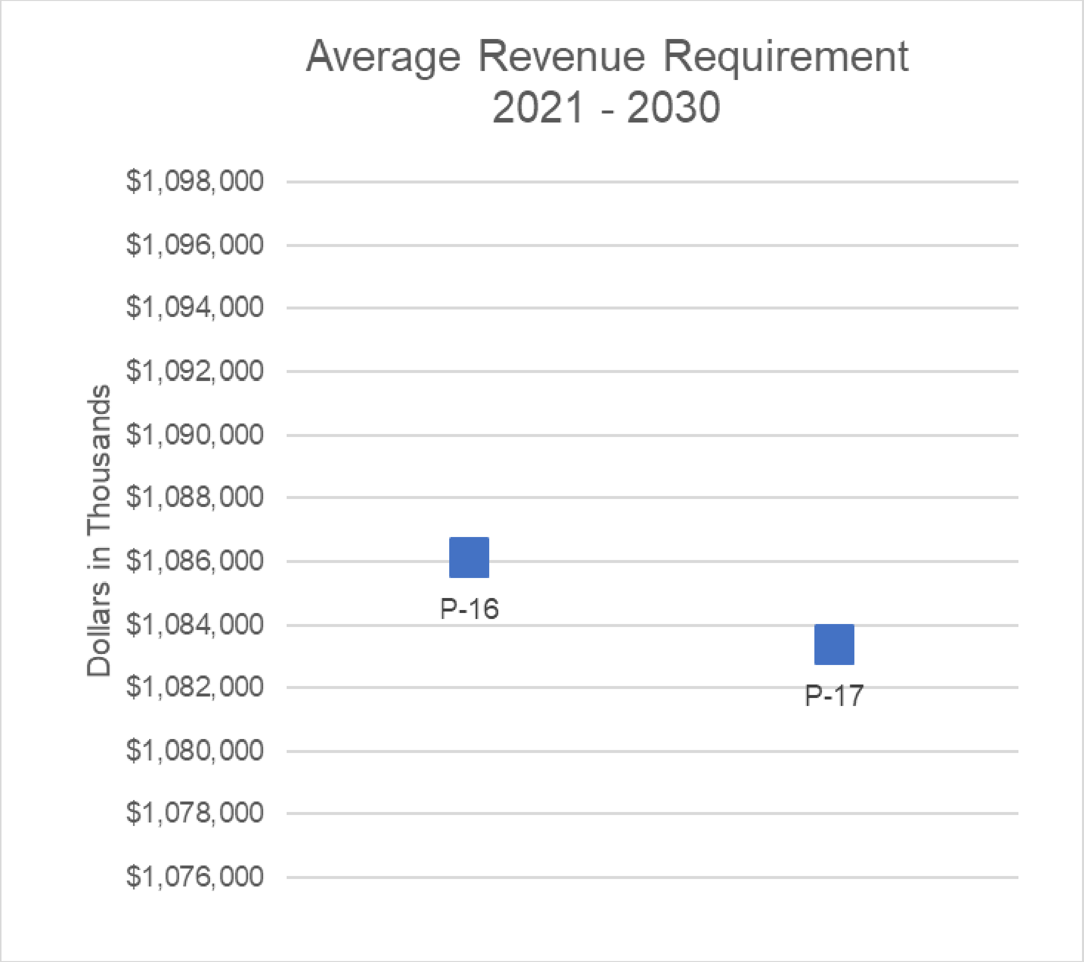




Revenue numbers are for 30 years.

Portfolio 16 & 17 Financial Results (10 year)





Revenue numbers are for 10 years.

Summary Comparison - Similarities

Portfolio 16:

- 2nd highest Attribute ranking (Phase 2)
- Meets state regulatory carbon reduction
- Solid financial results (within margin of error)
- Reasonable risk profile
- Earliest Drake decommissioning (NLT 2023) with gas aeroderivative replacement
- Provides flexibility on Nixon 1 replacement
- Aligned with community input (early decommissioning)
- Aligned with IRP Goals
- Aligned with GIRP Portfolio 6

Portfolio 17:

- Highest scoring portfolio on attributes (Phase 2)
- Meets state regulatory carbon reduction
- Solid financial results (within margin of error)
- Reasonable risk profile
- Earliest Drake decommissioning (NLT 2023) with gas aeroderivative replacement
- Provides flexibility on Nixon 1 replacement
- Aligned with community input (early decommissioning)
- Aligned with IRP Goals
- Aligned with GIRP Portfolio 6

Summary Comparison - Differences

Portfolio 16:

- Relies on gas resources and demand side management to replace Nixon 1 capacity

Portfolio 17:

- Relies on wind, energy storage and demand side management to replace Nixon 1 capacity
- Less dependence on spot market purchases to serve load and reduce carbon footprint

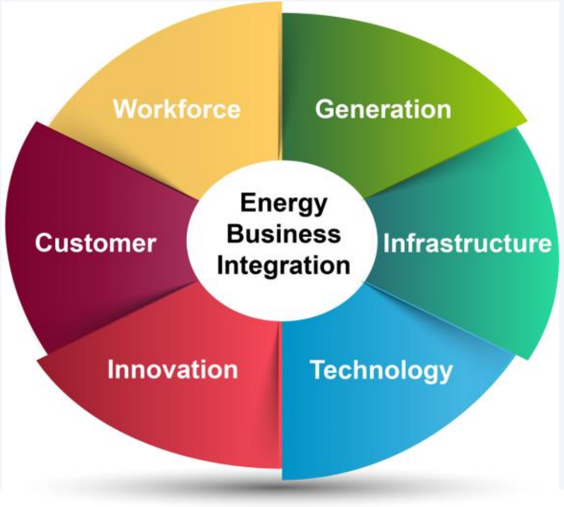
Utilities' Recommendation- Portfolio 17

EIRP PORTFOLIO 17

Pathway	Portfolio	Carbon targets	2022	2023	2025	2026	2030	2035	2040	2050
Pathway E	Portfolio 17	2030 80% 2050 90%		Drake retire Small, mobile, natural gas generator			Nixon 1 retire Non-carbon, storage & DSM	Birdsall retire Non-carbon, storage & DSM		
Gas	G-E17		LDC IT with oil backup		Expand/new pipeline capacity with NNT					

Reasons for Utilities' recommendation of Portfolio 17:

- Enhanced reliability and resilience
- Investment in infrastructure to support renewables and advanced technologies
- Supports vision of advancing renewable energy and future technologies (e.g. microgrids, storage, electric vehicles, AMI, distributed resources, etc.)
- Will promote innovation, utility transformation and agility
- Use gas resources for Nixon replacement only as a contingency/back up plan



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Customer Comment

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Board Discussion and Decision


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Supplemental Information

Public Comment Summary – June 17

Ft. Carson and Army Office of Energy Initiatives

- Resiliency is the most important aspect of their energy service.
- Colorado Springs Utilities has involved them in the IRP process and provides resilient power at Fort Carson.
- Army installations must have access to energy to assure readiness.
- Energy infrastructure is a key facet of resilience importance and the Army is willing to partner with Colorado Springs Utilities in siting key energy infrastructure that establish longer duration and larger scale backup resources.

Sierra Club Beyond Coal

- Applauds early coal retirement and the promise that no Utilities employees will lose their job.
- Sees the need to invest in new energy sources, but prefers renewable resources to fossil fuel due to environmental impacts.
- New natural gas plants will cost more money with significant regulatory risk.
- Supports Portfolio 17.

Public Comment Summary – June 17

Penrose/St. Francis

- Penrose/St. Francis partners with Colorado Springs Utilities at both campuses.
- They rely on resilience and enhanced power at St. Francis, and look forward to planning programs with Interquest campus, and the possibility of a solar farm there.
- Appreciative of rebate programs.

Downtown Partnership

- Downtown Partnership were engaged and participated in the IRP, and appreciates strong business community involvement.
- Pleased with both portfolios and supporting portfolio 17, as it gives an edge with wind and battery for a clean energy future, new investment to downtown, and opportunity to have a bold clean energy commitment.
- Supports swift plan for decommissioning Drake Power Plant, which will attract businesses looking for this commitment.

Public Comment Summary – June 17

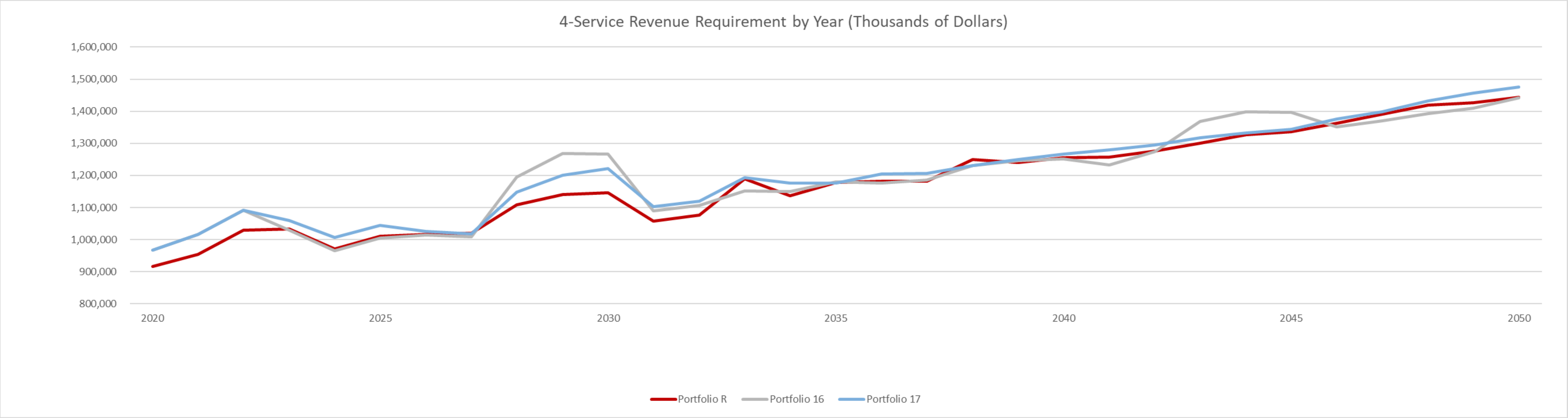
Chamber of Commerce & EDC

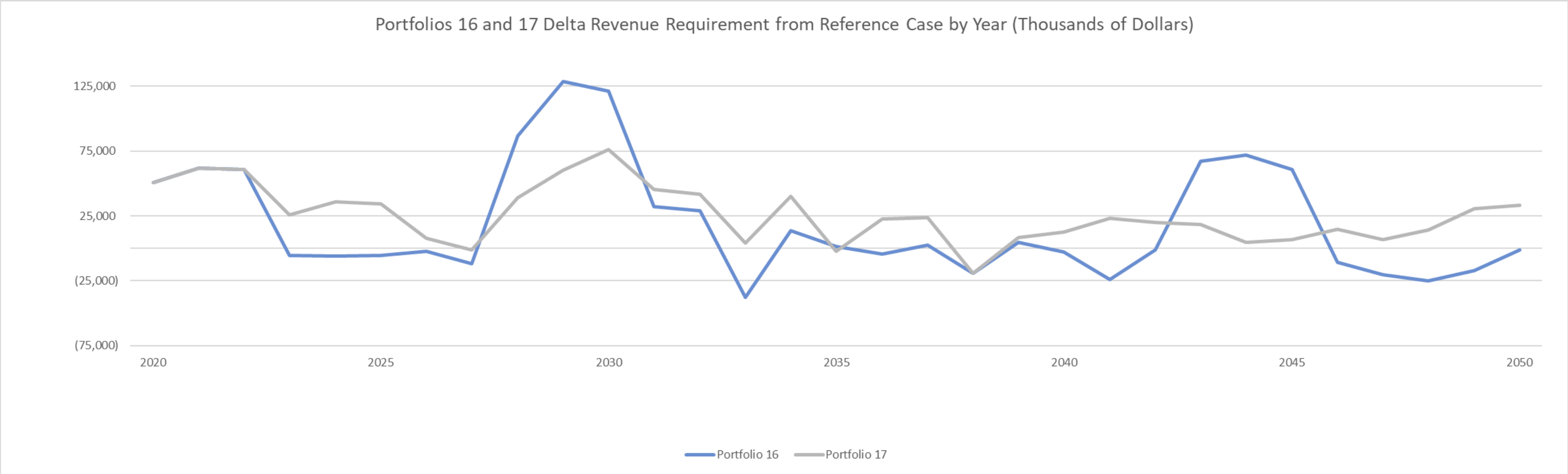
- Agrees with the five attributes used to evaluate portfolios.
- The Chamber & EDC has participated, and presented to UPAC, appreciate adjustments made, and endorsed the process conducted with robust public outreach.
- Sees Drake redevelopment and future of the plant as a gateway and opportunity for revitalization downtown.

Public Comments

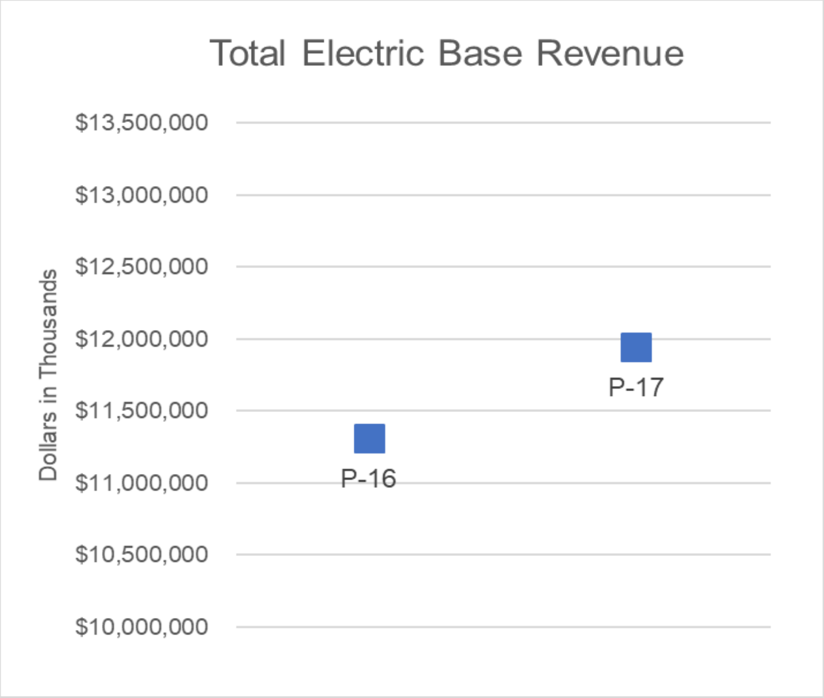
- Nineteen Speakers supported Portfolio 17 over Portfolio 16.
- Two speakers supported Portfolio 10, one speaker supported Portfolio 16.
- Preference for renewable resources vs. fossil fuels as replacement for Drake and Nixon.

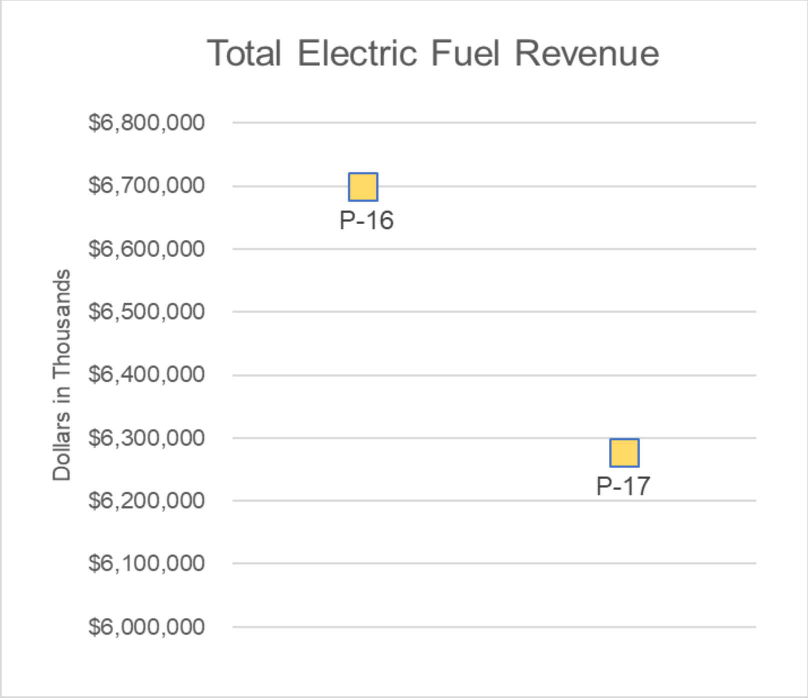
Revenue Requirement Comparison

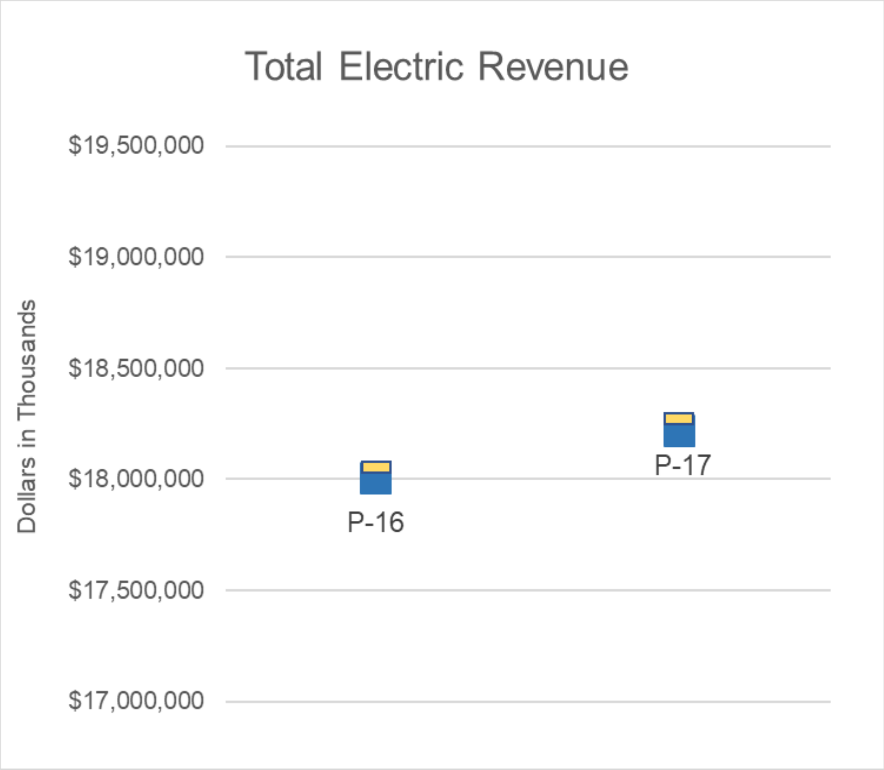




Electric Revenue – Base and Fuel





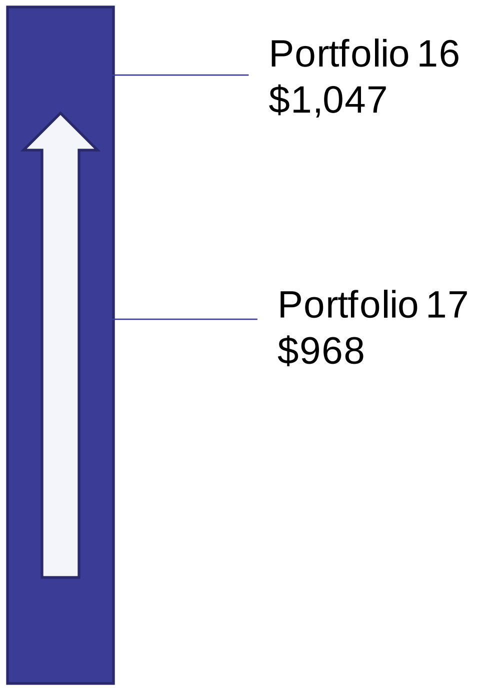


Revenue numbers are for 30 years.

EIRP Sensitivity
Social Cost of Carbon

- All portfolios are more costly
- Accelerates CO2 reduction by backing down coal and gas generation
- Requires substantial increase in carbon free or renewable energy
- Gas resources built to meet capacity requirements but do not run much

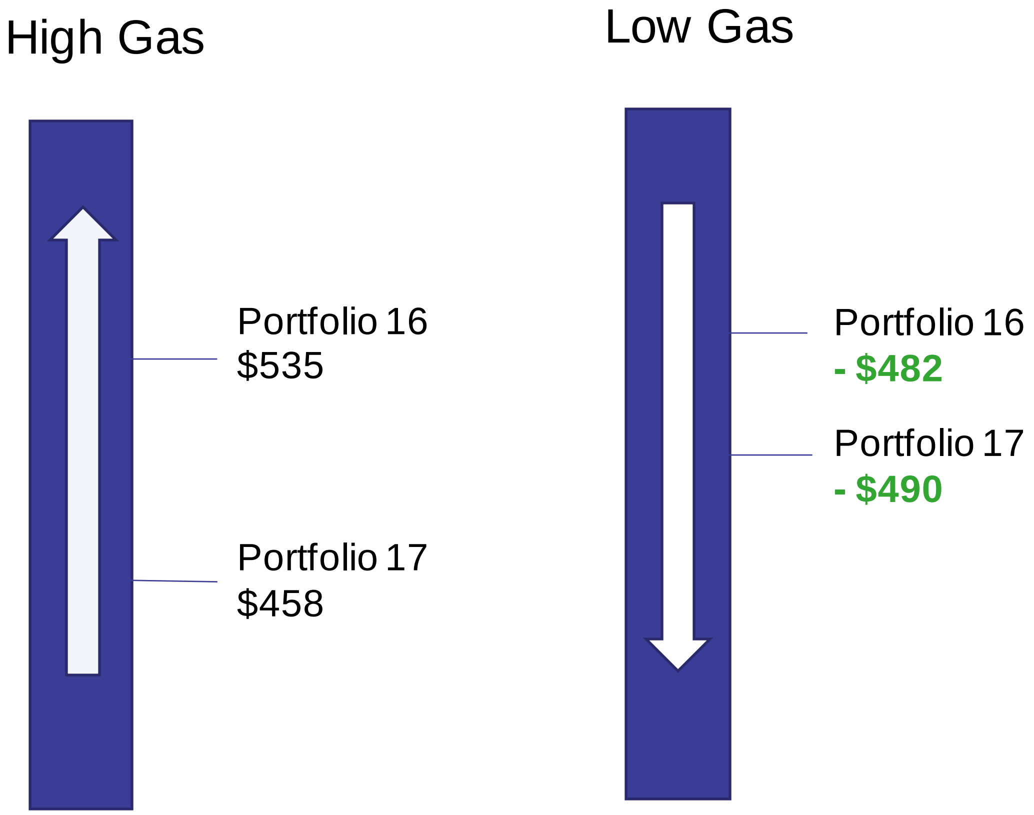
Social Cost of Carbon



Incremental net present value revenue requirement over 30 years.
Numbers are in millions of dollars.
Black numbers indicate increase.

EIRP Sensitivity
Gas Price

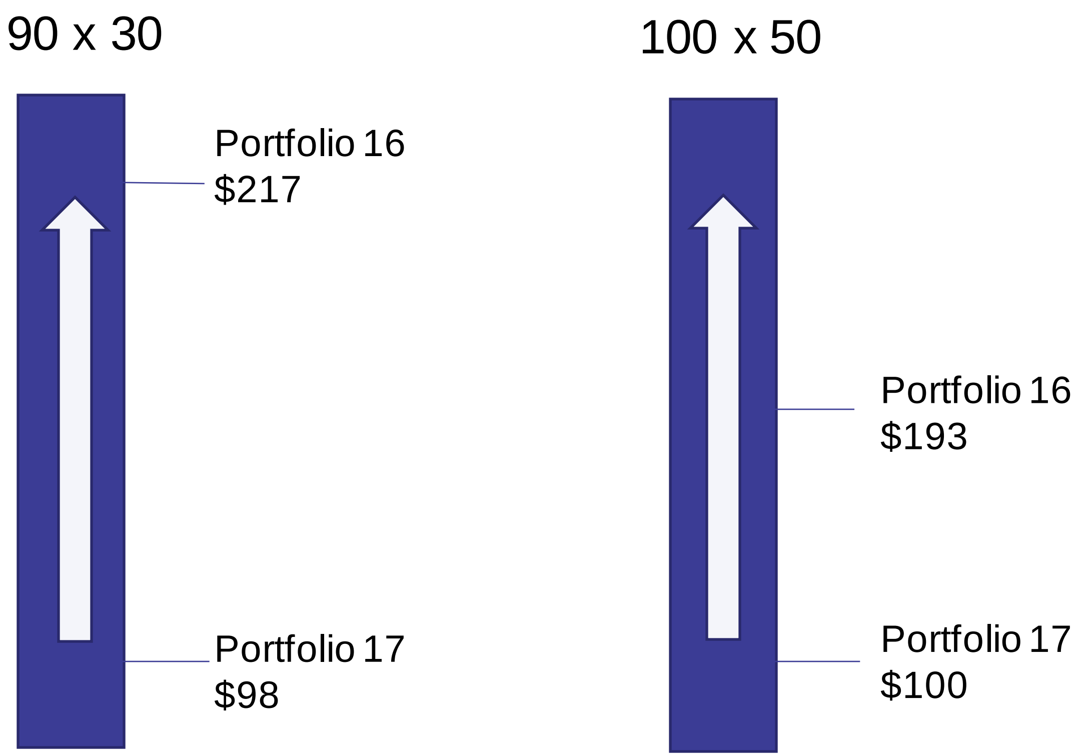
- Both gas and renewable portfolios are impacted due to cost of market purchases
- Low gas prices help all portfolios
- High gas prices hurt all portfolios



Incremental net present value revenue requirement over 30 years. Numbers are in millions of dollars. Green numbers indicate decrease in revenue requirement. Black numbers indicate increase.

EIRP Sensitivity
Carbon reduction

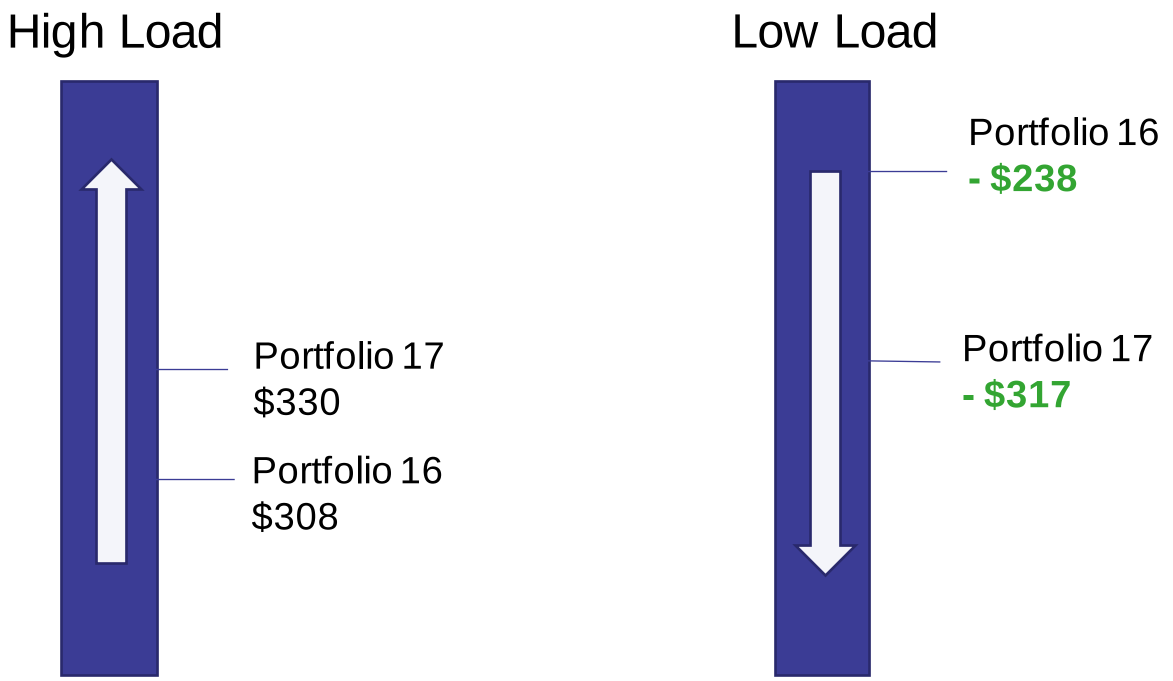
- All portfolios are more costly
- Increased reliance on energy market
- Model still builds gas generation as bridge allowing for cost of renewables to continue to decline
- Current transmission infrastructure not sufficient to achieve 100% renewable energy
- A lot of excess energy and hours of curtailment, and a significant amount of energy storage and DSM needed
- Portfolios 10 and 11 already meet 100% by 2050 target



Incremental net present value revenue requirement over 30 years. Numbers are in millions of dollars. Black numbers indicate increase.

EIRP Sensitivity
Load Forecast

- High load represents potential annexation and electrification scenarios
- Electrification will increase electric revenue requirement but decrease gas revenue requirement
- High load increases total revenue requirement
- Low load decreases total revenue requirement

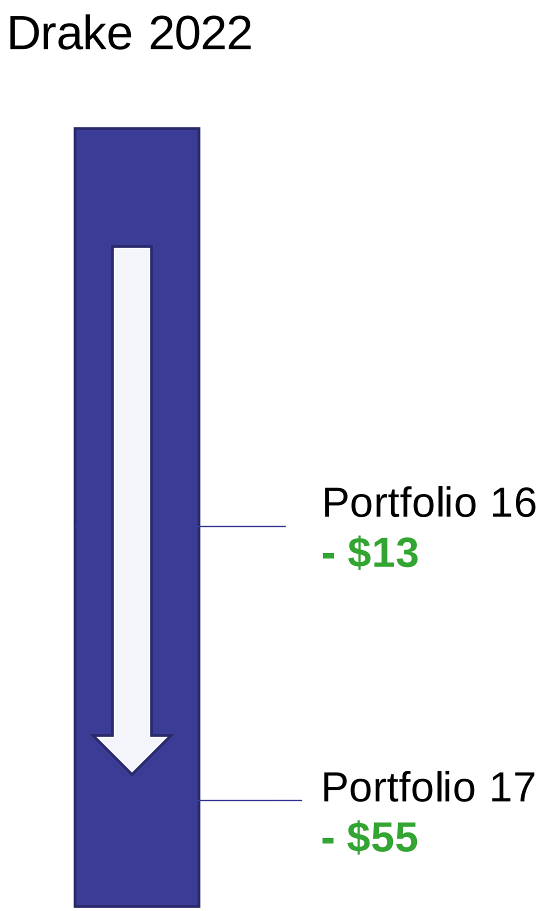


Incremental net present value revenue requirement over 30 years. Numbers are in millions of dollars. Green numbers indicate decrease in revenue requirement. Black numbers indicate increase.

EIRP Sensitivity

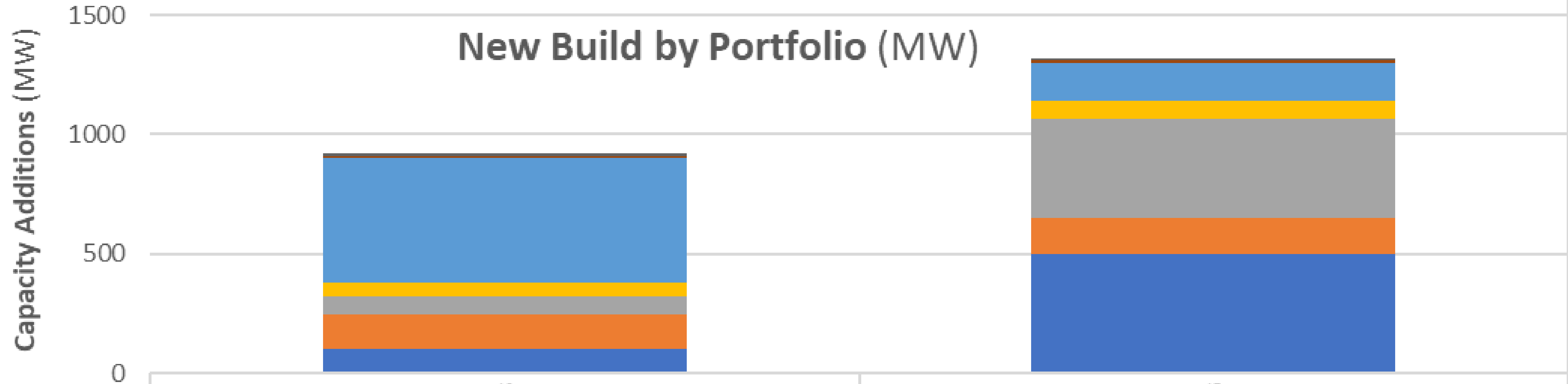
Drake retired no later than 2022

- Only possible in portfolios 12, 16 and 17
- Additional capacity is needed sooner
- Can lower costs even more depending on new capacity resource



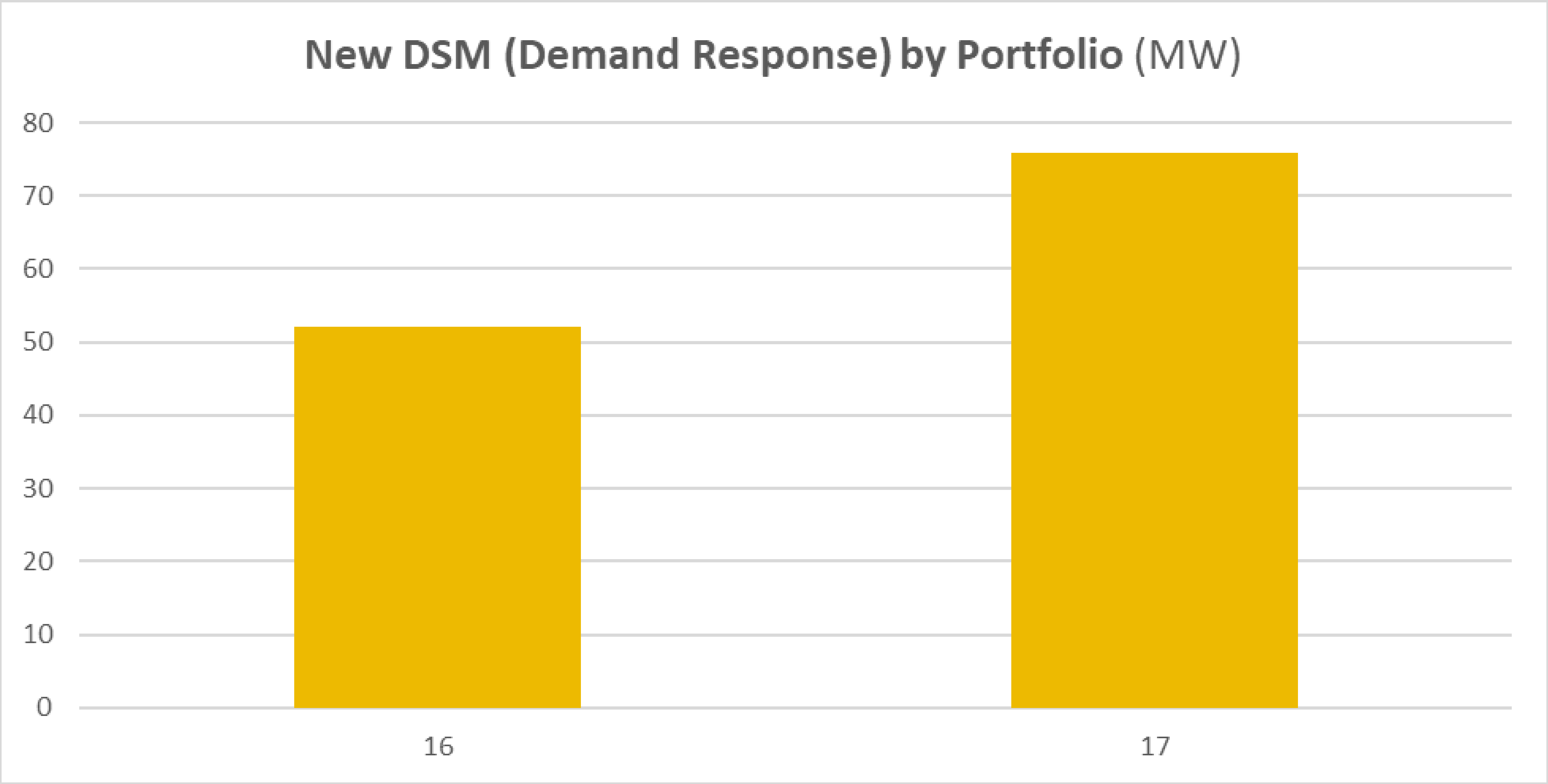
Incremental net present value revenue requirement over 30 years. Numbers are in millions of dollars. Green numbers indicate decrease in revenue requirement. Black numbers indicate increase.

Portfolios 16 and 17 New Resources

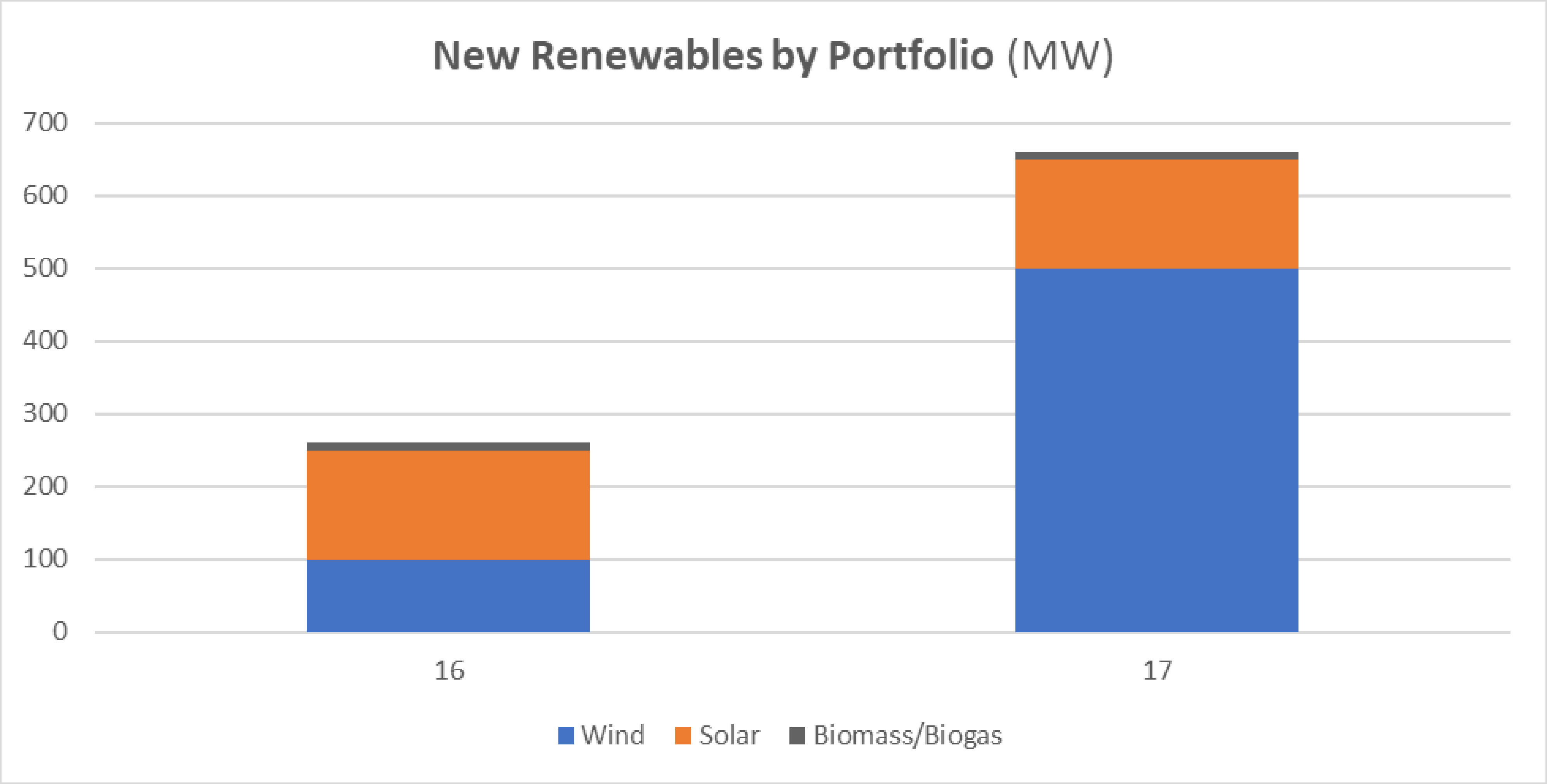


	16	17
Biomass/Biogas	10	10
Geothermal	10	10
Gas	523	156
Demand Response	52	76
Battery	75	417
Solar	150	150
Wind	100	500

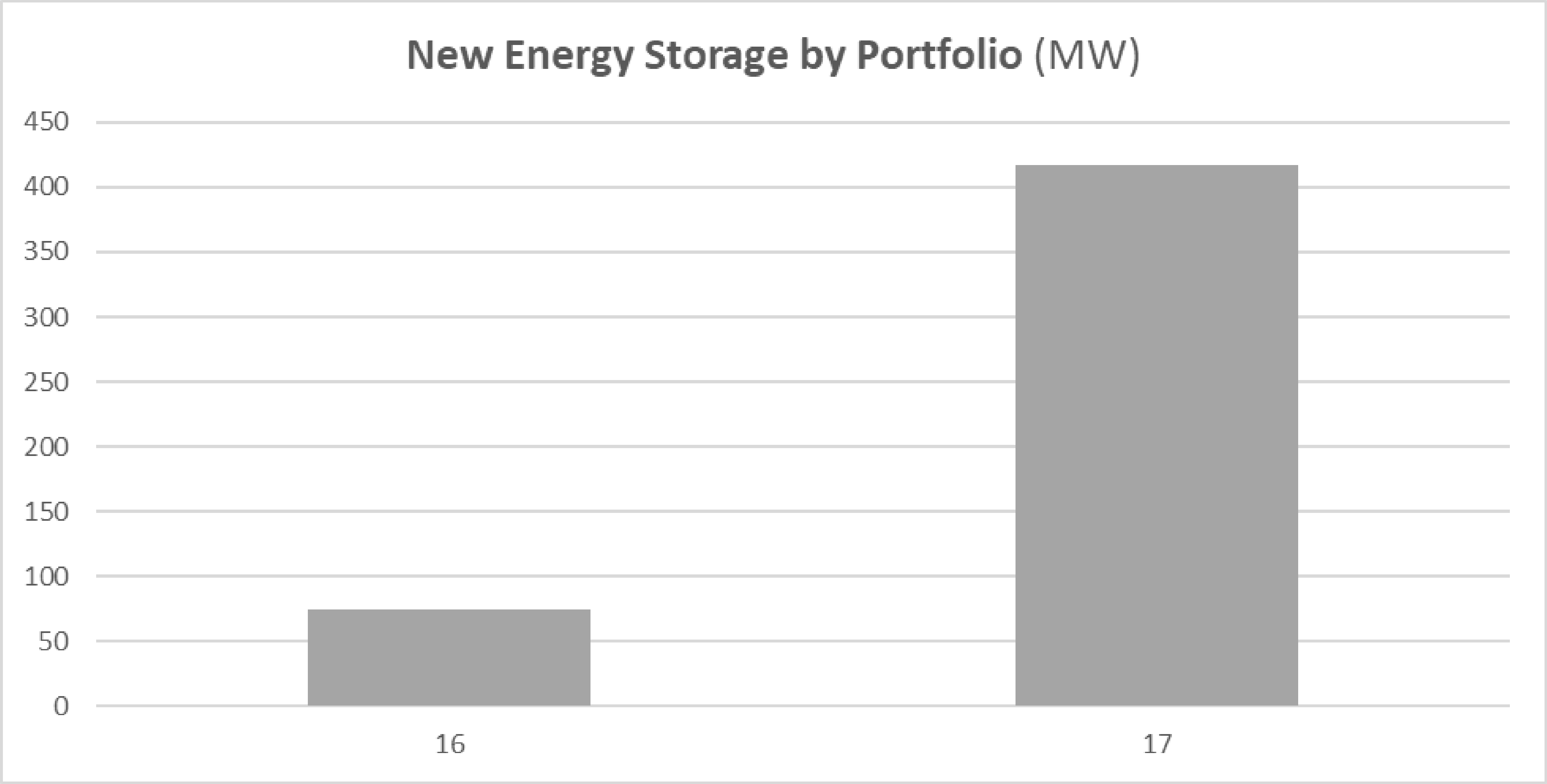
DSM Resources by Portfolio



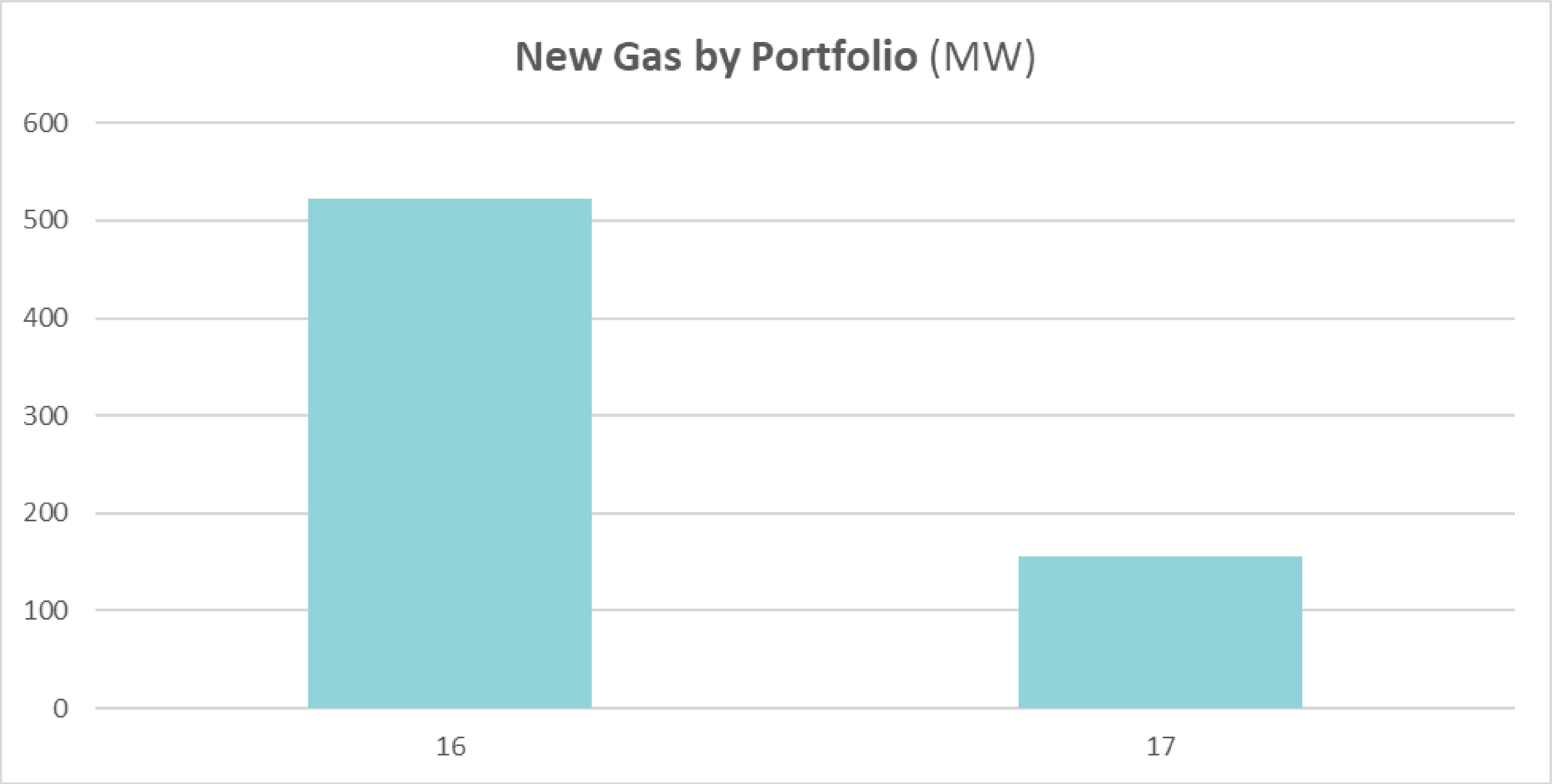
Renewable Resources by Portfolio

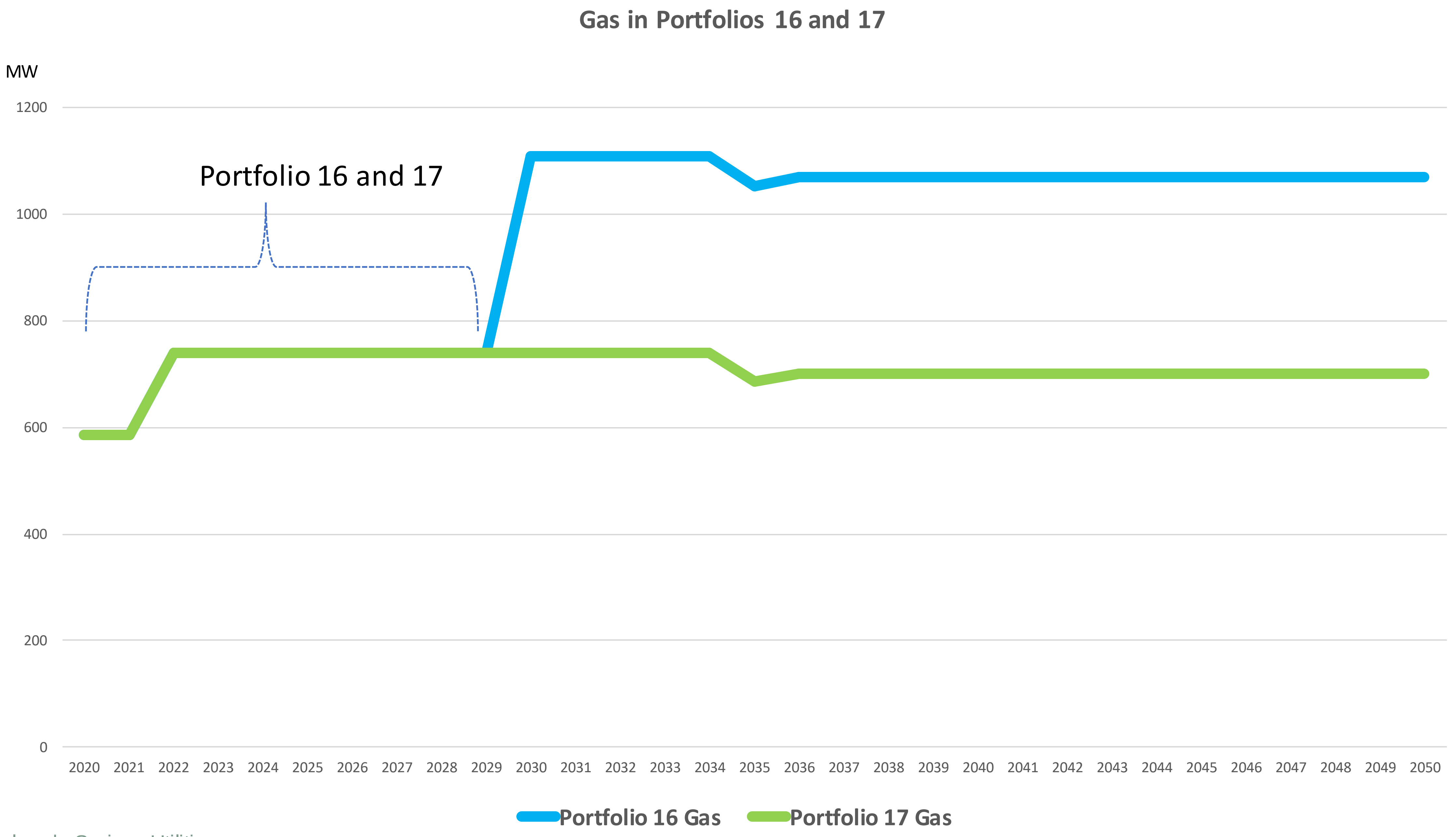


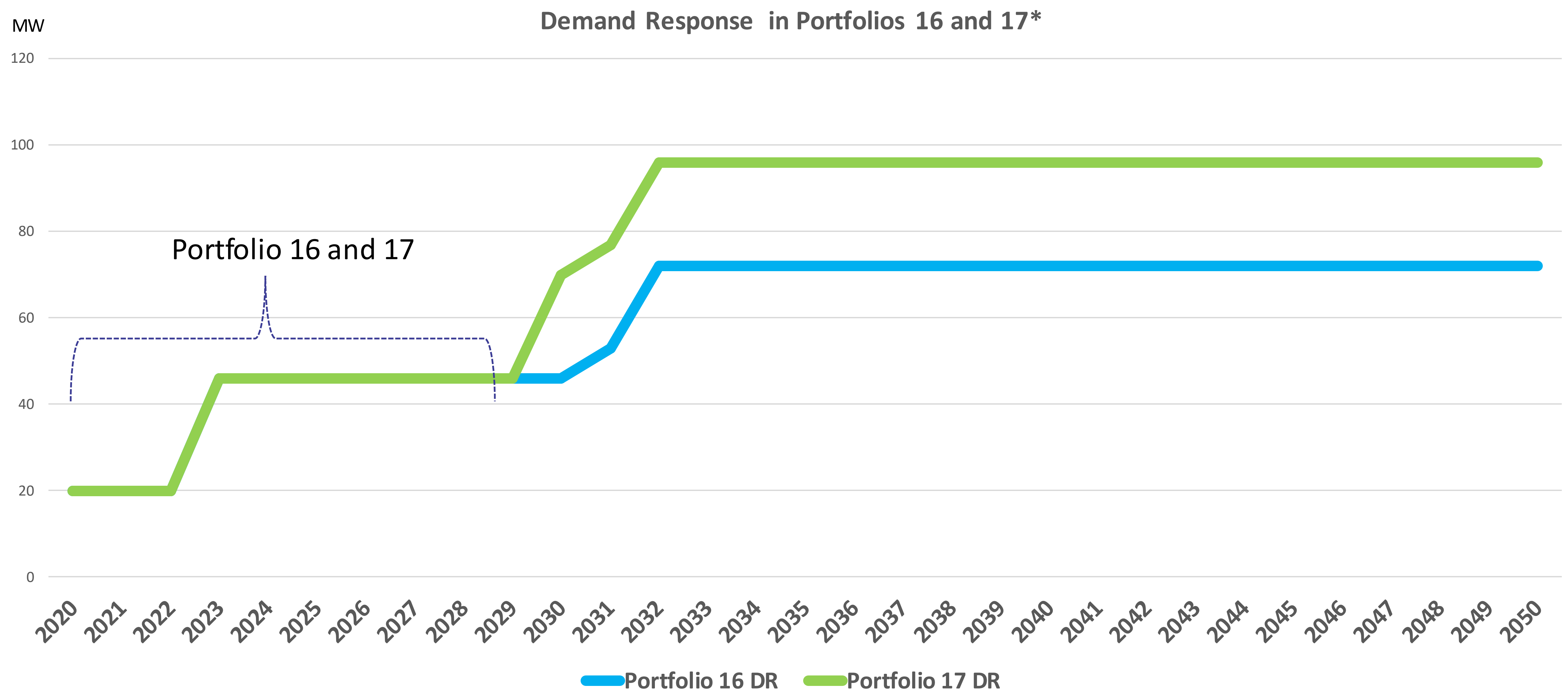
Energy Storage Resources by Portfolio



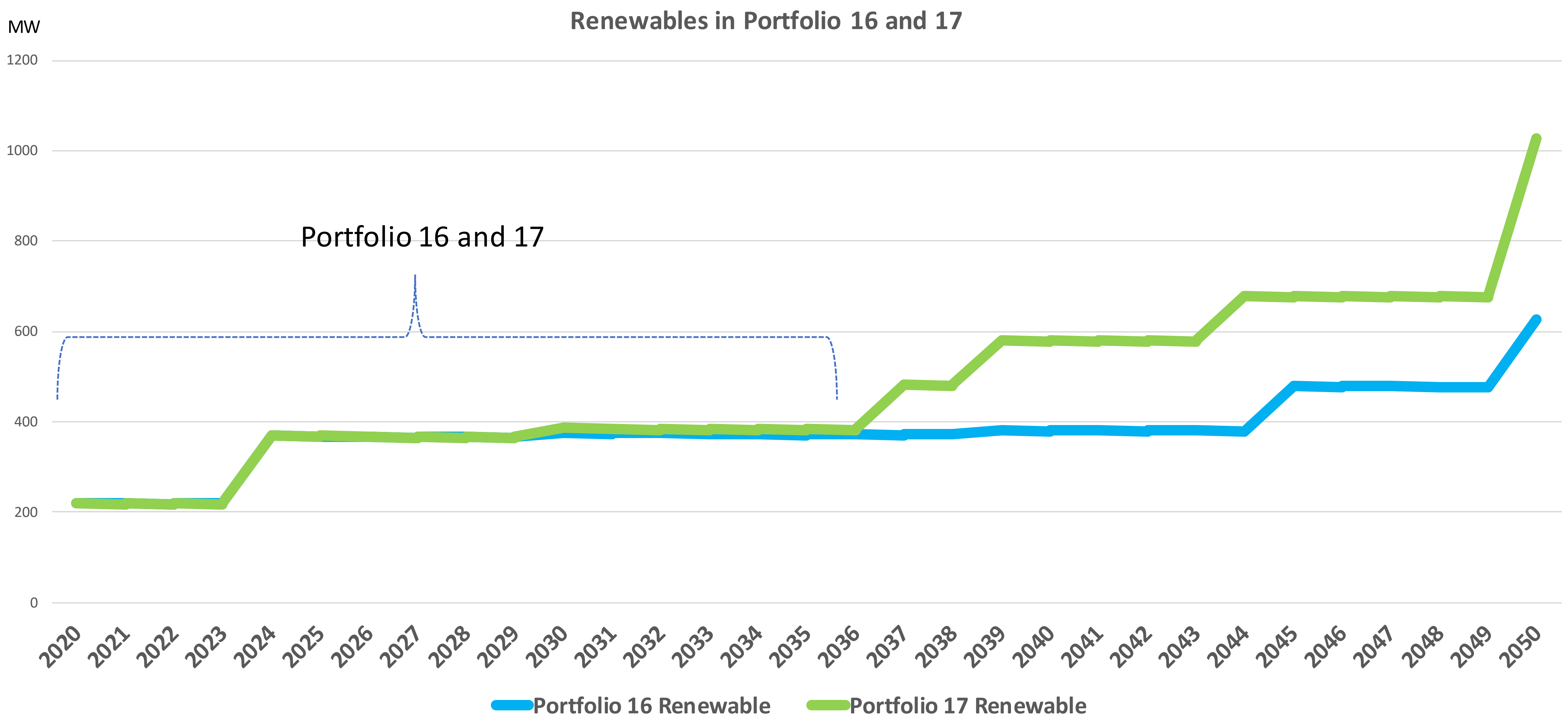
Gas Resources by Portfolio




Gas in Portfolios 16 and 17
MW
1200
1000
800
600
400
200
0
Portfolio 16 and 17
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
Portfolio 16 Gas
Portfolio 17 Gas



*Savings from energy efficiency is the same for each portfolio


Renewables in Portfolio 16 and 17
MW
1200
1000
800
600
400
200
0
Portfolio 16 and 17
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
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2032
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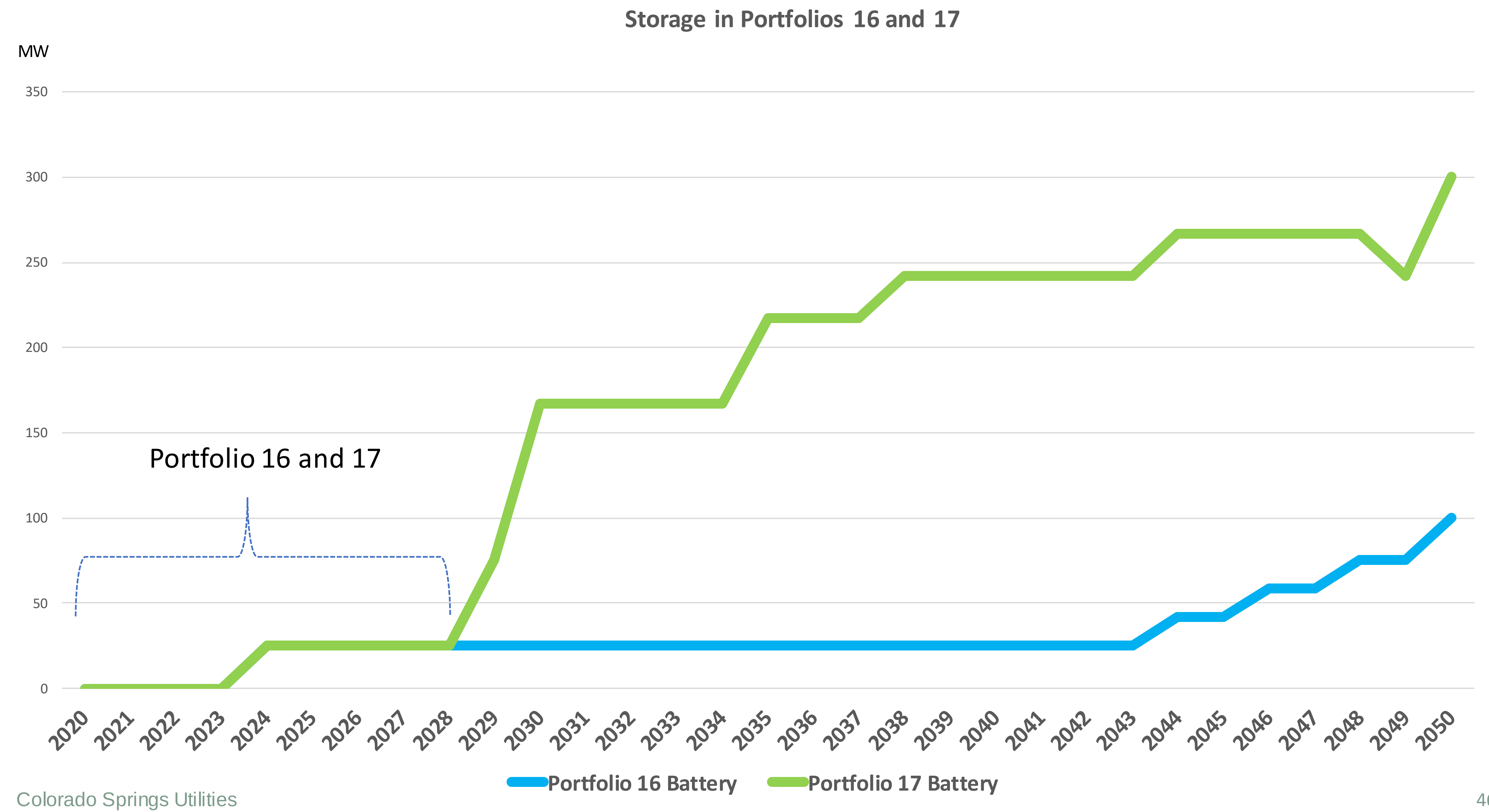
2047
2048
2049
2050
Portfolio 16 Renewable
Portfolio 17 Renewable



Storage in Portfolios 16 and 17
MW
350
300
250
200
150
100
50
0
Portfolio 16 and 17
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
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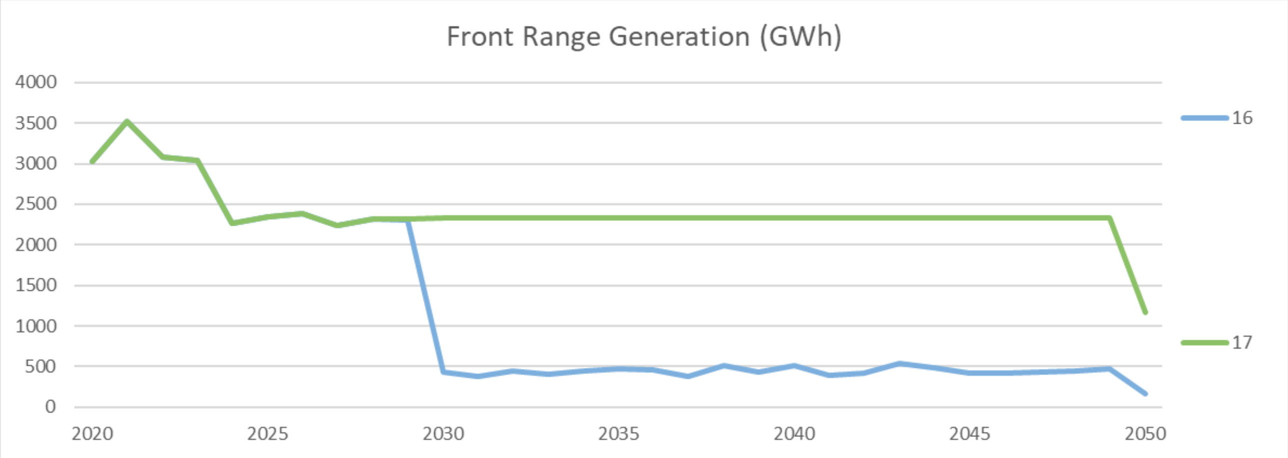
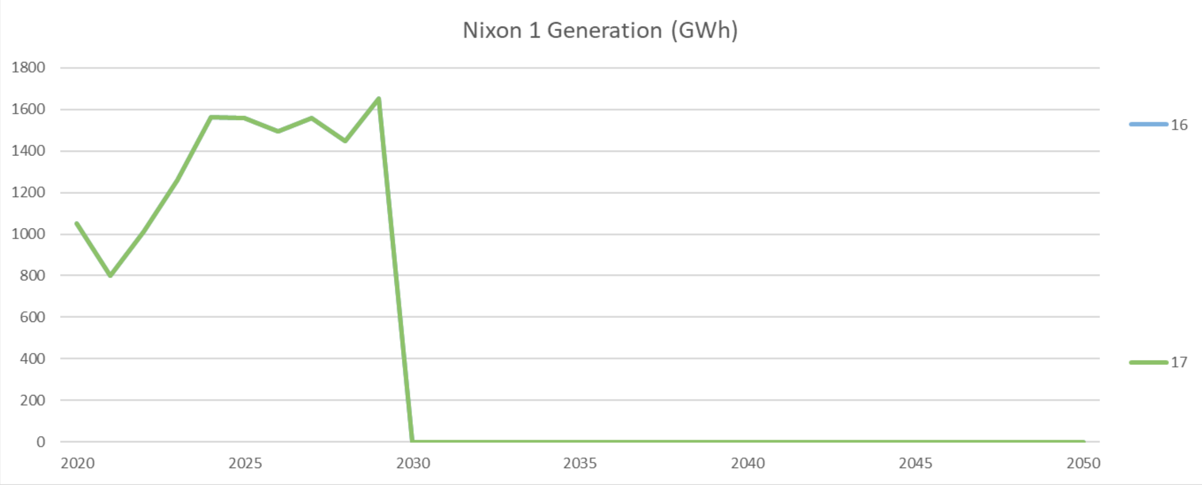
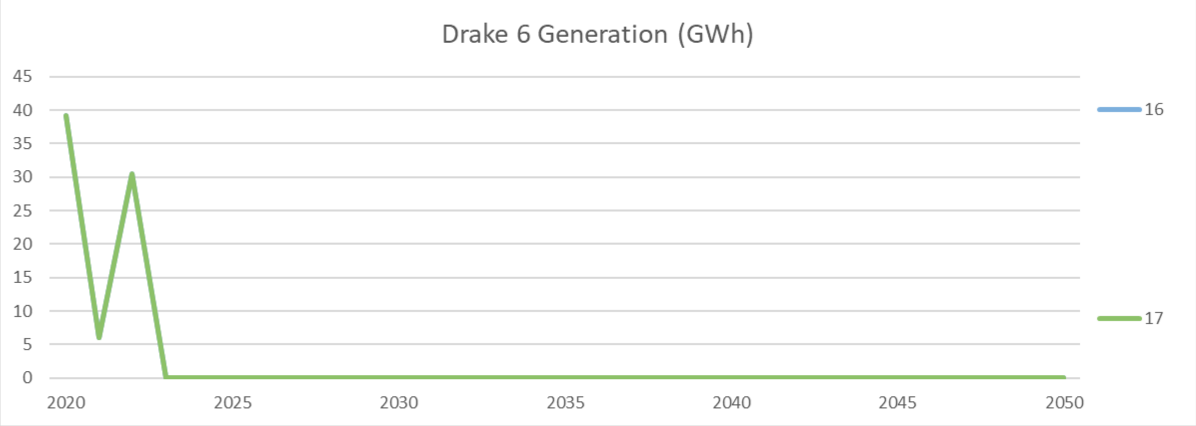
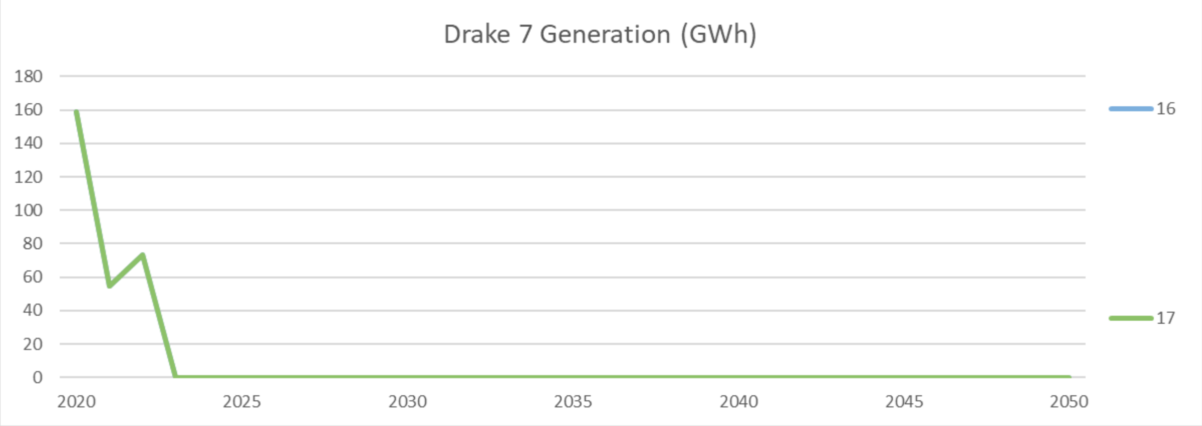
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
Portfolio 16 Battery
Portfolio 17 Battery

Unit Generation

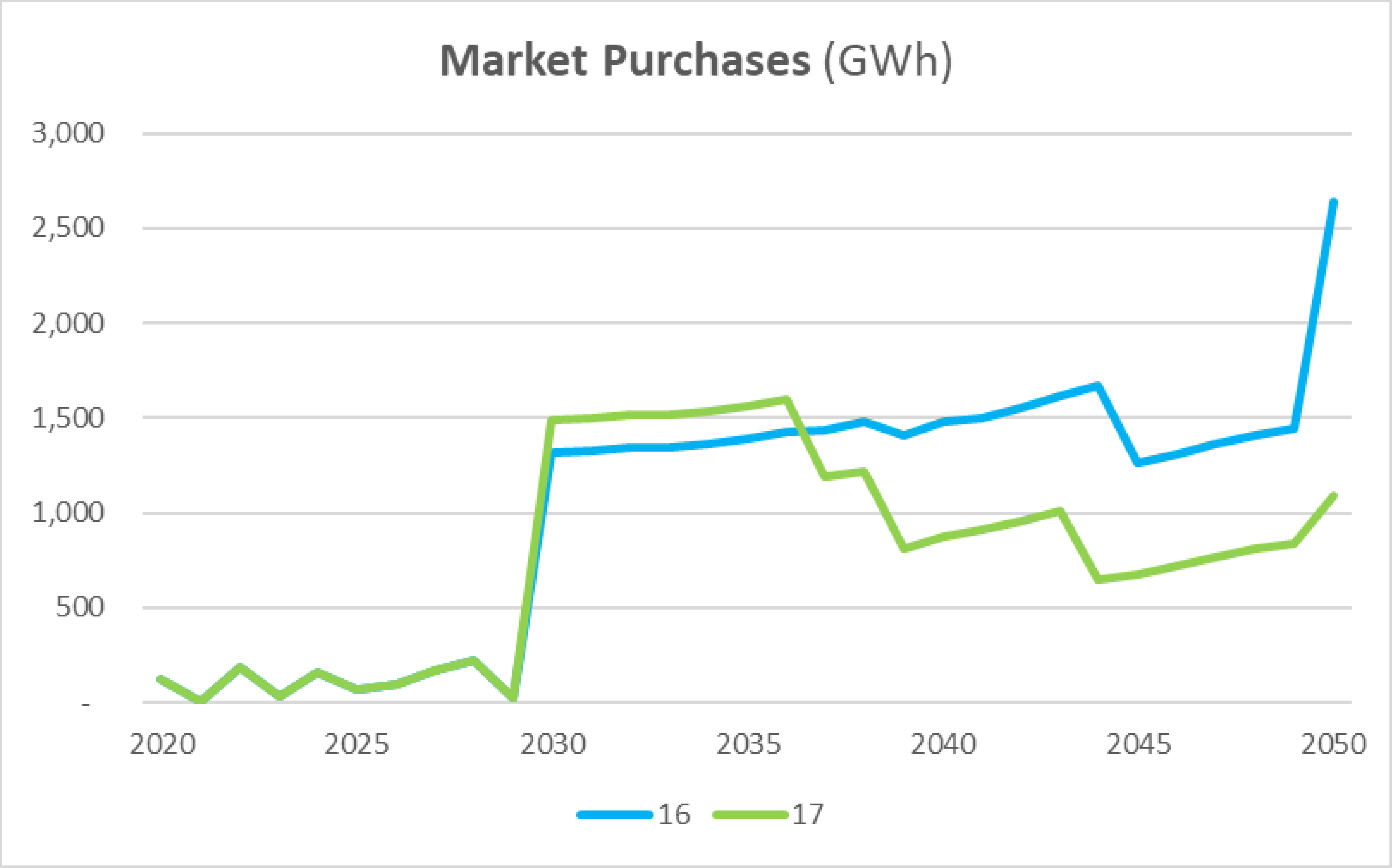








Market Purchases

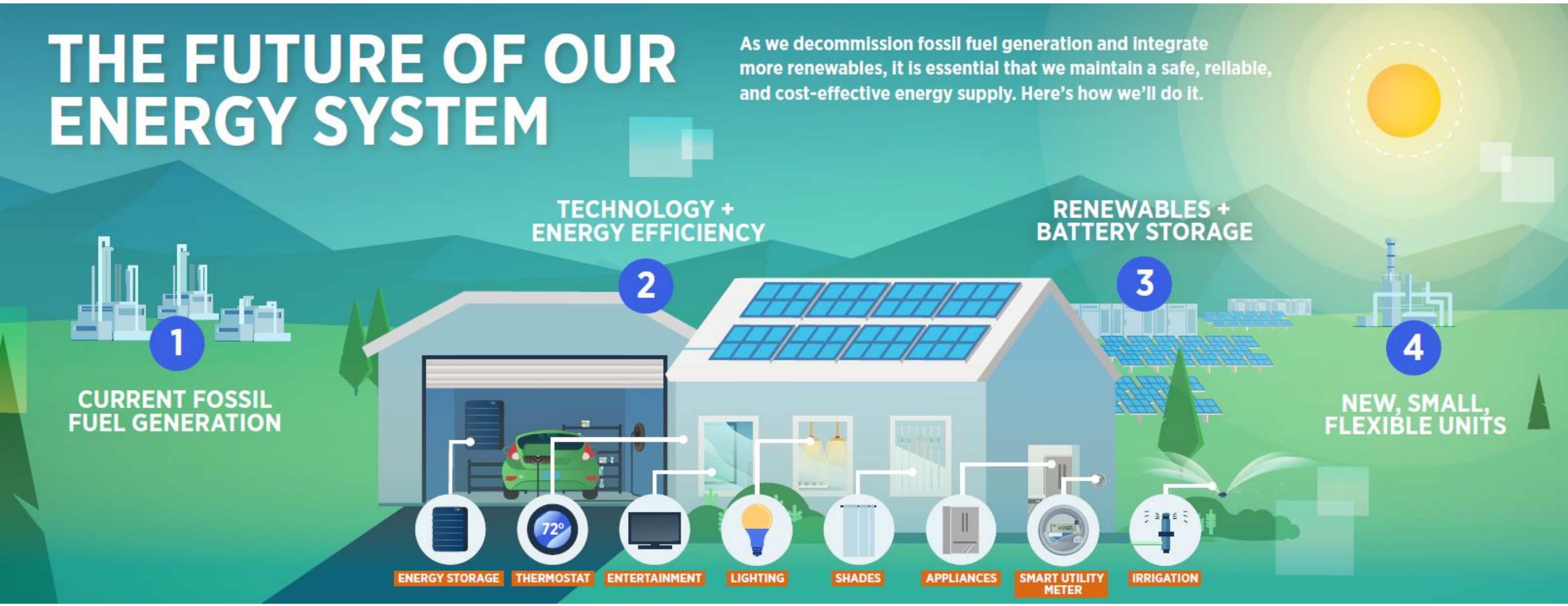


100% Renewable Portfolios

Portfolio	CO2 Target	Retirements	New Resources	Attribute Ranking	Total Score Normalized	Reliability	Cost / Implementation	Environment / Stewardship	Flexibility / Diversity	Innovation
15	100% by 2030	Drake/Nixon/Front Range 2030	Renewable/Storage/DSM	8	82.8	73	24	100	50	60
18	100% by 2040	Drake 2035 Nixon/Front Range 2040	Renewable/Storage/DSM	10	74.2	80	34	53	50	60
19	100% by 2050	Drake 2035 Nixon/Front Range 2050	Renewable/Storage/DSM	12	67.3	73	44	38	63	30

Energy Vision

Provide resilient, reliable and cost-effective energy that is environmentally sustainable, reduces our carbon footprint and uses proven state-of-the-art technologies to enhance our quality of life for generations to come.



1 TODAY, WE HAVE ABOUT 1,000 MEGAWATTS OF FOSSIL FUEL ELECTRIC GENERATION. IN THE COMING YEARS, WE WILL DECOMMISSION MORE THAN A QUARTER OF IT.

2 THE COMMUNITY INCORPORATES SMART TECHNOLOGY (INCLUDING SOLAR PANELS, STORAGE SYSTEMS, AND ELECTRIC VEHICLES) IN THEIR HOMES AND BUSINESSES AND PARTICIPATES IN ENERGY EFFICIENCY, REDUCING THE AMOUNT OF NEEDED REPLACEMENT GENERATION.

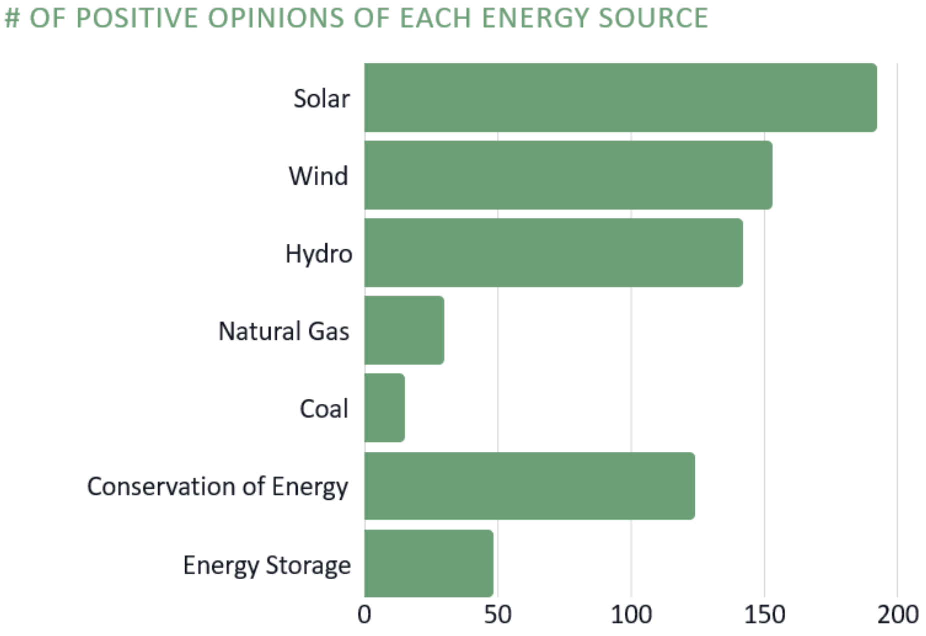
3 OUR COMMUNITY AND ENVIRONMENT BENEFIT FROM UTILITY-SCALE SOLAR AND STORAGE PROJECTS (GROWING CARBON-FREE GENERATION TO MORE THAN 260 MEGAWATTS BY 2023).

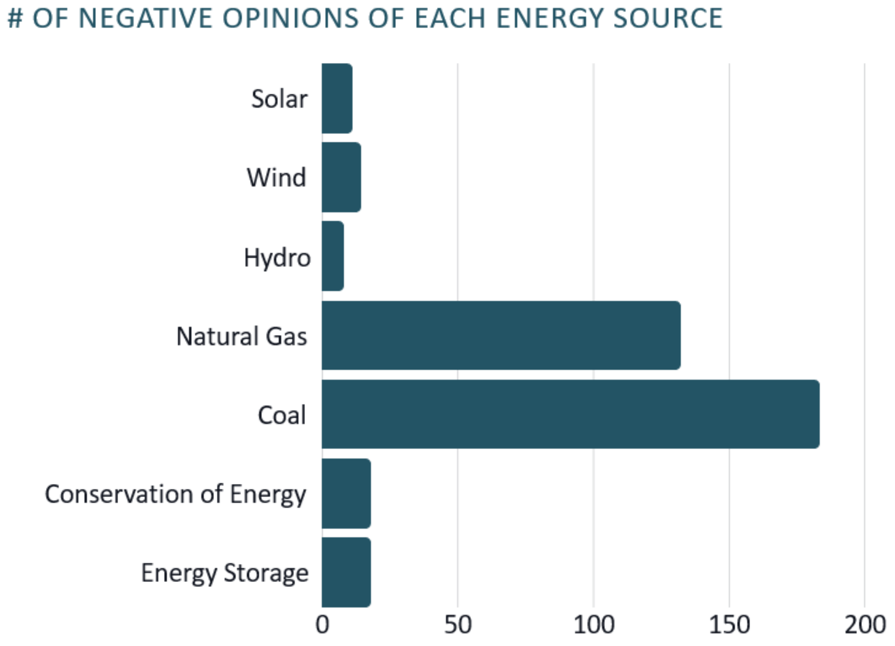
4 MINIMAL AMOUNTS OF NATURAL GAS GENERATION CAN BE OUR BRIDGE TO NEW TECHNOLOGIES.

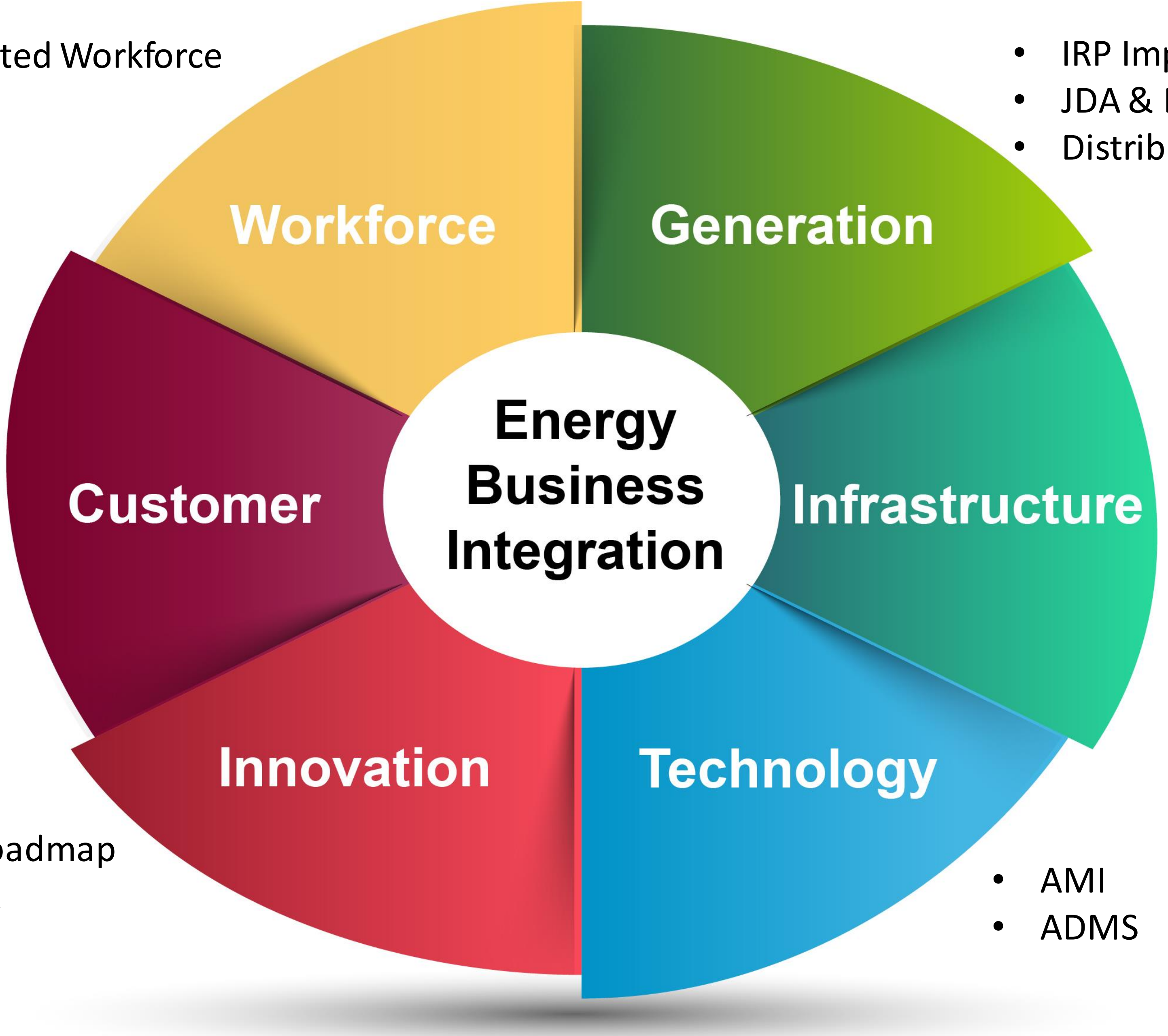
Colorado Springs Utilities
It's how we're all connected

Youth Input

DO YOU HAVE A POSITIVE OR NEGATIVE OPINION OF THE FOLLOWING ENERGY SOURCES?







- Integrated Workforce Plan

- IRP Implementation
- JDA & Energy Markets
- Distributed Generation Siting

- Rate Modernization and Customer Outreach

- Transmission Projects
- Military Resilience
- Drake Studies

- Energy Roadmap
- DSM/DER

- AMI
- ADMS