Electric and Natural Gas Integrated Resource Plans

Phase 1 and 2 Summaries
Integrated Resource Plans (IRP)

Our Electric and Natural Gas IRPs are long-term plans that provide direction on how we can best meet future demand for energy. They consider both supply-side (generation) and customer side (efficiency and load management programs) options to determine the best path forward.
IRP Process

Q1 2020

Portfolio Evaluation Criteria

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

Rate portfolios based on scoring criteria developed early in the process

Q4 2020

Goals, Reference Case, Inputs and Sensitivities

EIRP/GIRP Process

1. Develop foundation for IRPs
2. Development of analysis
3. Gather inputs & assumptions
4. Modeling & analysis
5. Evaluate results
6. Risk analysis
7. Determine course of action

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 decisions? Alternative resources

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

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

Initial results may provide insight to additional sensitivities to be evaluated
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.
Energy Vision Pillars

**ECONOMIC**
Cost-effective and equitable initiatives that drive 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

OUR FOUNDATION IS THE COMMUNITY WE SERVE
IRP Goals align with Energy Vision

**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
Methodologies/Sources on Key Inputs

Electric Load Forecasts
- Historical trends: ABB Group
- Population and economic: University of Colorado - Colorado Springs (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
• 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
Phase 1 Summary
# Electric IRP Reference Case

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

- 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
- Higher and lower planning reserve margin
- Front Range reliability
- Annexations

*see subsequent slides
# Plant Decommission Sensitivities

<table>
<thead>
<tr>
<th>Drake/Birdsall</th>
<th>Decommissioning Sensitivities</th>
<th>Selective Catalytic Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birdsall Only 2025</td>
<td>All units in – 2023, 2025, 2028, 2030</td>
<td>Drake 6 only 2025</td>
</tr>
</tbody>
</table>

| Nixon 1 | 2026, 2030, 2035, 2040, 2050 | 2028 |

| Front Range | 2030, 2040, 2050 | 2028, 2038 |
Renewables Sensitivities

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

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
Gas IRP Reference Case

<table>
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<th>Methodology (Study period through 2050)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load Forecast</strong></td>
<td>Utilize Planning and Finance Department’s peak demand and sales forecasts</td>
</tr>
<tr>
<td><strong>Hourly Peak Factor</strong></td>
<td>5.1% based on recent study conducted by gas planning</td>
</tr>
<tr>
<td><strong>Natural Gas Price Forecast</strong></td>
<td>First 5 years utilizes short-term forward pricing. Fundamental forecast utilized between 2025-2050.</td>
</tr>
<tr>
<td><strong>Gas-fired generation</strong></td>
<td>No new local distributing company (LDC) load from gas-fired generation</td>
</tr>
<tr>
<td><strong>Interruptible Customer Load</strong></td>
<td>Assume no change to prior years</td>
</tr>
<tr>
<td><strong>Current Capacity</strong></td>
<td>Assume no changes to current capacity charges (Firm, No Notice Transport (Storage), Propane Air)</td>
</tr>
</tbody>
</table>
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 Summary
Phase 2 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 Attributes and Weighting

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Weight</th>
</tr>
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<tbody>
<tr>
<td><strong>Reliability</strong></td>
<td>32%</td>
</tr>
<tr>
<td>Ability to react to variable or extreme daily operating conditions (i.e., the lights stay on).</td>
<td></td>
</tr>
<tr>
<td><strong>Cost/Implementation</strong></td>
<td>22%</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>Environment/Stewardship</strong></td>
<td>22%</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>Flexibility/Diversity</strong></td>
<td>14%</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>Innovation</strong></td>
<td>10%</td>
</tr>
<tr>
<td>Proactively and responsibly integrate technologies and programs.</td>
<td></td>
</tr>
</tbody>
</table>
Applying Attribute Weighting to Portfolios

Rating \times \text{Attribute Weighting} = \text{Score}

Highest Score \rightarrow \text{Optimal Portfolio}