Board of Directors

April 25, 2024
Evolution of distributed energy solutions

Bryce Brady, manager, distributed energy solutions
Distributed energy solutions

Utility of the past
- Building customer relationships
- Single focus: energy efficiency

Powering up the future
- Customer needs and behavior
- Electrification and flexibility
- Integration with owner communities
- Feeding the virtual power plant (VPP)
What are customers asking?

- How do I reduce my carbon footprint?
- Where do I start on my upgrades?
- Can I change how I use energy?
- Can you connect me with a qualified contractor?
- How do I disconnect my gas service?
- Should I buy an electric vehicle now or wait?
- I already did energy efficiency upgrades, what do I do next?
- Can you help my business meet our sustainability goals?
- What should I do first, install solar or a new electric heat pump?

Saving money or energy with efficiency is no longer the main drivers of action.
What are utilities needing?

- Equity must be considered in all programs
- Carbon reduction
- Incorporate building performance standards
- Use available budgets
- Home overhauls for income qualified
- Expand program goals to match various initiatives beyond traditional efficiency efforts
- Contractor training and workforce development
- Flexibility and control programs

Many goals and perspectives are competing for resources
Utility of the past powering the future

How do we transition?
Using a trusted resource to connect with customers

Efficiency Works is a regional utility collaboration that provides guidance and resources to enable customers to use energy effectively, work toward a noncarbon energy future and build strong, resilient communities for customers served by Platte River Power Authority and its owner communities of Estes Park, Fort Collins, Longmont and Loveland.
The power of the customer

Is it working?
# Residential building electrification

<table>
<thead>
<tr>
<th>Year</th>
<th>Upgrades</th>
<th>Invested</th>
<th>MWh Impact</th>
<th>Local Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>0</td>
<td>$0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2023</td>
<td>327</td>
<td>$474,235</td>
<td>1,781</td>
<td>20+</td>
</tr>
<tr>
<td>2024 (so far)</td>
<td>39</td>
<td>$61,835</td>
<td>228</td>
<td>13</td>
</tr>
</tbody>
</table>

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**CO₂ reduction**
Residential income qualified

2022
- $64,035 invested on home upgrades
- 0.27 MWh savings per participant

2023
- $708,041 invested on home upgrades and services
- Leveraged additional $672,000 of external funds for customer upgrades
- 3.27 MWh savings per participant
- Included building electrification efforts

Helping others

Changing lives

One participant gave feedback as,

“According to my Fort Collins home energy report my home is now one of the most efficient on the street, and it's all thanks to the Efficiency Works Care program completing my upgrades.”
## School education

<table>
<thead>
<tr>
<th>2021-2022</th>
<th>2022-2023</th>
<th>2023-2024 (so far)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,759 grades 9-12</td>
<td>2,399 4\textsuperscript{th} graders</td>
<td>2,620 4\textsuperscript{th} graders (and counting)</td>
</tr>
<tr>
<td>68 classrooms</td>
<td>101 classrooms</td>
<td>92 classrooms (and counting)</td>
</tr>
<tr>
<td>~12% of HS students</td>
<td>~65% of 4\textsuperscript{th} graders</td>
<td>~73% of 4\textsuperscript{th} graders when done</td>
</tr>
</tbody>
</table>
Electric vehicles

**2022**
- Educational EV shopper website launched

**2023**
- Public EV charging incentives
- Expansion of information on EV website platforms
- Launched EV fleet planner tool

**2024**
- Now - Building EV fleet programming services
- Late 2024 – Development of EV charge management programming
# Commercial HVAC System Optimization

## 2022
- 43 upgrades completed
- 222 MWh savings
- $458,118 invested
- 7 local contractors

## 2023
- 54 upgrades completed
- 2,549 MWh savings
- $1.1M invested
- 6 local contractors

## 2024 (so far)
- 68 upgrades underway
- 5,320 MWh savings underway
- $1.2M planned investments
- 12 local contractors involved

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**Functional**  ➡️  **Peak performance**
Powering forward

Where to next?
Building the future utility

Distributed energy solutions (customer)

- Solar
- Batteries
- EVs & smart devices
- Carbon reduction
- Comfort & customer connection

Distributed energy resources (utility)

- Distributed generation
- Reliability
- Flexible load
- Building electrification
- Energy efficiency
Distributed energy resources

Working together as building blocks

- Solar
- Batteries
- EVs & smart devices
- Carbon reduction
- Comfort & customer connection
- Distributed generation
- Reliability
- Flexible load
- Building electrification
- Energy efficiency

Virtual Power Plant

- Customers
- Virtual power plant
- Markets
Powering on

Coming soon

• Efficiency Works website rebuild
• Expansion of services to support the virtual power plant (VPP)
• Customer energy programs giving us the power
Questions
Board of Directors

April 25, 2024
VPP series: achieving dispatchable capacity with a VPP

Paul Davis, manager, distributed energy resources
Virtual power plant (VPP)

Dispatchable capacity for Platte River and the owner communities
Based on integrated flexible distributed energy resources (DER)

- Customer DERs
- Utility DERs

Dispatchable capacity that can provide electric system benefits

- Decarbonization
- Reliability (power supply and delivery)
- Managing costs of DER
- Making better use of intermittent, noncarbon generation

Operated through advanced technologies

- Communication, monitoring and control
- Analytics and optimization
- Data engineering and management
DERs, flexible DERs and the VPP

Flexible potential → Flexibility managed in a VPP

- **Energy efficiency**
  - Save energy and save money by using energy more efficiently

- **Electrification**
  - Reduce greenhouse gases by replacing fossil fuel use with increasingly decarbonized electricity

- **Demand response**
  - Shift energy to align electric use to renewable availability and to decarbonize the electric system in a cost effective and reliable manner

- **Distributed energy storage**

- **Distributed generation**
  - Improved visibility and grid support from on-site noncarbon generation

**Electric vehicles, batteries and traditional demand response**

**Solar generation**
Electric system benefits (…and challenges)

VPP benefits

• Visibility / forecasting improvement
• Dispatchable resource
  • Resource adequacy
  • Energy value
  • Ancillary services (operating and regulating reserves)
• Distribution system capacity / reliability

VPP challenges

• Achieving a VPP that is visible, measurable, predictable and responsive in near real time
• Value stacking vs. mutually exclusive benefits
• Coordination among:
  • Owner communities
  • Platte River
  • “VPP ecosystem…”
DER aggregators
Enable flexible DER enrollment, registration, communication and control to DERs (e.g., AutoGrid, Voltus, Tesla, Google Nest)

Customers
Provide the VPP assets (flexible DERs like EVs, storage, smart thermostats)

Platte River Power Authority and owner communities

Local service providers
Retailers, contractors, consultants involved in sale or implementation of DERs (e.g., electricians, HVAC installers, energy auditors)

DER original equipment manufacturers (OEMs)
Make flexible DERs, provide flexibility parameters, communication and control to DERs (e.g., Tesla, Chargepoint, Google Nest)

VPP ecosystem

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DER aggregators
Enable flexible DER enrollment, registration, communication and control to DERs (e.g., AutoGrid, Voltus, Tesla, Google Nest)
VPP potential: what is possible

DER potential study (2023)

VPP potential from flexible customer DERs
- Enrolled, diversified
- Achievable

VPP to also include
- Distribution-scale storage: 4 x 5 MW, 4 hour planned in 2027
- Distributed solar for visibility: 155 MW forecast by 2030
- Potential total capacity accounted for in VPP: 207 MW (~25% of 2030 peak)
Building the VPP: two scopes of work

Two related scopes of work are associated with VPP development

1. VPP customer programs - flexible DER assets
   • How customers become aware of, learn about, participate in and benefit from participation

2. VPP enabling systems – flexible DER management
   • Platte River and owner community systems
     • Communication, monitoring, control
     • Analytics and optimization
     • Data

These scopes may be developed in parallel and must be interoperable.
VPP enabling systems: gap assessment and roadmap

A deliberative process to gather requirements from Platte River and the owner communities, assess gaps and develop a gap-closure roadmap

- Drivers, goals, and desired outcomes
- Challenges and benefits of DER integration and services
- Identify DER services and functional capabilities needed
- Identify technology target state
- Determine current state, gap analysis, and roadmap
VPP enabling systems

Shared systems

- Enterprise distributed energy resource management system (Enterprise DERMS)
- Owner community DERMS – tenant of enterprise DERMS or an independent DERMS
- Data management systems

Platte River systems

- Market management systems
- Automatic generation control
- Energy management system

Owner community systems

- Customer information system
- Advanced metering infrastructure and meter data management system
- Geographic information system
- Advanced distribution management system (ADMS) providing “advanced apps”: as-operated network model and power flow modeling

Other systems may be needed depending on what we learn as the systems above are implemented and integrated
Next steps

- Board resolution in support of VPP
- Collaboration with owner communities
- RFP for DERMS and VPP programs, vendor selection (through late 2024)
- Contracting with DERMS, VPP program provider (late 2024 – early 2025)
- Work with vendor(s) to design system and programs (2025)
- **Assess completeness of contracted services and fill remaining gaps (2025)**
- Begin system and program implementation (timeline to be determined with input from vendors)
Questions
Board of Directors

April 25, 2024
Reservoir update

Chris Fields, senior fuels and water resources engineer
Reservoir update

Agenda

• Water supply update
• Chimney Hollow reservoir
  • Project status
  • Video
• Water resources reference document
Reservoir update

Water supply update

• Pop quiz: what is Colorado’s largest reservoir?
Reservoir update

Water supply update

• Pop quiz: what is Colorado’s largest reservoir?
  • Answer: snowpack!
Reservoir update

Water supply update

- Pop quiz: what is Colorado’s largest reservoir?
  - Answer: snowpack!

- Reservoir factoids
  - Colorado reservoir storage $\approx 2.5$-million-acre feet
  - Colorado snowpack $\approx 20$-million-acre feet
Reservoir update

Water supply update

- Snowpack conditions
  - Colorado River
    - Upper basin – 103% of average
    - Lower basin – 170% of average
  - Lake Powell
    - Below-average runoff – 80%-85% of average
    - Dry soil heading into winter
Reservoir update

Water supply update

- Snowpack conditions
  - Colorado headwaters
    - Peak – 107% of average
    - Current – 98% of average
  - C-BT and Windy Gap forecast
    - Below-average runoff – 90% of average
    - Lake Granby will spill
    - Windy Gap will not pump
Reservoir update

Chimney Hollow reservoir
Reservoir update

Chimney Hollow reservoir

- Main Dam update
  - 185 feet tall (final height is 350 feet); increasing at 3.75 feet/week
  - Double shift work has resumed: two 12-hour shifts, six days per week
Reservoir update

Chimney Hollow reservoir

- An inlet/outlet tunnel will house a pipeline used to fill the reservoir and make deliveries to water users
- Tunnel excavation started on the downstream portion in April 2022, then moved to the upstream portion seven months later
- The two portions of the tunnel were connected on March 15

A roadheader was used to hole through and connect the upstream and downstream tunnel sections.
Reservoir update

Chimney Hollow reservoir

- Schedule performance
  - 59% complete as of March 3, 2024
- Target completion: Fall 2025
Reservoir update

Chimney Hollow reservoir
Reservoir update

Water resources reference document

New condensed version coming in May…stay tuned!
Questions
IRP community engagement update

Eddie Gutiérrez, chief strategy officer
Upcoming Council and board presentations

- Estes Park
  - Town Board: July 9
- Fort Collins
  - Energy Board: August 8
  - Council: August 13
- Longmont
  - Council: June 25
  - Sustainability Advisory Board: August 21
- Loveland
  - Utilities Commission: July 17
  - Council: July 23
Board of Directors

April 25, 2024
March operational results

<table>
<thead>
<tr>
<th>Owner community load</th>
<th>Budget</th>
<th>Actual</th>
<th>Variance</th>
<th>% variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner community demand</td>
<td>447 MW</td>
<td>412 MW</td>
<td>(35 MW)</td>
<td>(7.8%)</td>
</tr>
<tr>
<td>Owner community energy</td>
<td>263 GWh</td>
<td>250 GWh</td>
<td>(13 GWh)</td>
<td>(5.0%)</td>
</tr>
<tr>
<td>Net variable cost* to serve owner community energy</td>
<td>$5.1M</td>
<td>$4.1M</td>
<td>($1.0M)</td>
<td>(16.0%)</td>
</tr>
<tr>
<td></td>
<td>$19.48/MWh</td>
<td>$16.37/MWh</td>
<td>($3.11/MWh)</td>
<td>(16.0%)</td>
</tr>
</tbody>
</table>

*Net variable cost = total resource variable costs + purchased power costs - sales revenue

Market impacts to net variable cost

<table>
<thead>
<tr>
<th>Downward pressure</th>
<th>Upward pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation and market outcomes pushing costs lower</td>
<td>Generation and market outcomes pushing costs higher</td>
</tr>
<tr>
<td>Coal generation fuel savings</td>
<td>Lower bilateral and market sales volume</td>
</tr>
<tr>
<td>$1.2M</td>
<td>Lower wind generation volume</td>
</tr>
<tr>
<td>Lower wind generation volume</td>
<td>Higher market purchases pricing</td>
</tr>
</tbody>
</table>

Variance key: Favorable: ● | Near budget: ◆ | Unfavorable: ■
## YTD operational results

<table>
<thead>
<tr>
<th>Owner community load</th>
<th>Budget</th>
<th>Actual</th>
<th>Variance</th>
<th>% variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner community demand</td>
<td>1,423 MW</td>
<td>1,389 MW</td>
<td>(34 MW)</td>
<td>(2.4%)</td>
</tr>
<tr>
<td>Owner community energy</td>
<td>811 GWh</td>
<td>787 GWh</td>
<td>(24 GWh)</td>
<td>(3.0%)</td>
</tr>
<tr>
<td>Net variable cost* to serve owner community energy</td>
<td>$15.2M</td>
<td>$12.4M</td>
<td>($2.8M)</td>
<td>(16.0%)</td>
</tr>
<tr>
<td></td>
<td>$18.80/MWh</td>
<td>$15.78/MWh</td>
<td>($3.02/MWh)</td>
<td></td>
</tr>
</tbody>
</table>

*Net variable cost = total resource variable costs + purchased power costs - sales revenue

### Market impacts to net variable cost

#### Downward pressure

- **Generation and market outcomes pushing costs lower**
  - Coal generation fuel savings: $2.4M
  - Lower wind generation volume: $2.0M

#### Upward pressure

- **Generation and market outcomes pushing costs higher**
  - Lower bilateral and market sales volume: $2.0M
  - Higher market purchases pricing: $0.75M

Variance key: Favorable: • | Near budget: ◆ | Unfavorable: ■
## Financial summary

<table>
<thead>
<tr>
<th>Category</th>
<th>March variance from budget ($ in millions)</th>
<th>YTD variance from budget ($ in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net income</td>
<td>$3.0</td>
<td>$4.3</td>
</tr>
<tr>
<td>Fixed obligation charge coverage</td>
<td>.80x</td>
<td>.46x</td>
</tr>
<tr>
<td>Revenues</td>
<td>$(0.9)</td>
<td>$(1.9)</td>
</tr>
<tr>
<td>Operating expenses</td>
<td>$3.5</td>
<td>$6.8</td>
</tr>
<tr>
<td>Capital additions</td>
<td>$2.3</td>
<td>$11.7</td>
</tr>
</tbody>
</table>

2% ● Favorable | 2% to -2% ◇ At or near budget | < -2% ■ Unfavorable