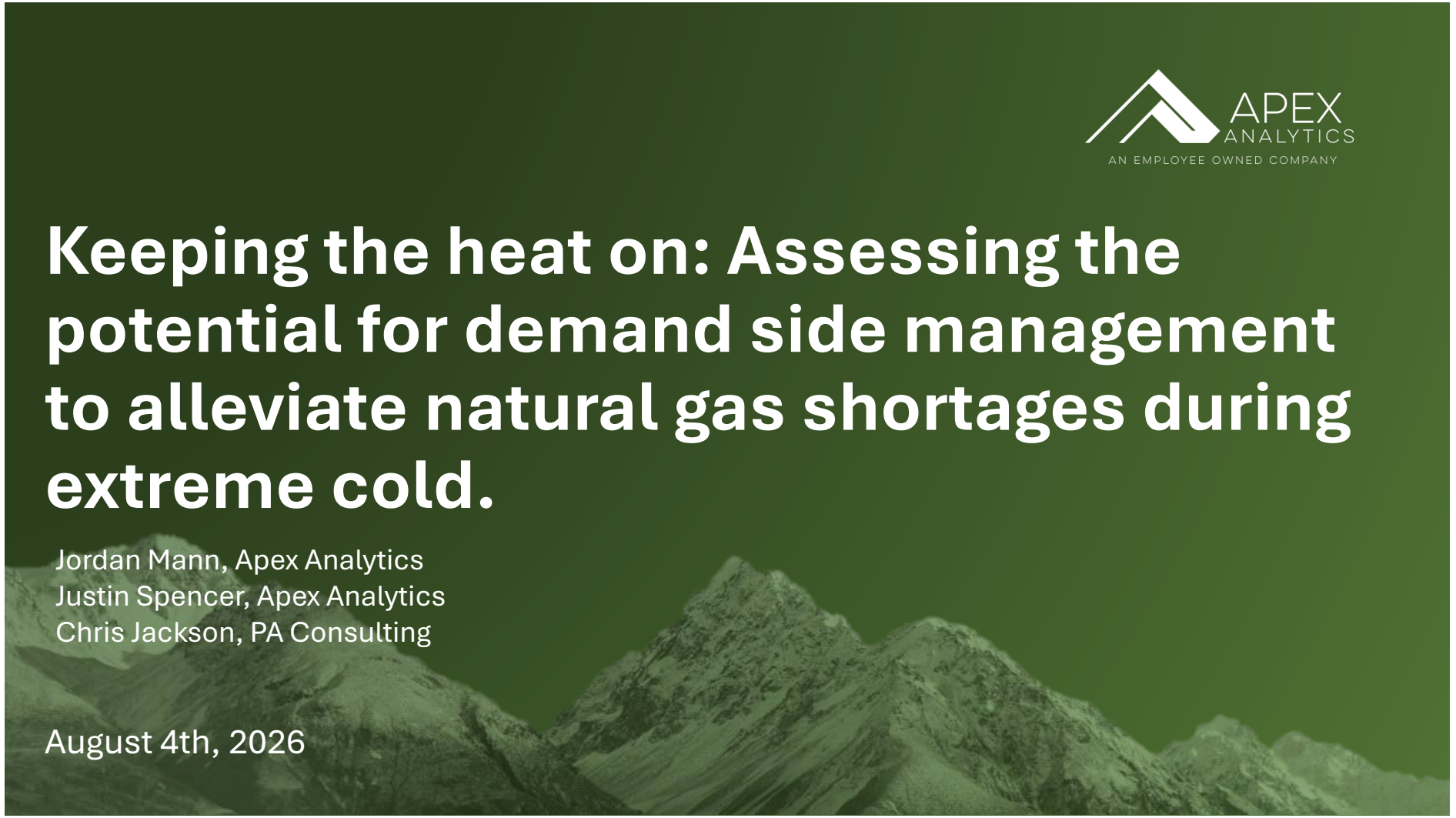
APEX
ANALYTICS
AN EMPLOYEE OWNED COMPANY
Keeping the heat on: Assessing the potential for demand side management to alleviate natural gas shortages during extreme cold.
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Background

An evolving policy landscape in gas regulation has created significant interest in non-pipeline alternative (NPA) solutions to address gas infrastructure needs. NPAs can **defer, reduce, or avoid** building of traditional gas infrastructure.

NPAs seek to address gas infrastructure investment within three broad categories

1. Replacement of Existing Infrastructure
2. **Capacity Expansion of Existing Systems**
3. System Extension

Opinions expressed in this presentation are of the authors alone and not Xcel Energy.

Mountain Energy Project Region of Interest

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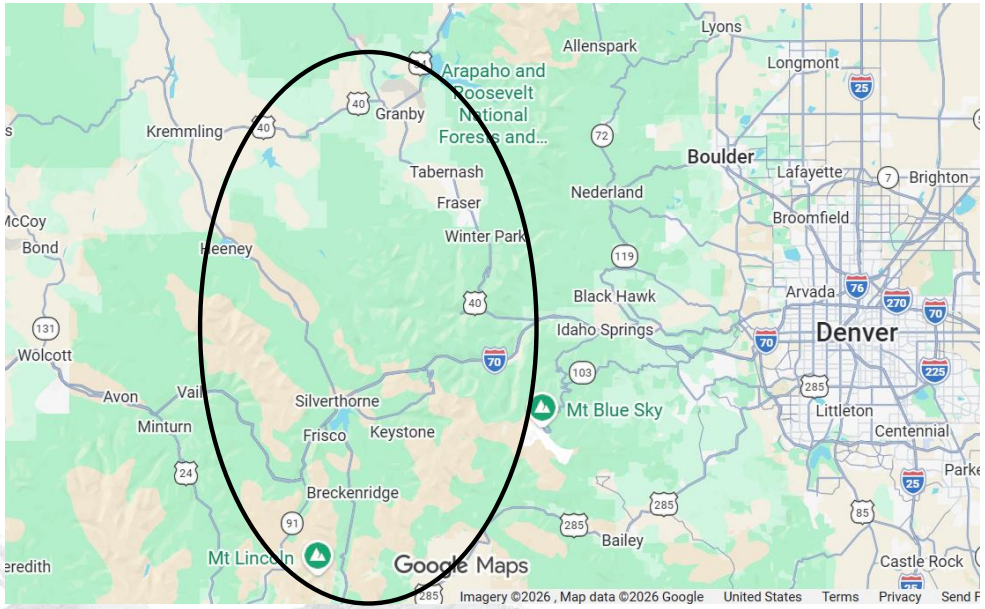
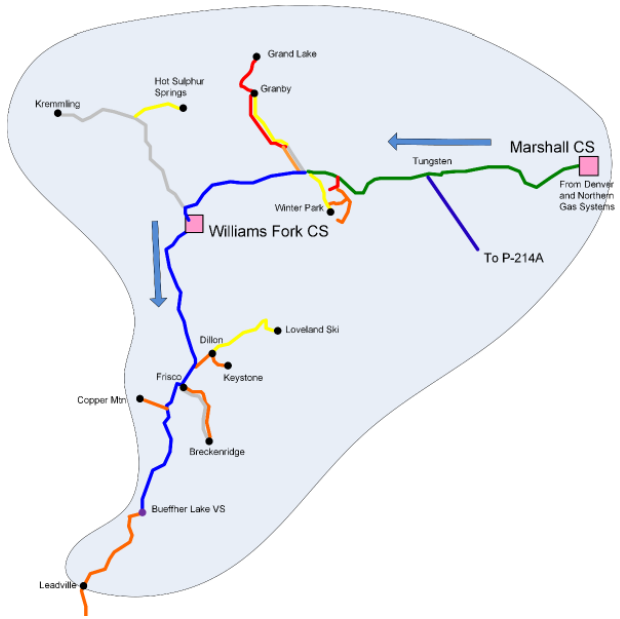
Three key areas of interest include, Grand Lake, Keystone, and Breckenridge. This area includes roughly 30,000 customers. It is very cold here with lows occasionally dropping below 30F.

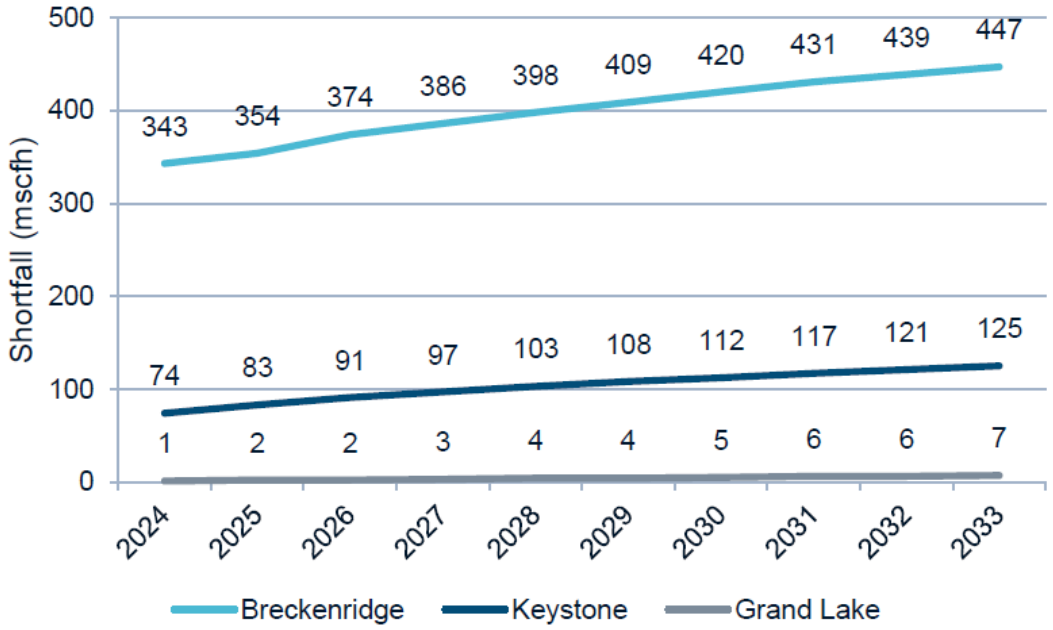




Existing Shortfall of Gas Supply

The total system needs over a 10% reduction from peak usage to no longer be constrained, before accounting for forecasted increases in peak hour consumption.

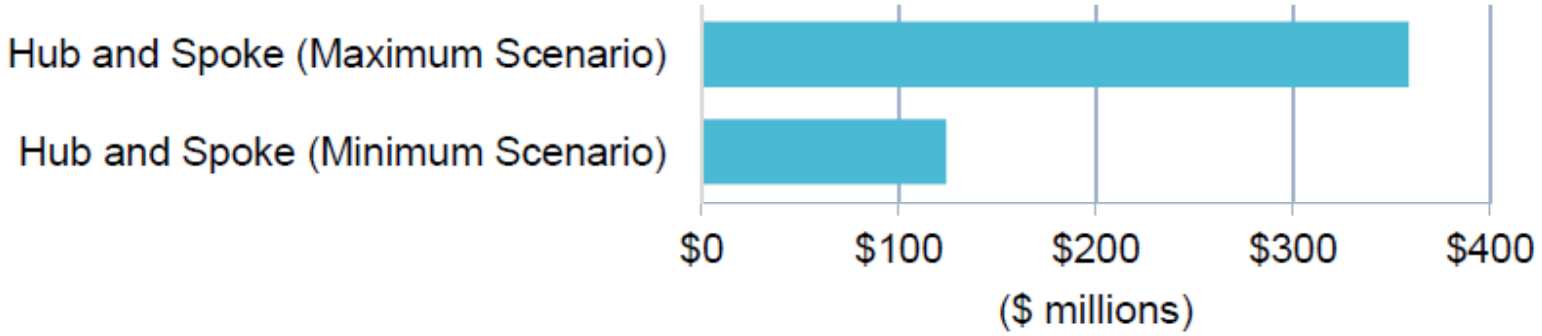
In prior winters, Xcel has been trucking up LNG and injecting it into the system. Not a feasible long-term solution.



Pipelines are Really Expensive

Expanding the pipeline capacity to allow the throughput needed would cost somewhere between $120M to $350M dollars.

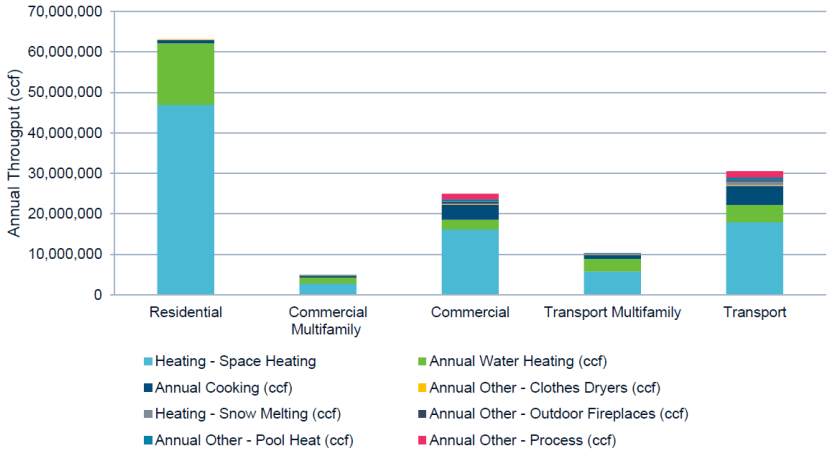
We wanted to explore if there were solutions that could cost less and also save greenhouse gas emissions, creating a win win scenario for Xcel Customers.



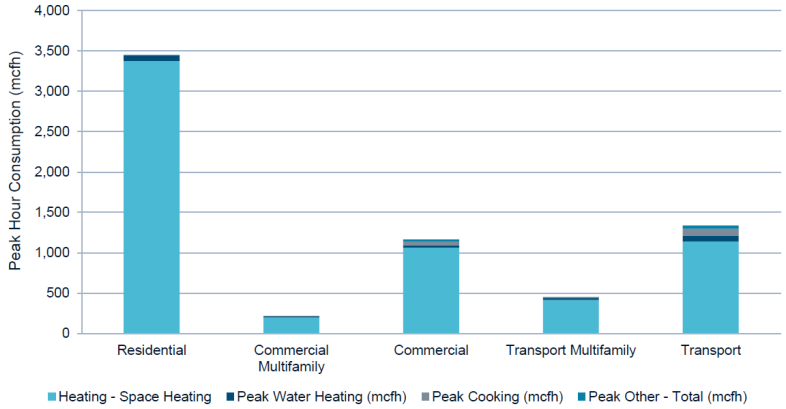
It's All About the Heating

Almost all of the load during peak winter conditions is heating based load. As the temperature drops, most gas loads stay roughly the same, while the heating load increases dramatically. We need a solution that addresses the heating load specifically.

Annual



Peak Hour



A Dual Fuel Solution?

The problem can be addressed through any mechanism that saves gas heat on peak. This could include:

- Gas equipment efficiency
- Improvements the building envelope
- Demand Response
- Behavioral Measures
- Full electrification

Dual fuel in the sense that it can either be gas efficiency OR full electrification

Not dual fuel from the perspective of a single hybrid heating system

Significant BE/EE/DR is Needed… Are Customers Willing to Participate?

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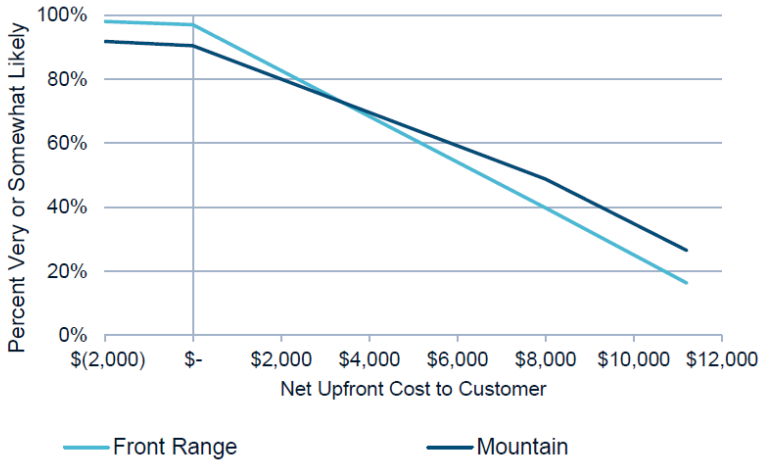
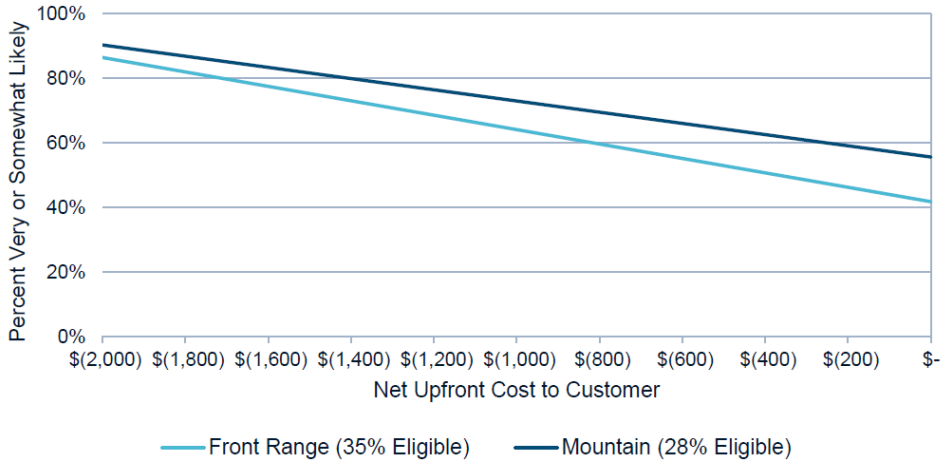
33% of front range (Denver area) and **30% of Mountain customers** would consider replacing their gas equipment with a full electrification heat pump solution. The price sensitivity of these customers is shown below.



Likelihood to Convert to Heat Pump with Same Operating Cost



Likelihood to Convert to Heat Pump with $1,000 per year increase in operating costs and incentives greater than incremental cost

If we can drive participation, which measures are most cost effective?

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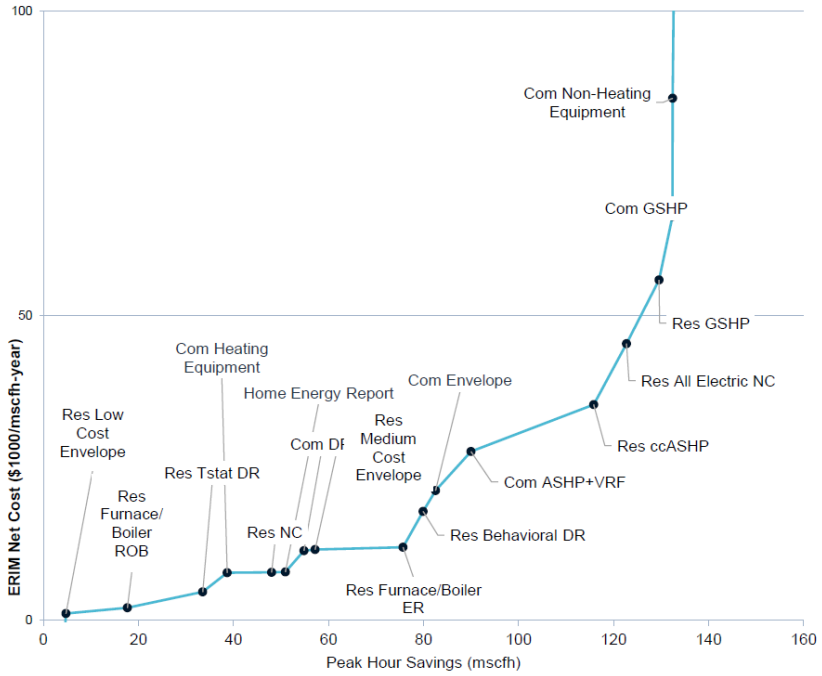
With incentives equal to full incremental costs, we mapped the cost effectiveness of measures using a standard RIM test with GHG as an included benefit and electric infrastructure as a cost. In general, envelope, DR, and gas equipment replacements were more cost efficient than full electrification.

Why not just use the TRC?

- Most customers not eligible to participate since they are not in the geographic area that would alleviate the constraint
- Concerns with equity/fairness



Can BE, EE, and DR solve the shortfall?

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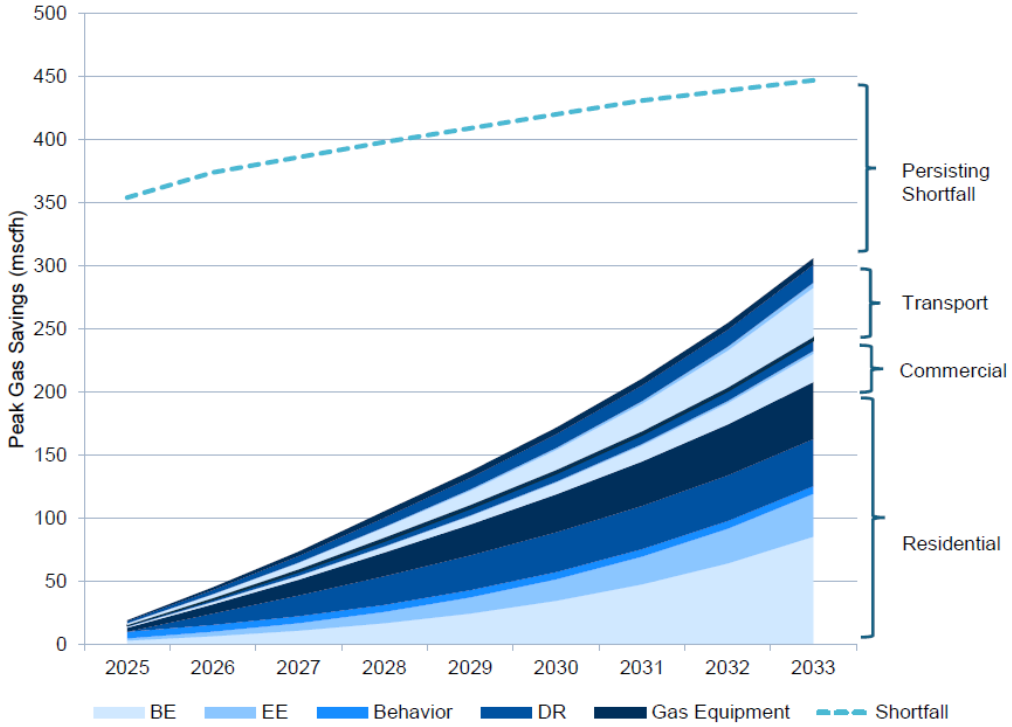
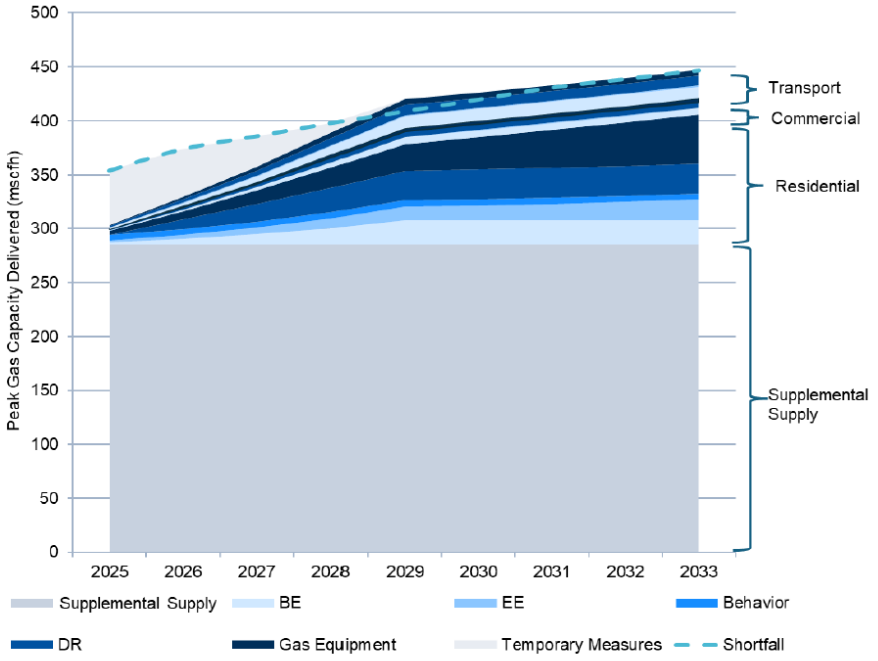
Even with incentives equal to the incremental cost of measures, the gas supply shortfall is not fully addressed by 2033.



Gas storage as an additional solution

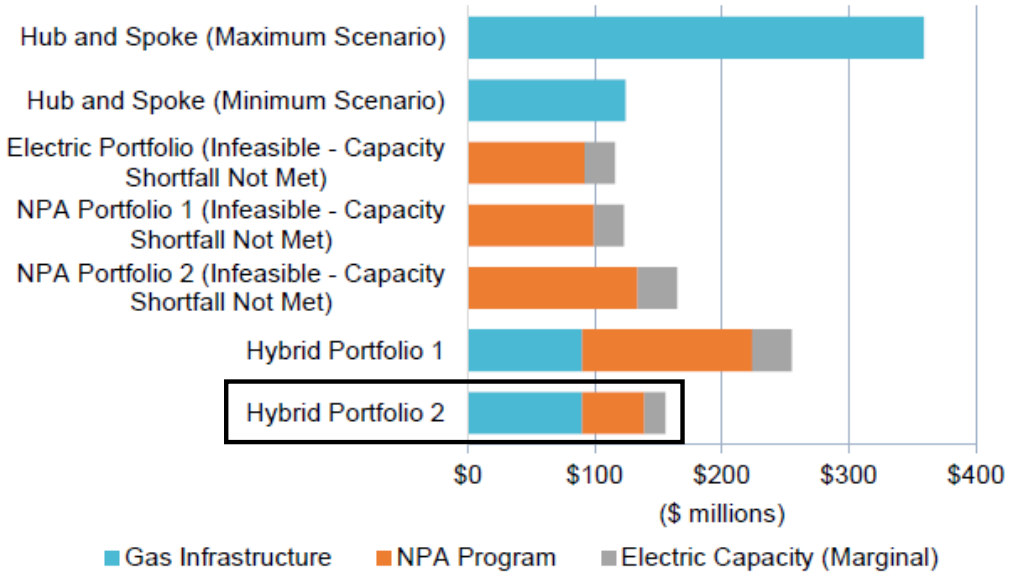
Not being able to address with BE, EE, and DR led the team to include LNG and CNG storage near the constraint points to inject stored natural gas into the system. This creates an inflection point in 2029, where policy makers will need to decide whether to fund additional DSM measures to decommission the onsite storage.



The Proposed Solution

The solution presented to the Colorado PUC, with support from the Sierra Club, SWEEP, Mountain Community Coalition, Colorado Energy Office, and PUC staff including aggressive electrification, efficiency, and DR, paired with gas storage.

The PUC approved a $155M NPA investment with ~$50M dollars dedicated to DSM.



What this means for participants

Rebates are large for customers willing to participate.

Gas equipment rebates are $225 and heat pump rebates are $2,250/ton for air source and $3,300/ton for ground source in other parts of the state.

Customers could get anywhere from ~20k – 75k for electrification projects, reflecting the high value of avoiding gas infrastructure.

KEY	HEATING AND COOLING EQUIPMENT	MINIMUM QUALIFYING STANDARDS*	EARLY REPLACEMENT REBATE AGE OF EQUIPMENT MUST BE 10 YEARS OR LESS	NON-EARLY REPLACEMENT/ EQUIPMENT FAILURE REBATE	NEW HOME CONSTRUCTION REBATE
	Cold Climate Air Source Heat Pump (ccASHP), Ducted*	15.2 SEER2, 10 EER2, 8.1 HSPF2,COP at 5 F ≥ 1.75, and the heating capacity at 5 F must be at least 70% of the 47 F rated heating capacity	$7,500/heating ton at 5 F	$4,000/heating ton at 5 F	$1,500 per heating ton at 5 F
	Ground Source Heat Pump (GSHP)* **	16 EER2, 3.3 COP, Full Load	$20,000/heating ton	$15,000/heating ton at 5 F	$5,000/heating ton
	Gas Furnace	95% + AFUE (must be replacing non-condensing furnace)	$3,000	$1,000	N/A

Source: Xcel Energy Rebates for the Mountain Energy Project, non-exhaustive list

Thank You

Follow up questions? Feel free to reach out.

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