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Gas System Long-Term Plan

Technical Session 03.06.24

Cases 20-G-0131 & 23-G-0676

Logistics and Background

James Keating
Director, Gas Transformation and Planning

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Agenda

- Logistics and Background for Session
- Introduction to the Natural Gas Planning Team
- Overview of CH GSLTP
- Central Hudson's Support for NY Policy Objectives
- Impacts on Disadvantaged Communities
- Gas Planning
- Demand Side Programs
- Supply Planning
- LTP Modeling Methodology, Scenarios, Assumptions, Results
- Q&A

Meeting Logistics

- Central Hudson Gas and Electric (CHG&E) is presenting at the Technical Session to provide Stakeholders with a summary discussion of the Central Hudson Gas System Long Term Plan filed in early February.
- A Q&A will follow each section to address matters related to the material presented.
- Please use the “raise hand” feature of the meeting platform so that we know when there are questions to address (We will answer questions in the order they are received).

CH Natural Gas Planning Team

- Dean Kane – Section Engineer, Gas Planning
- James Keating – Director, Gas Transformation and Planning
- Eric Kiszkiel – Vice President, Gas Operations and Engineering
- Joseph Koberger – Director of Gas Engineering
- Karen Lo – Sustainability Coordinator
- Jeffrey May – Manager, Energy Resources
- Timothy McClive – Director, Energy Policy and Regulation
- Brianna Peak – Manager, Gas Operations and Engineering
- Stacy Powers – Director, Costs, Rates & Forecasts
- Cory Scofield – Director, Demand Side Management
- Josh Bode – Demand Side Analytics

Overview of the GSLTP

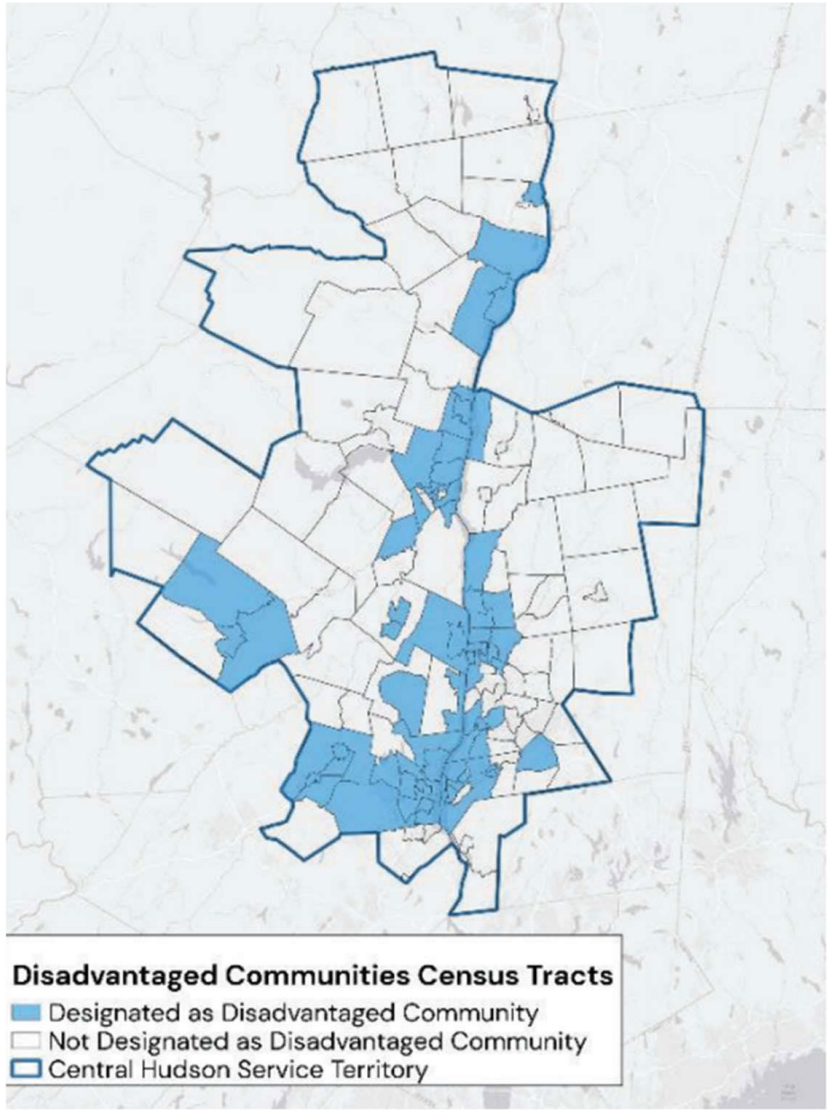
Section I. Executive Summary	• Describes Companies overall transition strategy • Summary of high-level results of scenario analysis
Section II. Introduction	• Provides the context for the GSLTP
Section III. Service Territory Description	• Provides an overview of the company's service territory • Describes the disadvantaged communities of CH's service territory • Reviews Company's current capital investment plan for the next 5 years • Reviews current economic and climate conditions for the service territory • Overview of any pipeline capacity constraints
Section IV. Forecasting Methodology	• Overview of gas planning criteria • Sales volumes and peak demand forecast • Demand-side management programs • Supply planning • Other planning methodologies
Section V. Decarbonization Scenarios – Assumptions and Outputs of the Scenarios	• Business As Usual • CLCPA Approach • No New Infrastructure • Pipe Use Transformation
Section VI. Near Term Actions for Decarbonization	• Highlights what Central Hudson is already doing to decarbonize
Appendices	A. 20-Year Historical Trend Gas Forecast and Location-Specific Gas Dist. Costs B. GSLTP Dynamic Model Overview C. Potential Hydrogen Blending Study D. Renewable Natural Gas Analysis, Final Report (Guidehouse) E. Utility Thermal Energy Network (UTEN) Potential Study F. Central Hudson Utility Thermal Energy Network Final Pilot Proposal

CH Support for NY Policy Objectives

- In conjunction with State, federal, and local policies and targets, Central Hudson has adopted decarbonization as a central objective, with a focus on the energy transition
- This reflects goals of Fortis, Inc., Central Hudson's parent company, which states that "Fortis has a clear path to achieve a mid-term target of reducing GHG emissions 75% by 2035 compared to 2019 levels, and a 2050 net-zero direct GHG emissions target to decarbonize over the long-term."
- On-going decarbonization efforts include:
  - Methane reduction through the Company's ongoing Mains Replacement Program (MRP);
  - Selection of supply resources;
  - Electrification of space heating and water heating;
  - Electrification of commercial and industrial (C&I) end uses; and
  - Utility thermal energy networks.
- From 2020 through 2023, through the NYS Clean Heat Program, Central Hudson incentivized ~19,000 heat pumps, achieving 583,922 MMBTu in energy savings, and achieved an estimated GHG reduction of 37,212 metric tons of carbon dioxide (CO2).
- Through its energy efficiency programs, Central Hudson has supported energy savings, cost savings for customers, and GHG reductions.

Impacts to Disadvantaged Communities

- Central Hudson estimates that 71% of its gas meters are located within a DAC.
- Since 2019, 23 of 34 investigated NPA cases are located within a DAC.
- Central Hudson filed its first DAC report on investments and energy saving benefits in DACs from 2020 through 2022 on December 28, 2023.
- DAC data is currently included in the GSLTP modeling and analysis to inform insights and planning.
- Central Hudson will look to further integrate the results of its DAC reporting into its gas planning process.



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Gas Demand Modeling

Josh Bode
Demand Side Analytics

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The study had two main components

Historical Analysis and Base Forecast

- Data cleaning and preparation of pressure data and volume of gas use for all gas lines
- Identifying highly loaded areas
- Estimating location specific growth rates
- Probabilistic forecasts of demand and pressure for all gas systems
- Estimate gas distribution avoided costs
- Historical analysis and adoption propensities for energy efficiency, and building electrification

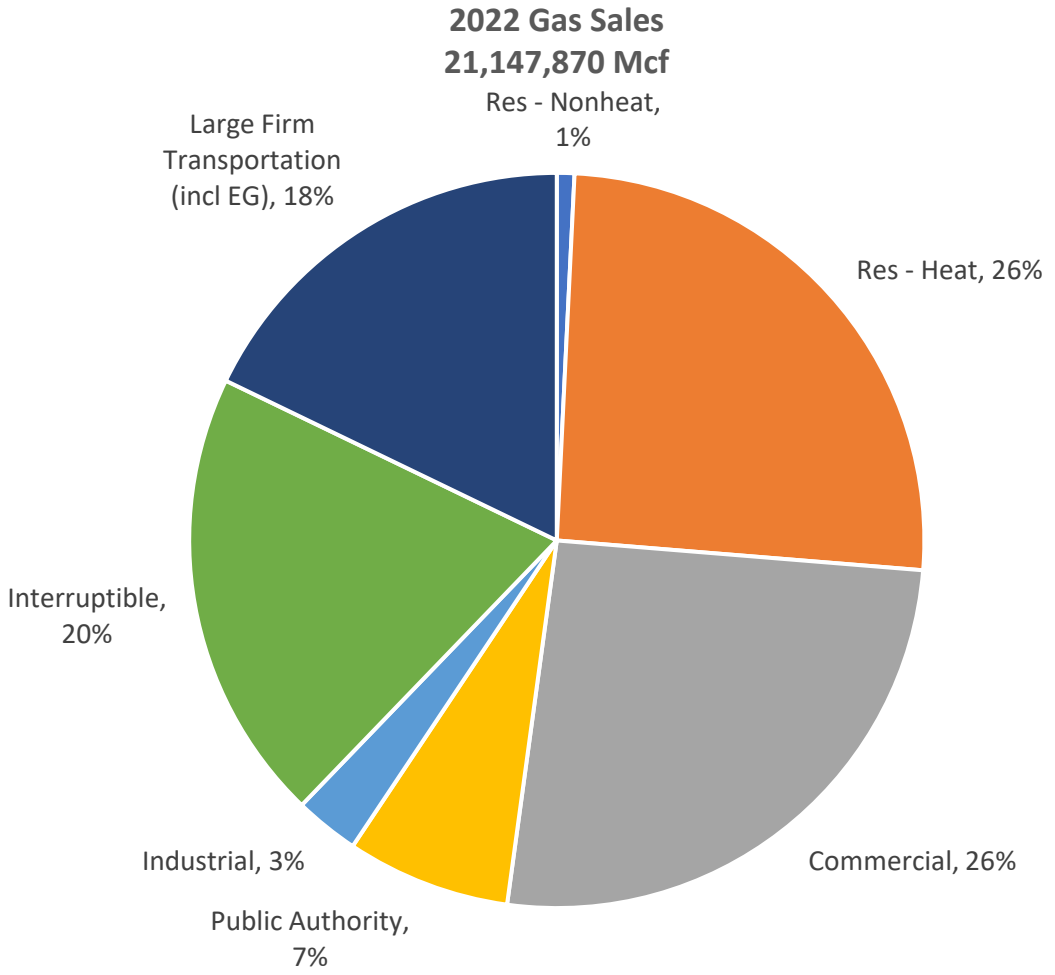
Modeling of Scenarios and Change for Key Metrics

- Estimate impact of incentives on heat pump and energy efficiency adoption
- Heat pump savings, CO2 reductions, and demand impacts under different incentive levels
- Energy Efficiency savings, CO2, and demand impacts under different incentives levels and budgets
- Energy Efficiency savings, CO2, and demand impacts under different incentives levels and budgets
- Supply curves for EE, heat pumps, and demand response
- Hydrogen cost and carbon impacts
- Renewable natural gas cost and carbon impacts
- Rate impacts and bill impacts

Fewer than 40 Customers Account for 38% of Sales

(Excludes interruptible and large transportation customers)

2022 Gas Customers	
Residential - Nonheat	7,024
Residential - Heat	67,427
Commercial	11,577
Public Authority	905
Industrial	309
Interruptible	33
Large Firm Transportation (incl EG)	5
	87,280



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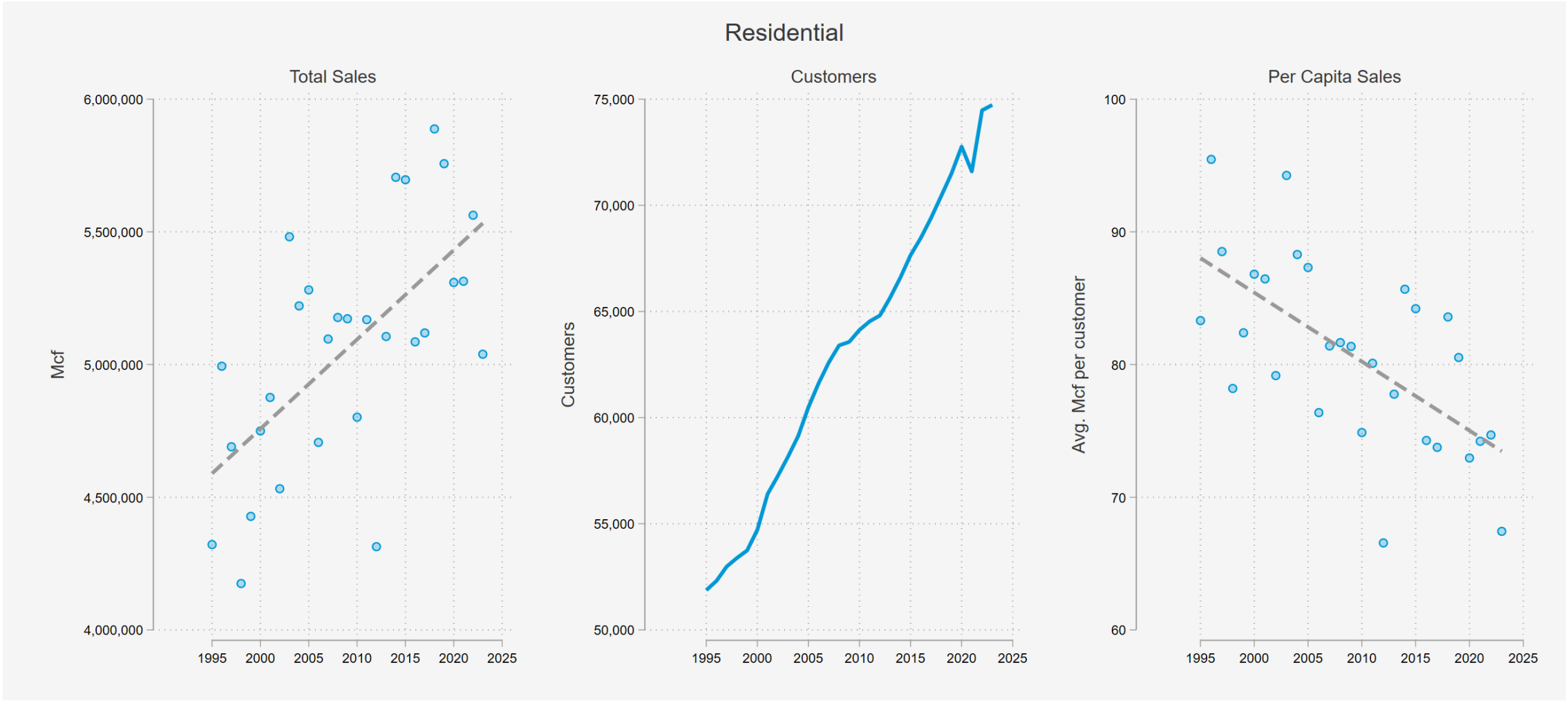
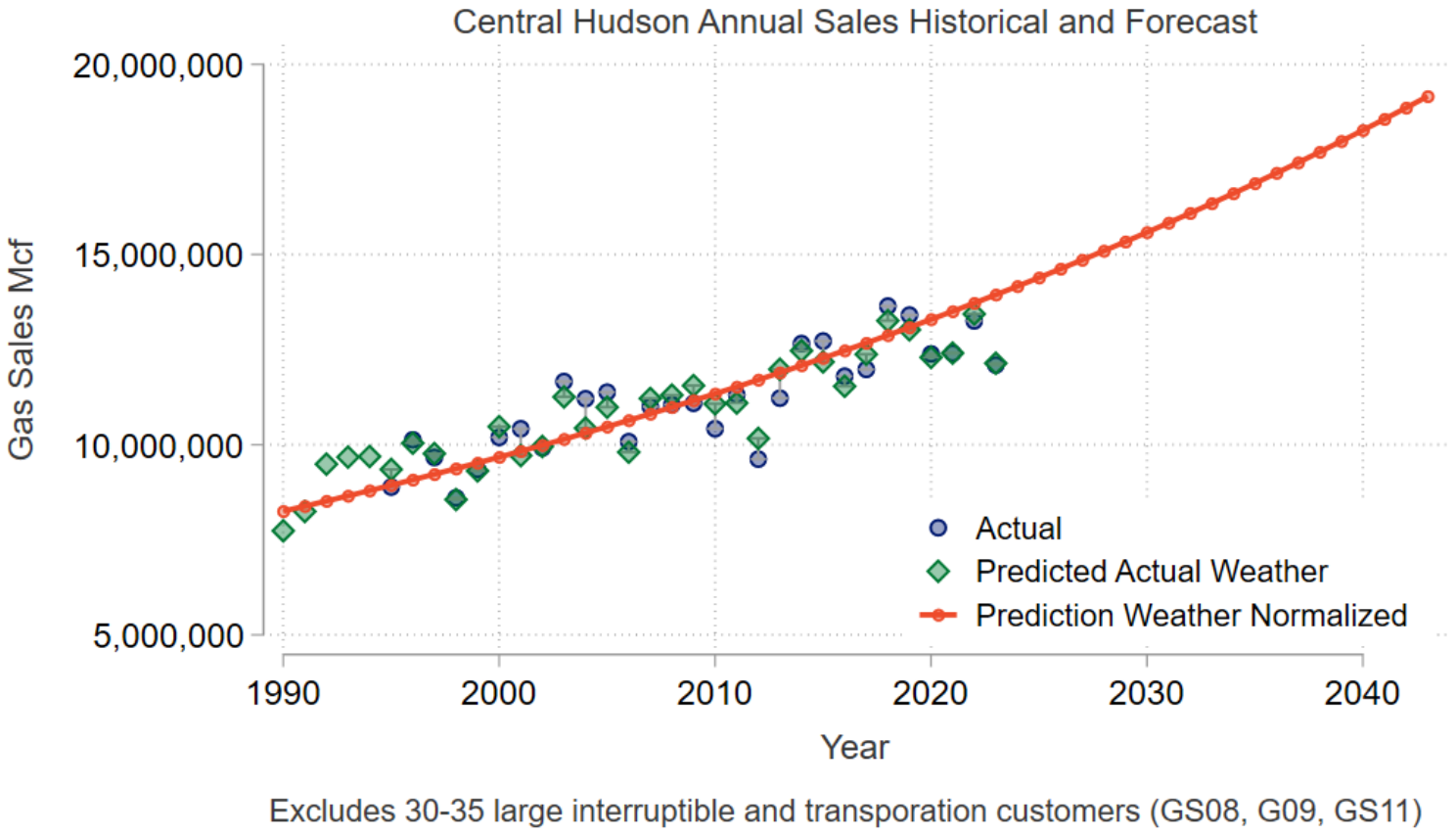
Per customer residential gas sales have been declining



20-Year Historic Trend Sales Forecast



Excludes 30-35 large interruptible and transporation customers (GS08, G09, GS11)

- Load growth forecasts use probabilistic methods rather than straight-line forecasts.
- A key goal: determine how growth in gas consumption during peak periods affects gas pressure and, thus, need for infrastructure upgrades or upstream asset agreements.
- The analysis was implemented for 43 gas systems to quantify the growth each system can accommodate, timing of peak loads, concentration of peaks, and relationship between peak demand and weather.
- With no interference by Central Hudson, annual sales would have grown approximately 1.59% per year, and customers would grow at 1.37%

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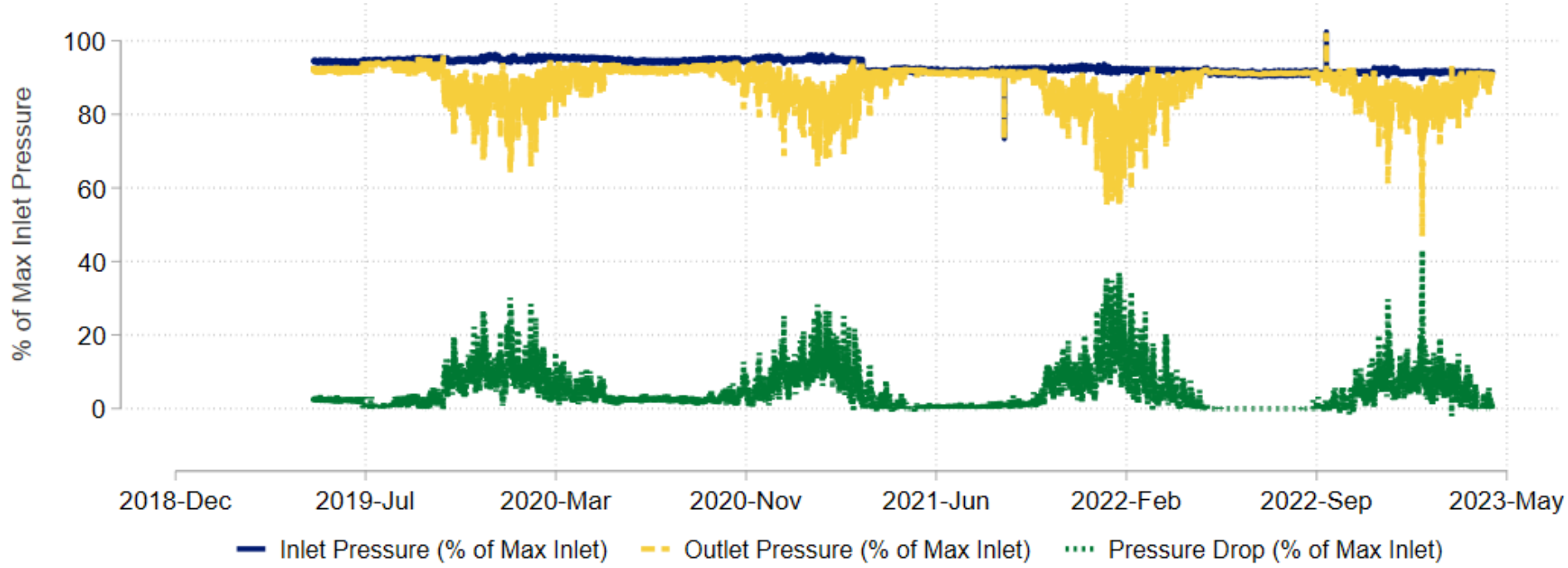
Gas Planning Criteria

- Gas planning focuses on maintaining system pressure above a minimum level
- Central Hudson reinforces distribution networks when gas pressure is projected to drop below 50% of the normal operation pressure
- Before upgrade criteria is met, Central Hudson has base risk criteria that triggers flow studies, identification of reinforcements, and project funding requests
- Planning is for conditions where the average daily temperature reaches -8°F.



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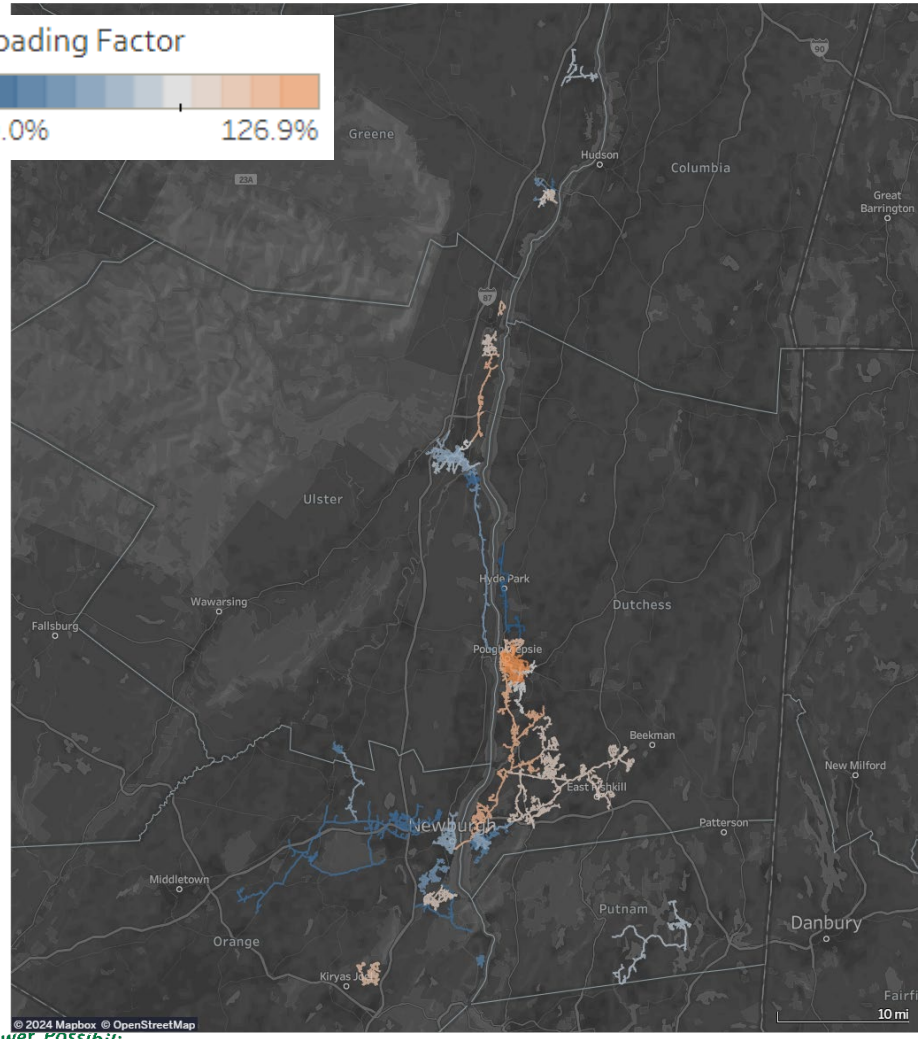
A Key Goal: Identify Highly-Loaded Gas Systems



System	Name
PLP	Poughkeepsie LP
PN	Poughkeepsie- Newburgh
KS High	Kingston-Saugerties High
HM	Highland Mills
GLP	Glasco LP
MLP	Malden Low Pressure
PM	Poughkeepsie Medium
CW	Cornwall Medium Pressure
CLP	Catskill LP
TVPV	Titusville/Pleasant Valley
KS Med	Kingston -Saugerties Medium
HH	Hopewell- Hughsonville
SP	Sharon Dr- Poughkeepsie
NFE	North Kingston - Foxhall
CK	Coxsackie
SM	Carmel- Mahopac
KM	Kingston Medium Pressure
KLP	Kingston LP
CFNM	Cronomer Hill - Fullerton Ave/Newburgh Medium
NFW	Elmendorf St- West King
B	Beacon LP
NLP	Newburgh LP
W	Coldenham- Wallkill
BN	Balmville- Newburgh Holder,
LNW	Lower New Windsor
CMP	Catskill System
STCRK	Salt Point Turnpike/Creek Rd
PK	Poughkeepsie- Kingston
WK	Wallkill
HF	Highland Falls
BF	Beacon-Fishkill-Glenham
CMENP	Newburgh - Cornwall/Cocheton - Nbg Holder/Newburgh - Park P..
HLMS	Blue Point - Highland/Highland Medium Pressure
CH	Cronomer Hill-Coldenham,
AMW	Scotts Corner - Maybrook/Berea - Chandler Ln
PE	Port Ewen
WP	West Point
MA	Maybrook
BC	Browns Crossing
HV	Hyde Park- Violet Ave

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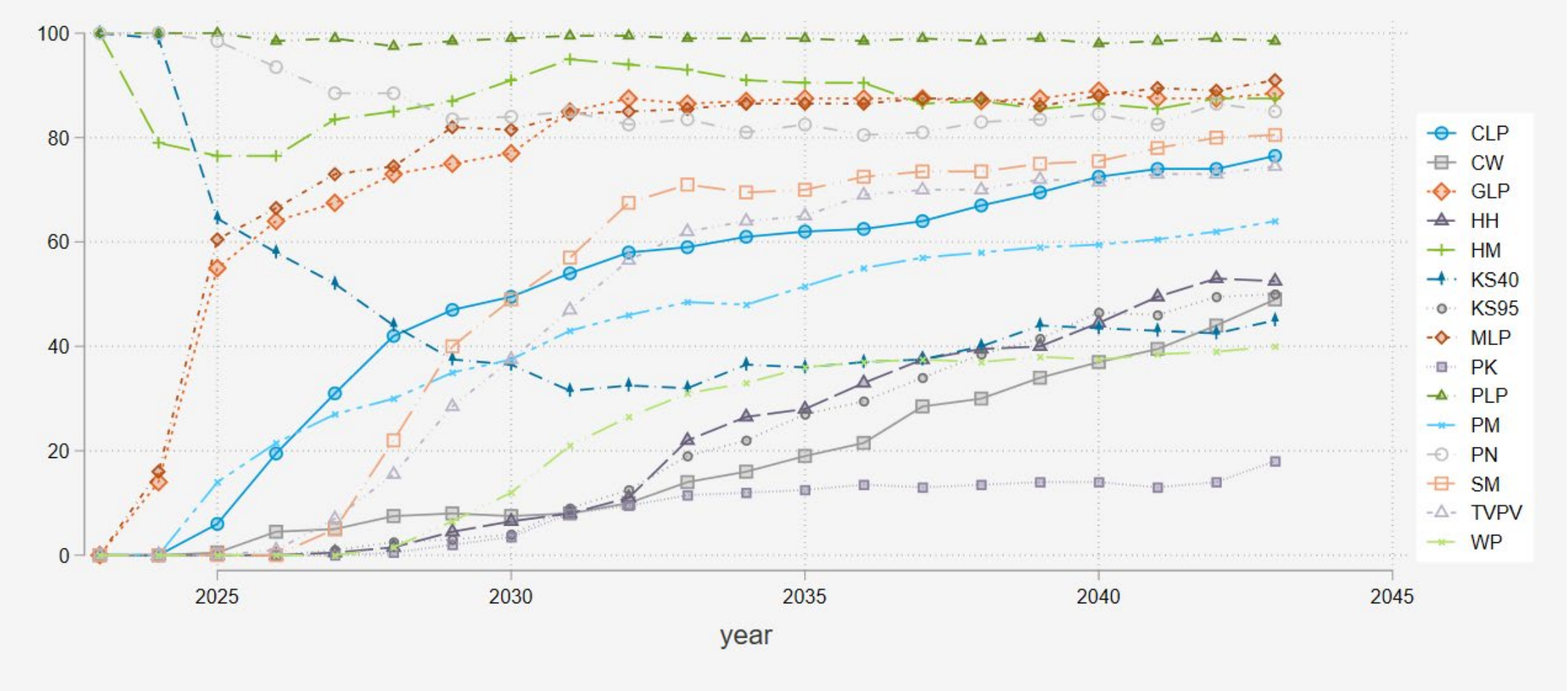
Besides the forecast, a key output was the likelihood of upgrades, absent additional interventions



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Demand Side Programs

Cory Scofield
Director, Demand Side Management

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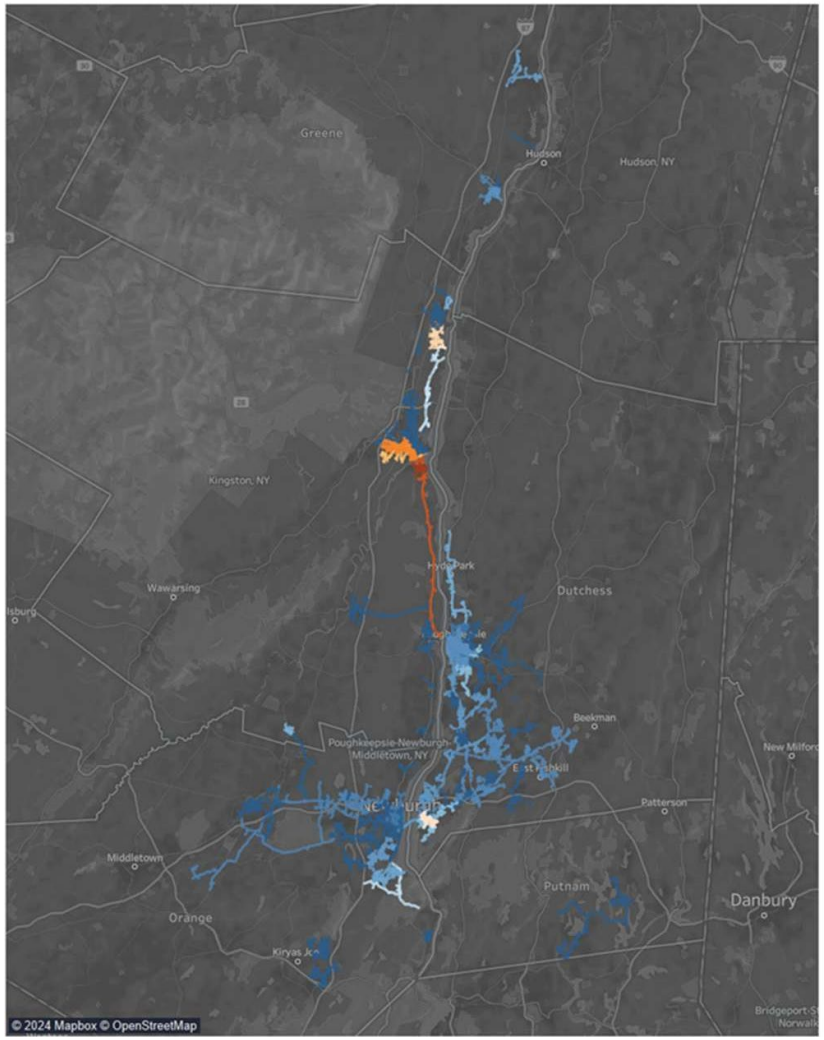
Demand-Side Programs

- **Energy Efficiency:**
  - Budget and Targets authorized through 2025 via the 2020 New Efficiency New York (NE:NY) Order
  - Total Market Rate Budget Approximately $6.4M for 2021-2025
  - Cumulative saving target: 322k MMBtu
  - November 1, 2023: The Company filed its EE & BE Portfolio Proposal for 2026-2030

- **Non-Pipeline Alternatives (NPAs):**
  - The Company continues to leverage opportunities to implement Energy Efficiency programs in a way that is complementary to other energy transition initiatives, including the New York Renewing the Energy Vision (REV) initiative. For example, additional incentives are being offered within NPAs to facilitate home electrification and the strategic retirement of leak-prone pipes.

- **Clean Heat :**
  - Authorized by the 2020 NE: NY Order for the period 2020-2025.
  - $43.2M budget to achieve 255,292 Gross MMBtu of savings
  - June 2023 Order Approving Funding for Clean Heat Program: $25.2M
  - Central Hudson proposes to allocate over 50 percent of its electric energy efficiency portfolio 2026-2030 budget (~$62.5M) (incentives and administration) to Clean Heat.
  - ~16%of full-load Clean Heat projects attributed to natural gas customers

Geographic Location of Heat Pump Adoption (As of 2023)

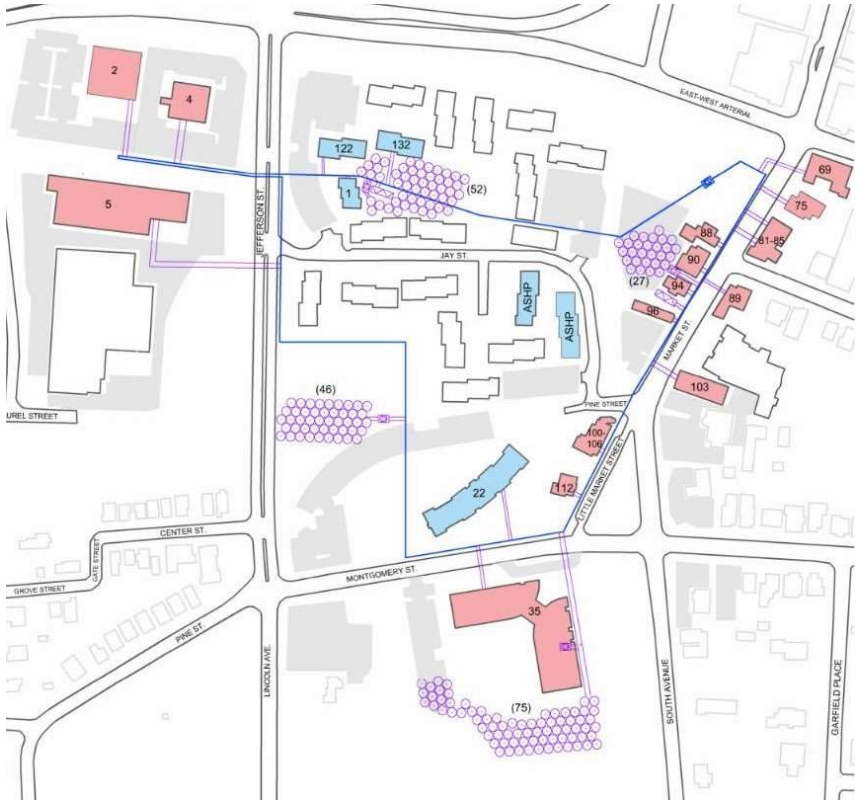


Demand-Side Programs

- **Non-Pipe Alternatives:**
  - The Company is pursuing two categories of NPA projects, both of which employ non-traditional solutions to avoid traditional infrastructure construction: Transportation Mode Alternatives (TMA) and Load Growth-Based Projects.
  - **TMA**; designed for strategic abandonment of leak prone pipe through electrification where it is more cost effective than replacement and system reliability is not negatively impacted.
  - **Load Growth-Based** - designed to manage locational constraints that are associated with peak demand.

- **Utility Thermal Energy Networks (UTEN):**
  - The Company conducted a Service-Territory-Wide District Geothermal Potential Study
  - June 2023 Study concluded indicated 13 potential sites
  - Top opportunity: Central Hudson's designated UTEN site is the Project Youth Opportunity Union (YOU) and an adjoining neighborhood in Poughkeepsie, NY. The site features 17 non-residential and 38 residential buildings in a densely populated area, which provide great diversification of thermal loading and value, and is located in a DAC.

Project YOU Proposed Thermal Energy Network Pilot



Supply Planning

Jeffrey May
Manager, Energy Resources

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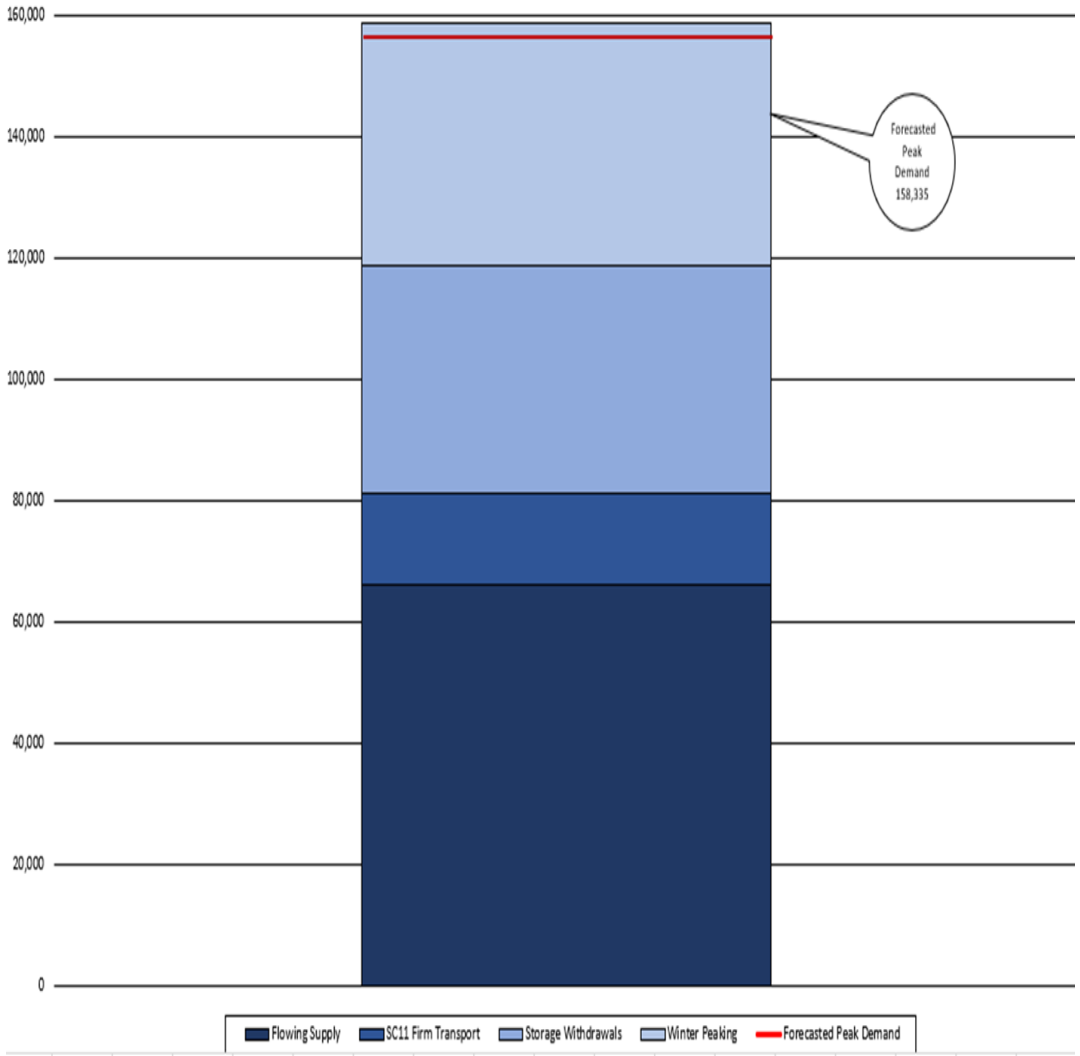
Natural Gas Supply

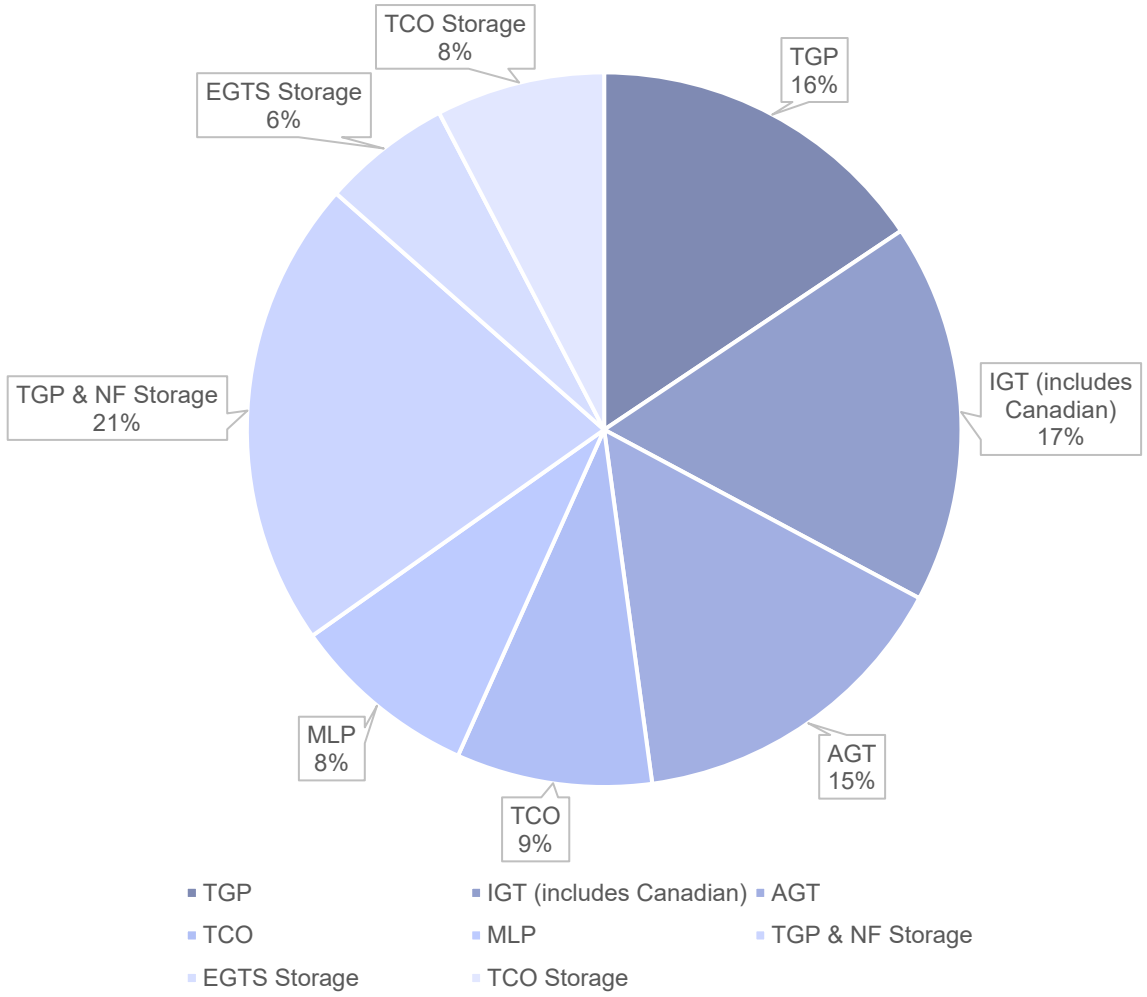
- Gas Supply Planning
  - Winter Supply Review and 5-year look-ahead
  - Annual Hedge Plan Review

- Gas Supply Strategies
  - A system load duration curve is constructed
  - The winter season monthly gas requirements are determined
  - Competitive RFPs are used to procure the necessary supplies for the season
  - Short-Term operating forecasts determine day-ahead gas supply requirements

- De-contracting Approach
  - Reduce supply portfolio assets to match changing customer usage patterns
  - No opportunities for the five year horizon

Design Day Supply Stack, Firm Transportation/Storage Capacity





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Supply Planning – Low-Carbon Fuels

- RNG
  - Central Hudson completed an RNG Potential Study.
  - Study is included in the appendix of GSLTP.
  - The study estimated RNG potential in the CH territory by County.
  - It included the greenhouse gas (GHG) emissions reduction.
  - Assumptions from the study were built into the GSLTP modeling.
- Hydrogen
  - Central Hudson has completed a Hydrogen Blending Study in 2024.
  - Study is included in the appendix of the GSLTP.
  - The analysis found that 72% of the systems that were studied can run hydrogen today with blends up to 20% hydrogen without any need for modification.

LTP Modeling Methodology, Scenarios, Results

Josh Bode
Demand Side Analytics

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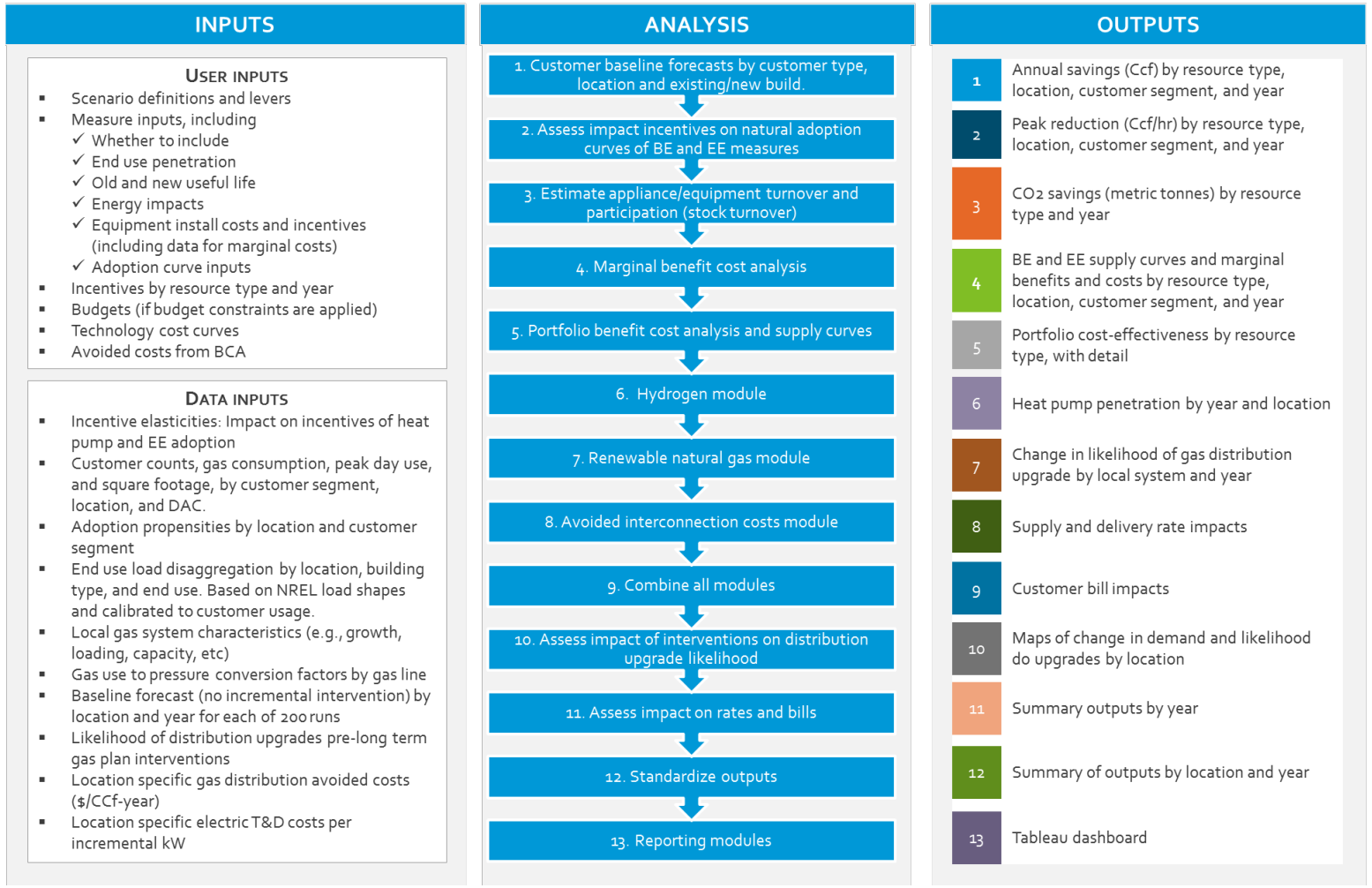
Model Overview



- Dynamic bottom-up model
- Highly granular - 42 local gas systems, 18 customer segments, 40 beneficial electrification and energy efficiency measures, and 20 years.
- Identifies the regions that may benefit from targeted efforts at demand mitigation
- Includes detailed analysis of the impacts of incentives of adoption
- All of the analyses in this GSLTP reflect data and assumptions regarding what is feasible considering existing technology

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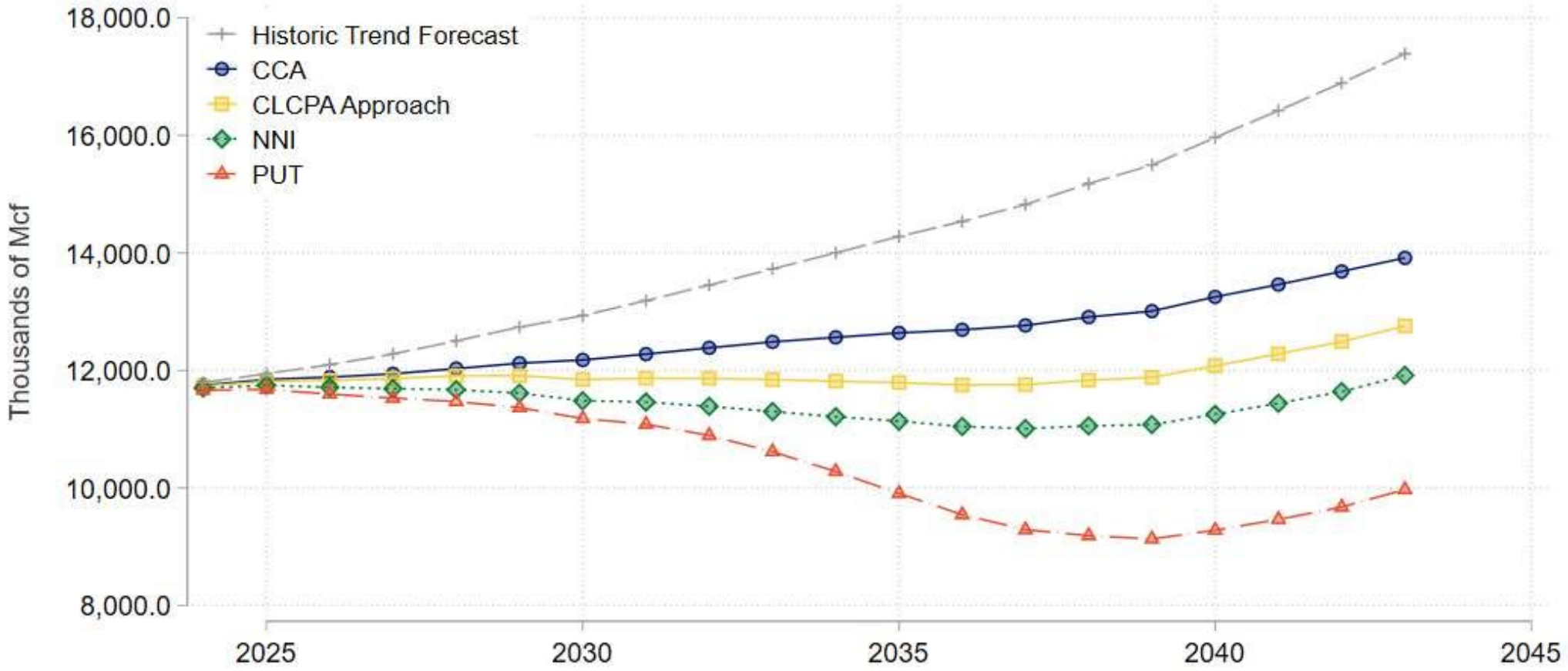
	Current Clean Agenda	CLCPA Approach	No New Infrastructure	Pipe Use Transformation
Brief Description	The current legal and policy framework and funding that applies today	Broad, economy wide efforts at decarbonization	Prevent growth-related gas infrastructure investments via targeted efforts	NNI + focused transition of Central Hudson's gas supply resources to low (or no) carbon fuels
Targeted incentives?	No	No	Yes, up to 5x current incentives	Yes, up to 5x current incentives
Incentive levels	Current incentive levels	Up to 2X current incentives	Up to 3X current incentives	Up to 3X current incentives
Budget cap	Approved budgets for 2024-2026	No cap, EE and BE selected as long DSM portfolio cost-effective	No cap, EE and BE selected as long DSM portfolio cost-effective	No cap, EE and BE selected as long DSM portfolio cost-effective
New gas connections	No new residential or commercial connections by 2040	No new residential and commercial connections by 2040	No new residential and commercial connections by 2030	No new residential and commercial connections by 2030
Hydrogen	Not included	5% of volume by 2040	20% of volume by 2040	20% of volume by 2040
Renewable Natural Gas	25% of identified potential	25% of identified potential	25% of identified potential	75% of identified potential

Under any scenario Central Hudson will continue to make the investments necessary to ensure that safe and reliable gas distribution service remains available to customers that continue to rely on the system.

Net Sales



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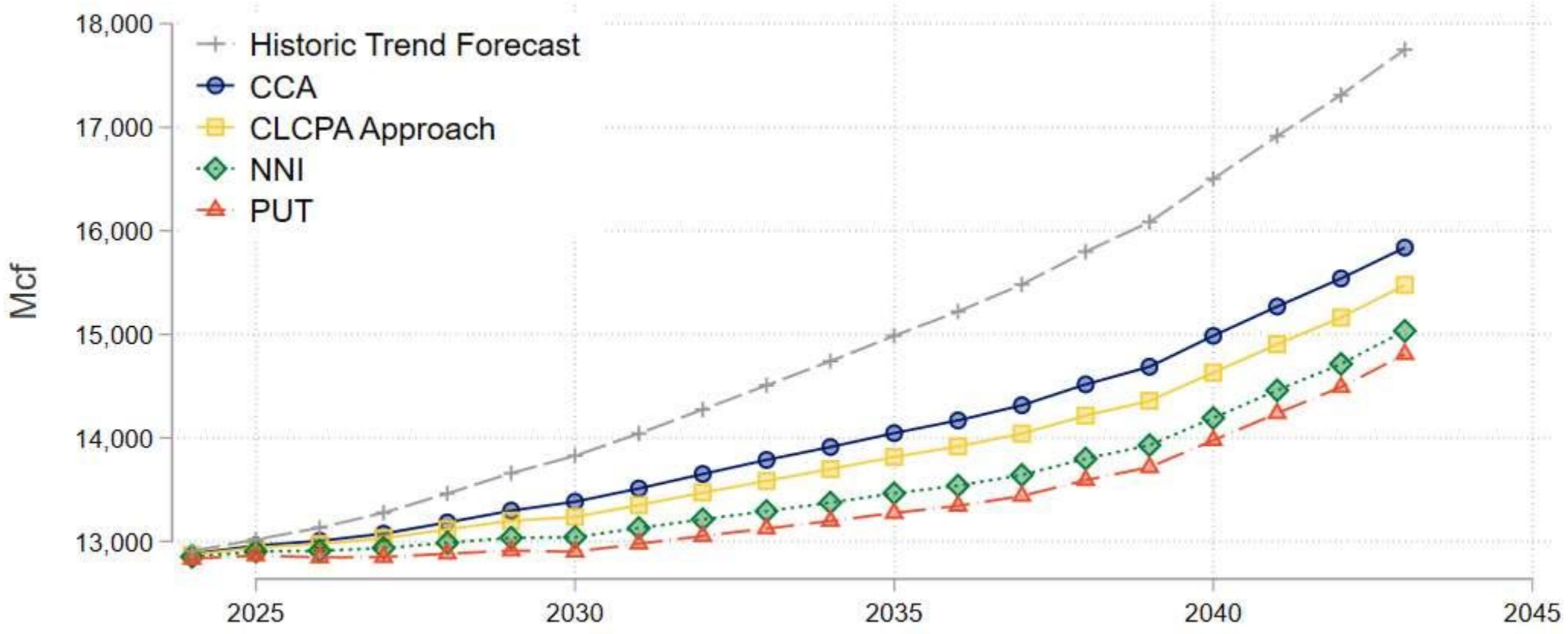
Peak Demand



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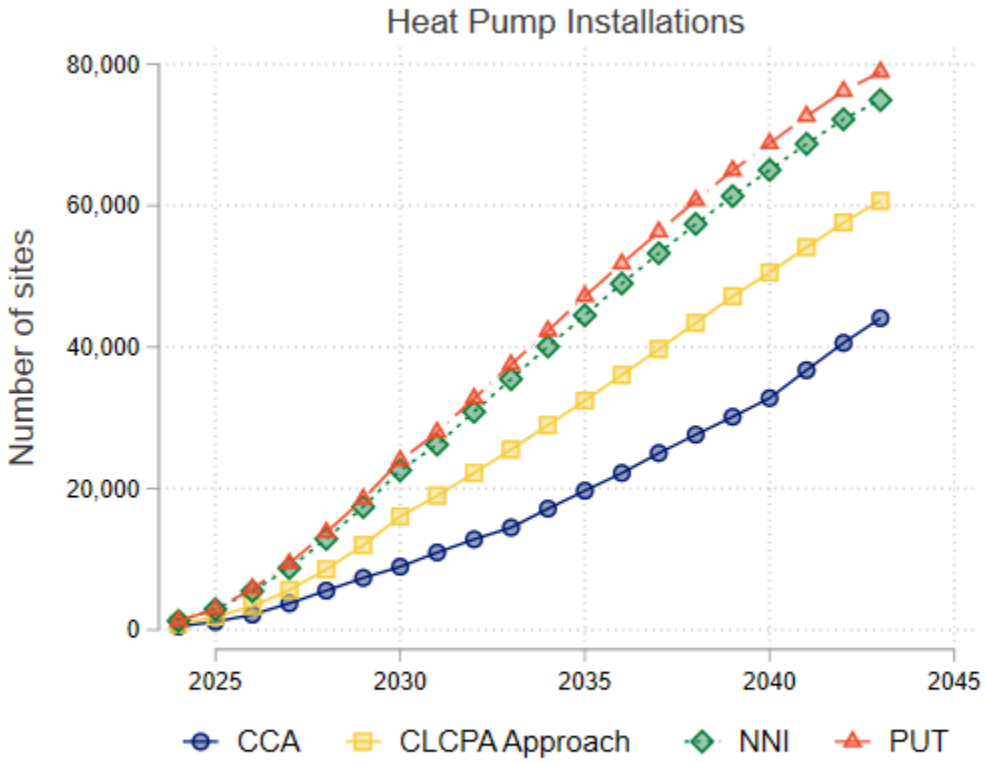
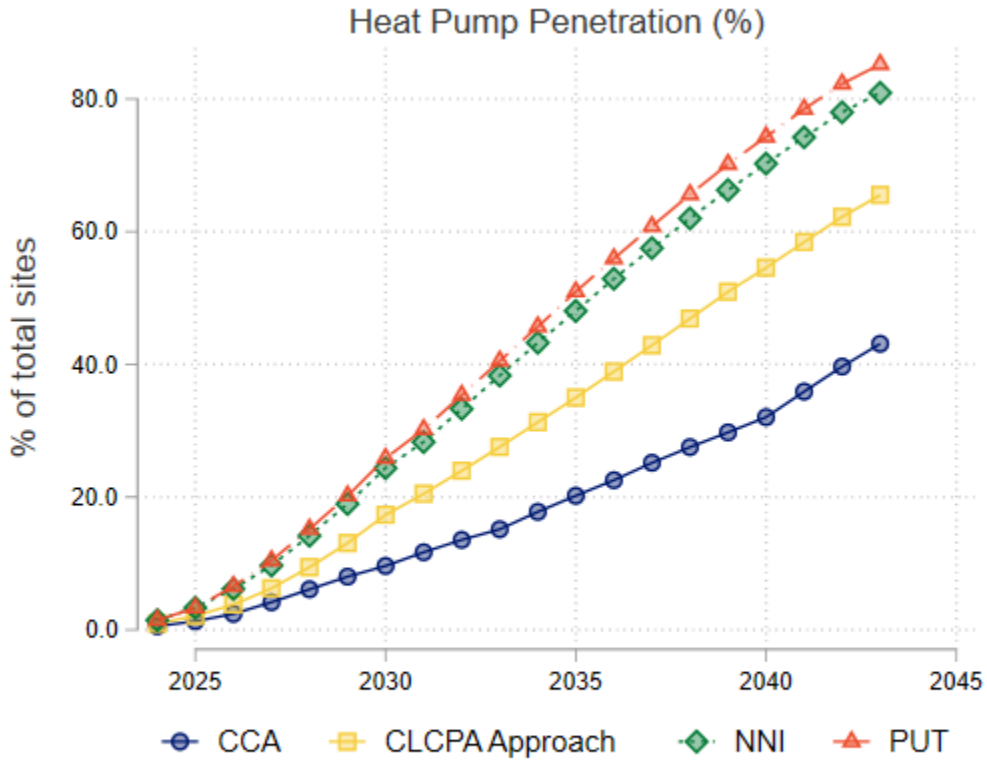
Heat Pump Penetration





Some Multi-family is commercially owned and can have multiple dwellings. Thus, the estimate may undercount dwellings

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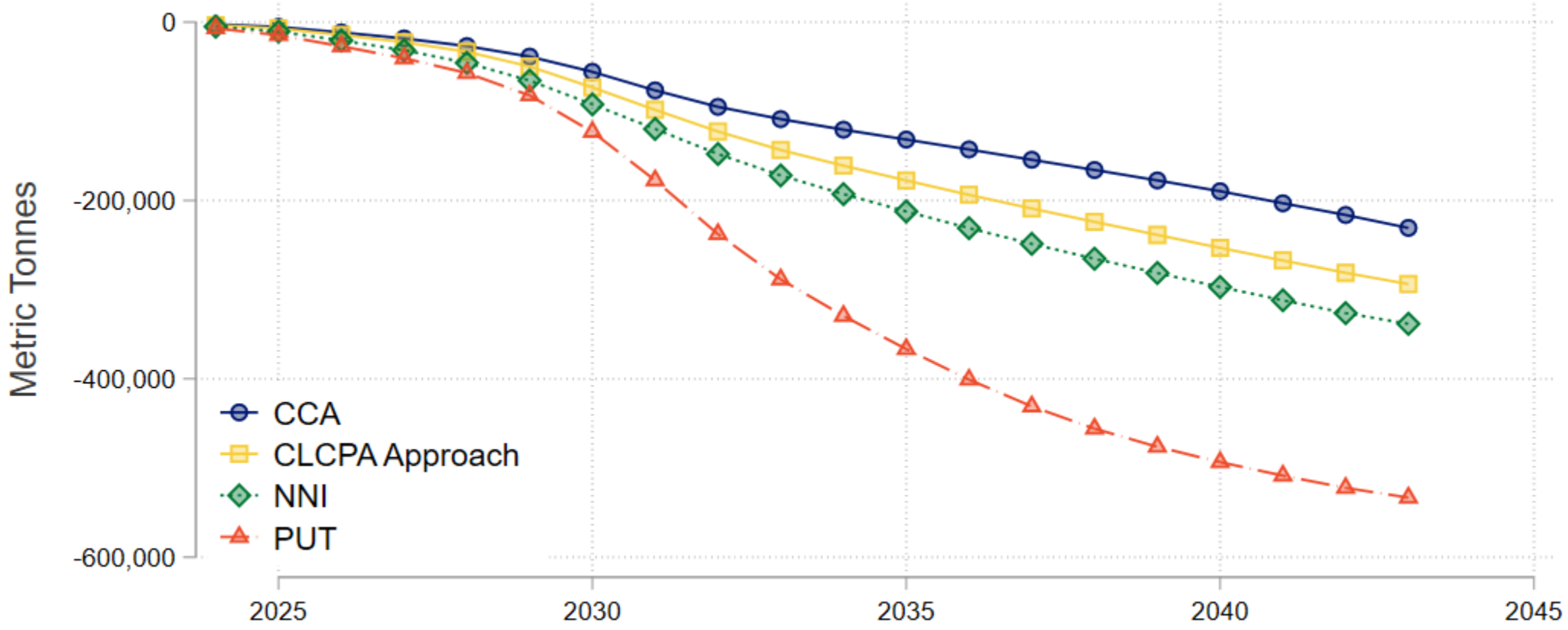
Change in Annual GHG emissions



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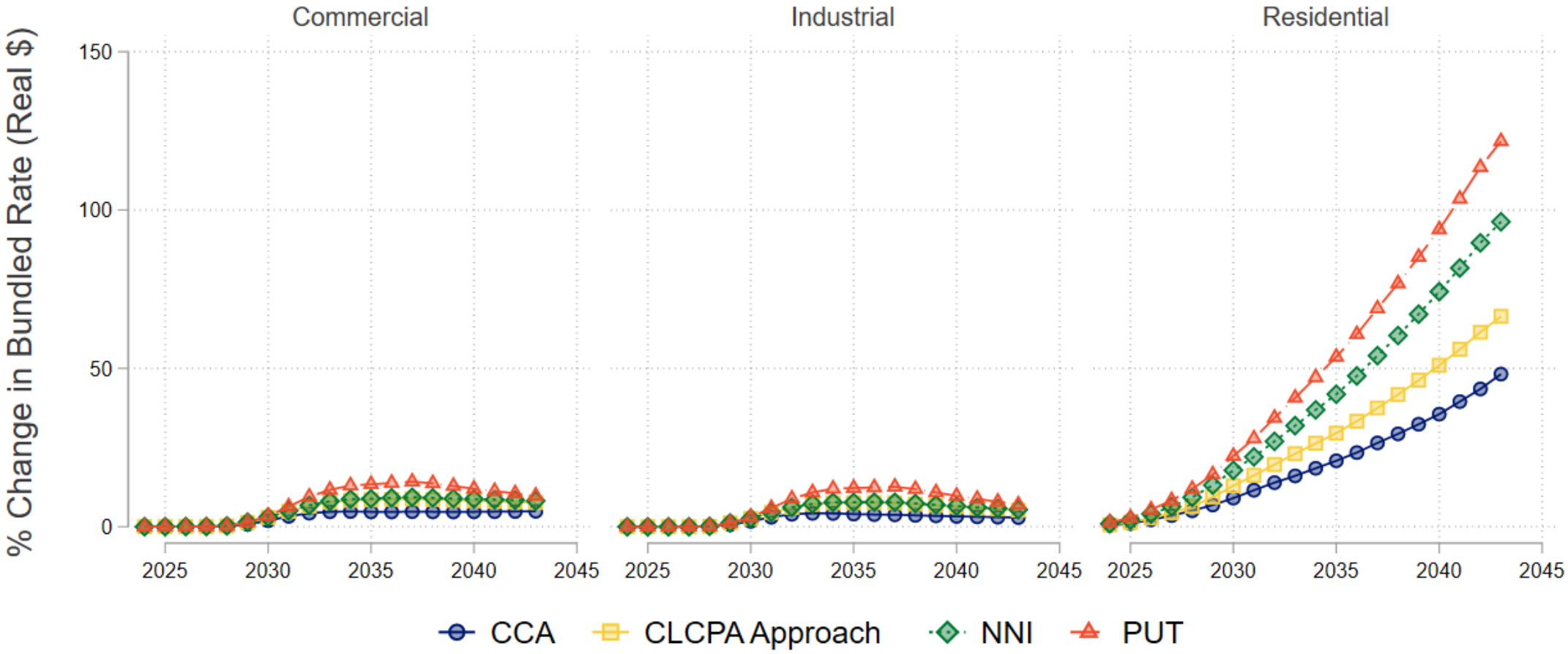
Impact on Gas Rates



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Benefit Cost Analysis (Societal Test)

Negative values = Costs
Positive values = Benefits
$0 values = Transfers

	Category	Metric	Current Clean Agenda	CLCPA Approach	No New Infrastructure	Pipe Use Transformation
Beneficial Electrification	Electric Impacts	Avoided Electric Supply Costs	-$33.9	-$44.9	-$57.4	-$61.7
		Electric Distribution Capacity	-$29.8	-$46.4	-$65.0	-$73.4
		Electric Generation Capacity	-$115.3	-$139.0	-$164.2	-$172.5
		Electric Transmission Capacity	-$15.1	-$23.4	-$32.7	-$36.9
		Utility Revenue Loss Electricity	$0.0	$0.0	$0.0	$0.0
		Electric Poletop Transformer Resizing	-$56.4	-$56.4	-$56.4	-$56.4
		Feeder Circuit Upgrades	-$137.0	-$137.0	-$137.0	-$137.0
	Environmental	Avoided CO2 Value	$50.3	$60.3	$71.7	$74.6
	Gas Impacts	Avoided Gas Distribution Capacity	$202.6	$229.7	$275.4	$280.7
		Avoided Natural Gas Supply Costs	$94.0	$112.4	$133.6	$139.2
		Avoided New Connection Costs	$24.2	$101.4	$101.4	$101.4
		Utility Revenue Loss Natural Gas	$0.0	$0.0	$0.0	$0.0
	Other	Admin Fixed	-$13.2	-$11.8	-$11.8	-$10.2
		Admin Volumetric	-$1.4	-$4.2	-$13.0	-$14.7
		Incentive Payments	$0.0	$0.0	$0.0	$0.0
		Incremental Equipment and Installation Costs	-$141.7	-$199.3	-$257.9	-$277.9
Energy Efficiency	Environmental	Avoided CO2 Value	$33.3	$40.5	$50.9	$60.3
	Gas Impacts	Avoided Gas Distribution Capacity	$74.6	$87.7	$118.7	$135.4
		Avoided Natural Gas Supply Costs	$56.9	$69.5	$86.8	$101.8
		Utility Revenue Loss Natural Gas	$0.0	$0.0	$0.0	$0.0
	Other	Admin Fixed	-$2.6	-$3.9	-$4.0	-$5.6
		Admin Volumetric	-$0.3	-$1.4	-$4.4	-$8.0
		Incentive Payments	$0.0	$0.0	$0.0	$0.0
		Incremental Equipment and Installation Costs	-$20.8	-$60.0	-$78.6	-$88.5
		Participant Bill Savings	$0.0	$0.0	$0.0	$0.0
Hydrogen	Environmental	Avoided CO2 Value	$0.0	$11.1	$10.7	$38.5
	Other Energy Costs	Hydrogen Blending Stations	$0.0	-$3.9	-$3.9	-$11.2
		Hydrogen Fuel Costs	$0.0	-$48.9	-$47.1	-$111.4
Renewable Natural Gas	Environmental	Avoided CO2 Value	$21.5	$21.5	$21.5	$62.0
	Other Energy Costs	RNG Fuel	-$121.9	-$121.9	-$121.9	-$212.4
Societal Cost Test		**Benefits**	**$523.6**	**$813.3**	**$689.3**	**$932.1**
		Costs	**$655.3**	**$997.8**	**$857.3**	**$1216.2**
		Net Benefits	**-$131.7**	**-$184.4**	**-$168.1**	**-$284.0**
		Benefit Cost Ratio	**0.80**	**0.82**	**0.80**	**0.77**

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Modeling Updates

James Keating
Director, Gas Transformation and Planning

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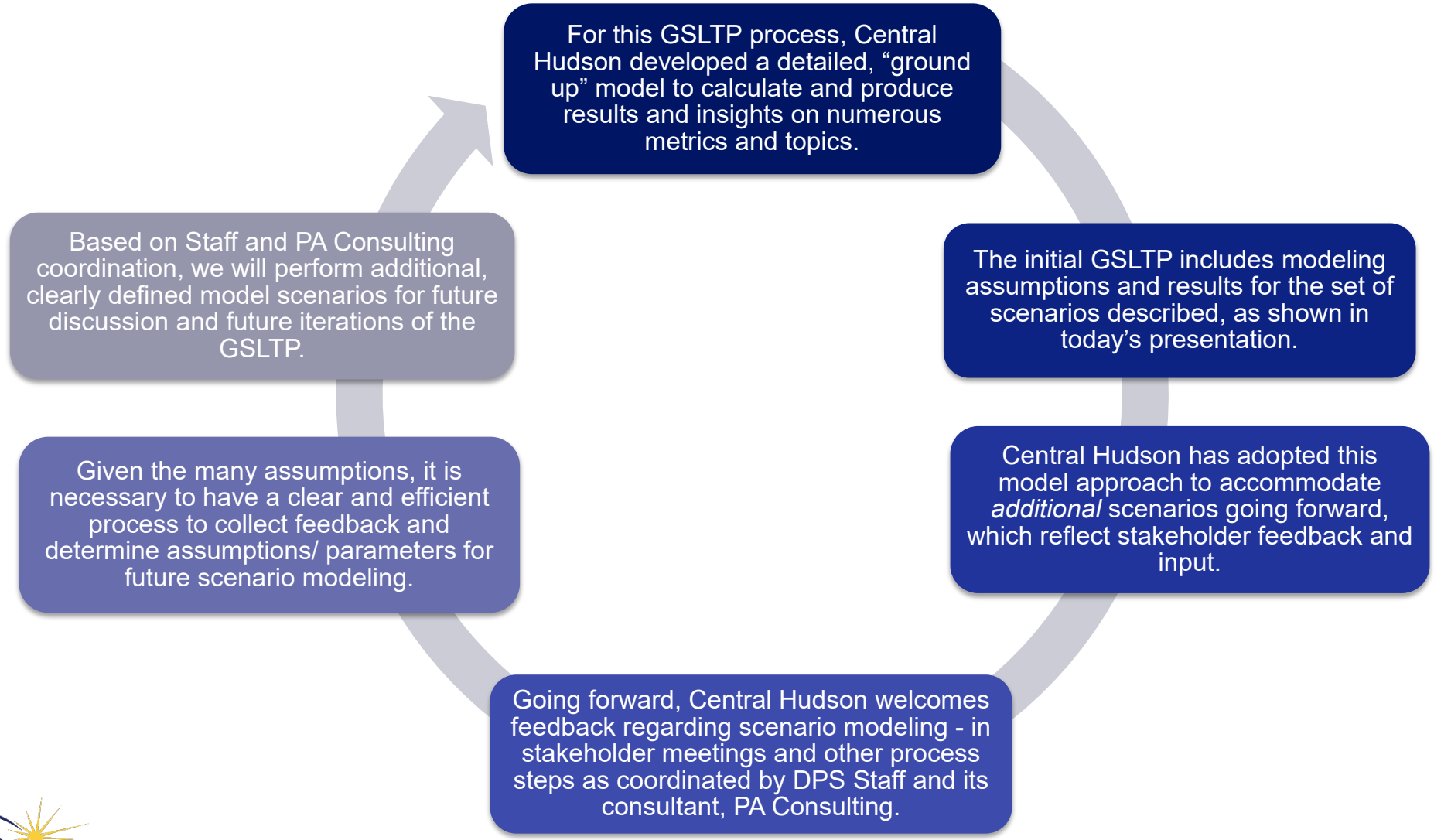
Future Modeling - Feedback & Scenarios



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Questions

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