Versant Power

Integrated Grid Planning (IGP)

Milestone 1.0 Stakeholder Meeting

February 28th, 2025

Agenda

- Introductions
- Overview of Versant Power
- Integrated Grid Planning Background
- Inputs to the Models
- Next Steps

Introductions

Eric Feigenbaum, Director of Public Affairs

Judy Long, Senior Manager, Communications

Tyler Stanley, Program Manager, T&D System Planning

Kyle Ravin, Director of Engineering, Asset Management, & AMI

Safety message: Ice safety

- Before venturing out on the ice, check the thickness of the ice. It doesn't take long to chop a hole in the ice with an ax or chisel. Chop until you can see at least 6 inches of good ice.
- When riding on large interconnected lakes, avoid thoroughfares, inlets, outlets, pressure ridges and spring holds — basically anywhere there is moving water.
- Bring basic safety equipment on your winter excursions on frozen lakes. An emergency kit could include a throw bag for pulling someone else out of the water, the "picks of life" for pulling yourself out of the water (ice picks with a retractable cover over the sharp end or good-sized spikes suffice), matches, a compass, and a first aid kit.
- Make sure to tell someone where you are going and what time you expect to return.

— Matthew LaRoche, Retired Superintendent, Allagash Wilderness Waterway

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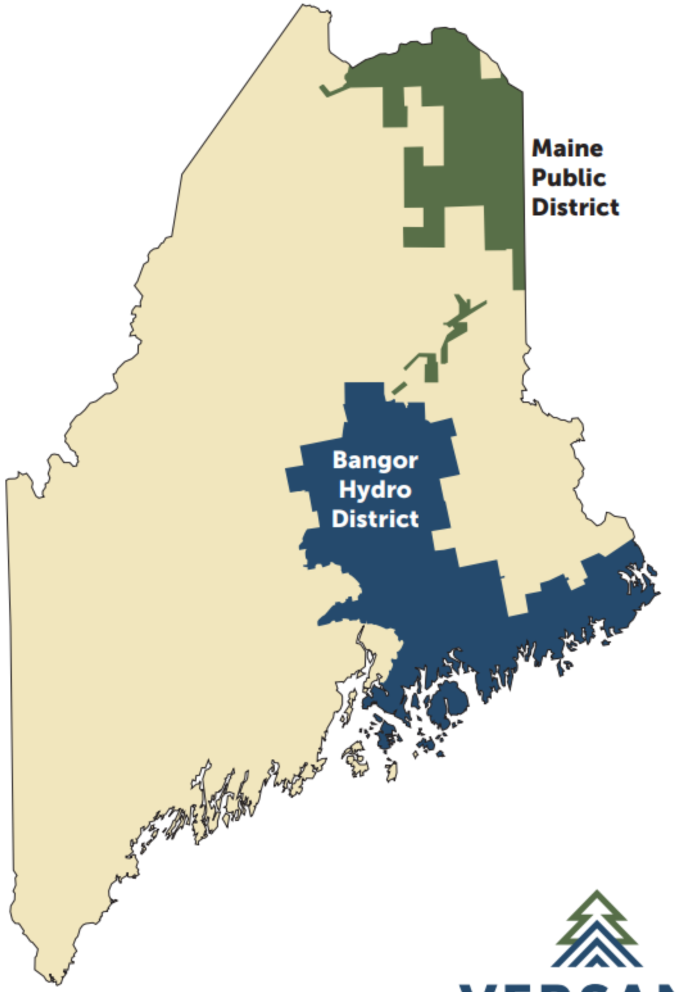
Overview of Versant Power

- Service territory covers 10,400 square miles in northern and eastern Maine
- Service territory is geographically diverse and mostly rural
- Maine is the most forested state in the nation (90%)
- 165,000 customers
- 56% are in small Disadvantaged Communities
- 375 transmission and distribution circuits
- 1,400 transmission and distribution protection and switching devices

Service Territory



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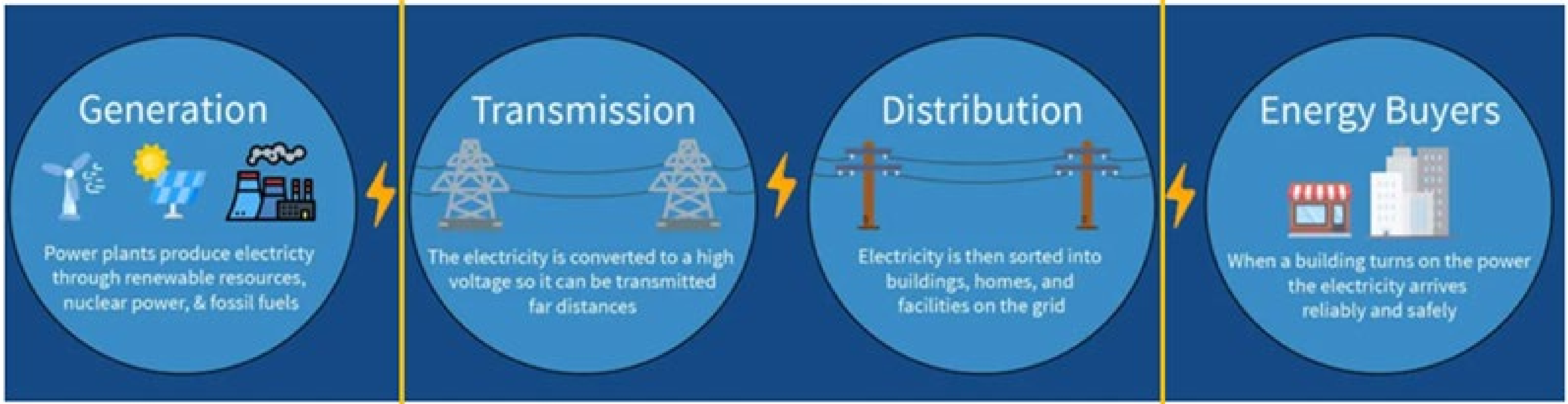
Versant Power: Transmission & Distribution Utility

Transmission System Planning: ISO-NE (CELT) and Utilities



Distribution System Planning: Versant IGP

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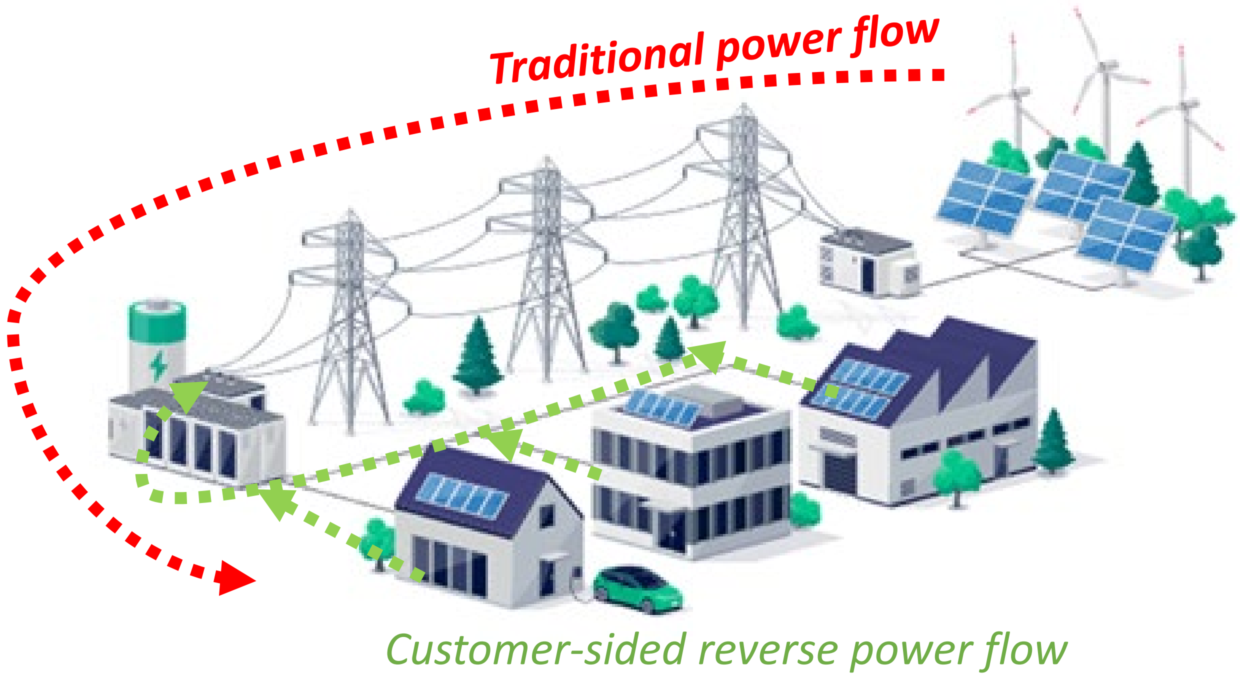
Versant Power: Managing a changing grid

- As a regulated T&D electric utility we must deliver safe, reliable, and quality electricity to the customers we serve.
- Traditional power flow starts from a central power plant and moves downstream towards the end-use customer
- Emerging technology (solar, electric vehicles, etc.) are being installed at the end-use customer which causes two-way power flow, which requires accommodations.



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Versant Power: Recent Trends & Emerging Technologies

Solar

- Significant increase in distribution solar since 2019 through net energy billing expansion
- State goal of 80% renewable energy by 2030 and 100% by 2040

Heating Electrification

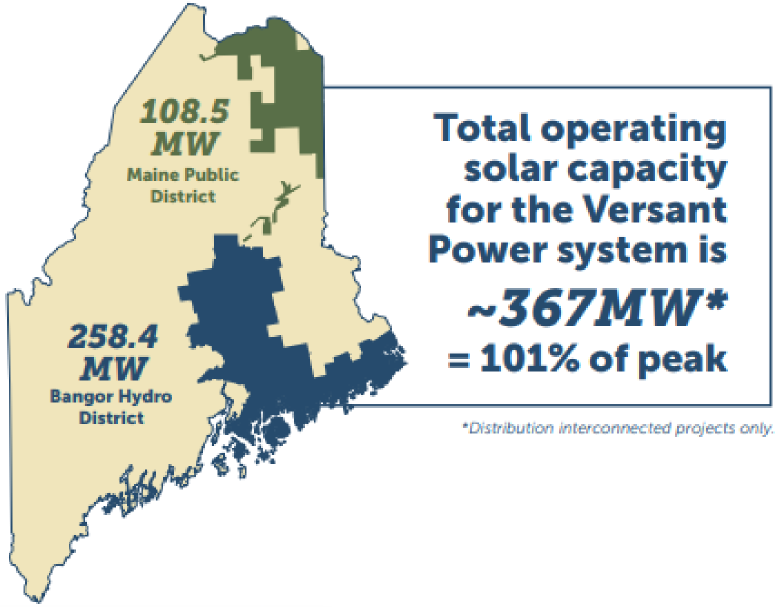
- Heat pumps and heat pump water heaters
- State goal of 100,000 by 2025 was surpassed, goal of additional 175,000 by 2027

Electric Vehicles

- Increased adoption through federal and state incentives
- State goal of 150,000 electric vehicles on the road by 2030

Battery Storage

- Residential and commercial Battery Energy Storage Systems
- State goal of 300MW by 2025 and 400MW by 2030



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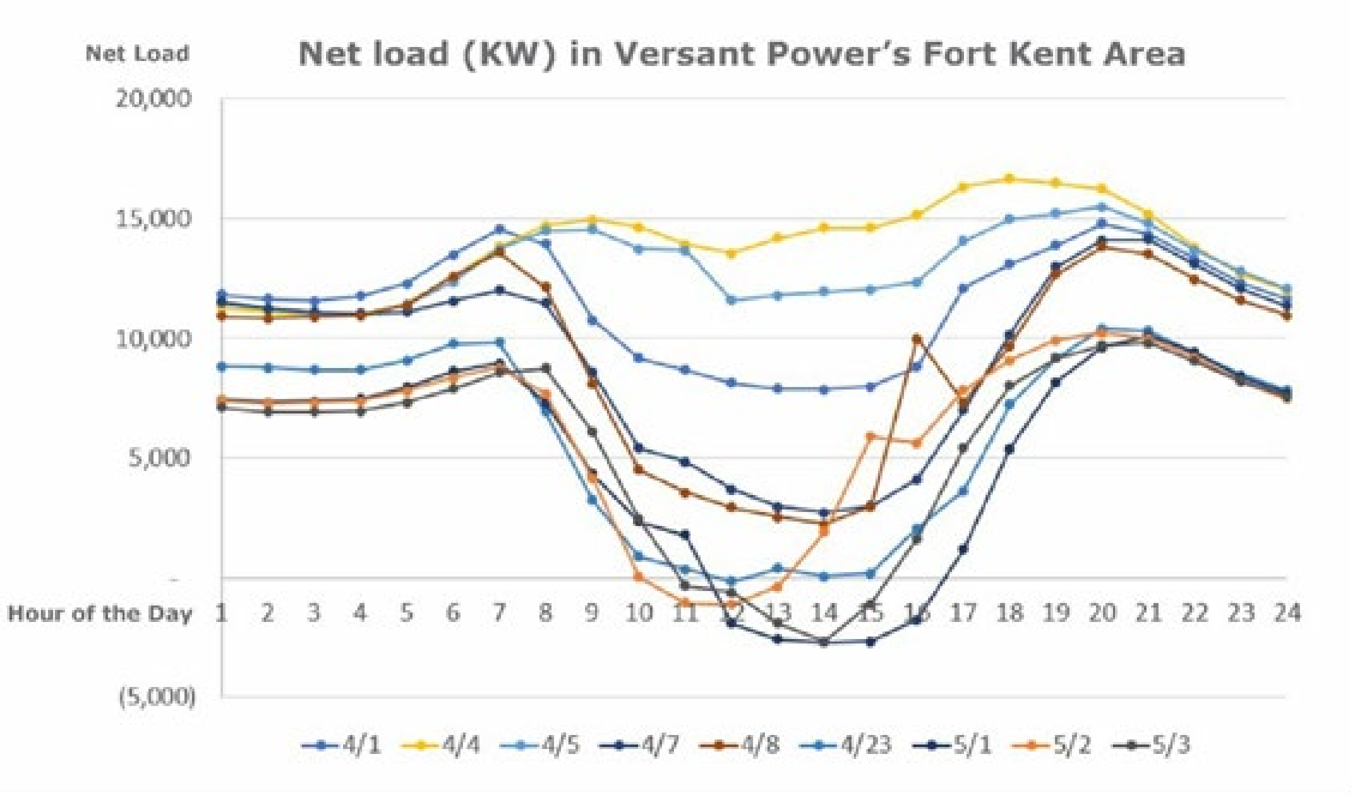

Fort Kent area reaches 100% solar milestone

- From noon to 4 p.m. Wednesday, May 1, Versant Power's service territory in the Fort Kent area was powered entirely by local solar energy. That feat was repeated twice more, on May 2 and May 3.
- The graph shows the total net load in the Fort Kent area in kilowatts. Each line represents one day, with 24 hours shown across the horizontal axis. Negative values indicate that local power needs are met entirely from local solar facilities, with excess energy sent into Canada.

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Versant Power’s Vision

Versant envisions a future electric grid that operates safely and reliably, enables a fully decarbonized energy supply, facilitates the deployment of significant distributed energy resources and beneficial electrification technologies, leverages cost-effective solutions, and does all this while maintaining affordability for our customers.

Our goal for grid planning is to identify opportunities for “no regrets” investments that empower customer choice of modern, low-carbon technologies and are aligned with Maine's state policy goals. We are committed to collaborating with the communities we serve and other stakeholders to ensure Maine's electric grid is resilient, reliable and capable of meeting the challenges of a fully electrified future.

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Integrated grid planning background

- LD 1959 directed Maine's investor-owned utilities to create plans that will assist in the cost-effective transition to a clean, affordable and reliable electric grid
- The Maine Public Utilities Commission opened Docket 2022-00322 in late 2022 to explore options for utilities' plans with a range of stakeholders
- In July 2024, the MPUC issued an order containing requirements: "A 10-year integrated grid plan … designed to improve system reliability and resiliency and enable the cost-effective achievement of greenhouse gas reduction obligations and climate policies"

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Integrated grid plan: What will it include?

Identified priorities

- Utilities must create detailed plans that address reliability and resilience improvements, improve data quality for distribution system planning, and promote flexible management of customer resources including renewable energy integration, electric vehicle charging, and heating electrification, all while maintaining affordability for customers.

Climate alignment

- These plans must support Maine's ambitious climate goals, including substantial reductions in greenhouse gas emissions.

Public engagement

- Utilities are required to actively engage with stakeholders, fostering open dialogue and transparency throughout the planning process.

Grid modernization

- The plans should outline necessary upgrades and investments to ensure a resilient and efficient grid capable of meeting future energy demands.

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Integrated grid planning: What are the priorities?

Keeping costs affordable and facilitating the achievement of the State's climate action and greenhouse gas (GHG) emission reduction policies are overarching principles that apply to all of the priorities.

Reliability and resilience improvements

- Cost-effectively maintain or improve reliability
- Reduce barriers to promote cost-effective nonwires alternatives (NWA) solutions
- Build in climate adaptation

Improve data quality and integrity for use in distribution system planning

- Leverage Advanced Metering Infrastructure investments
- Improve mapping for the distribution system and hosting capacity
- Develop time-series planning
- Enhance hosting capacity maps by standardizing them across utilities.

Promote flexible management of consumers' resources and energy consumption

- Improve forecasting for Electric Vehicle (EV) charging, distributed energy resources (DERs), and climate parameters
- Support DER integration for load flexibility and resilience
- Reduce system peak demand

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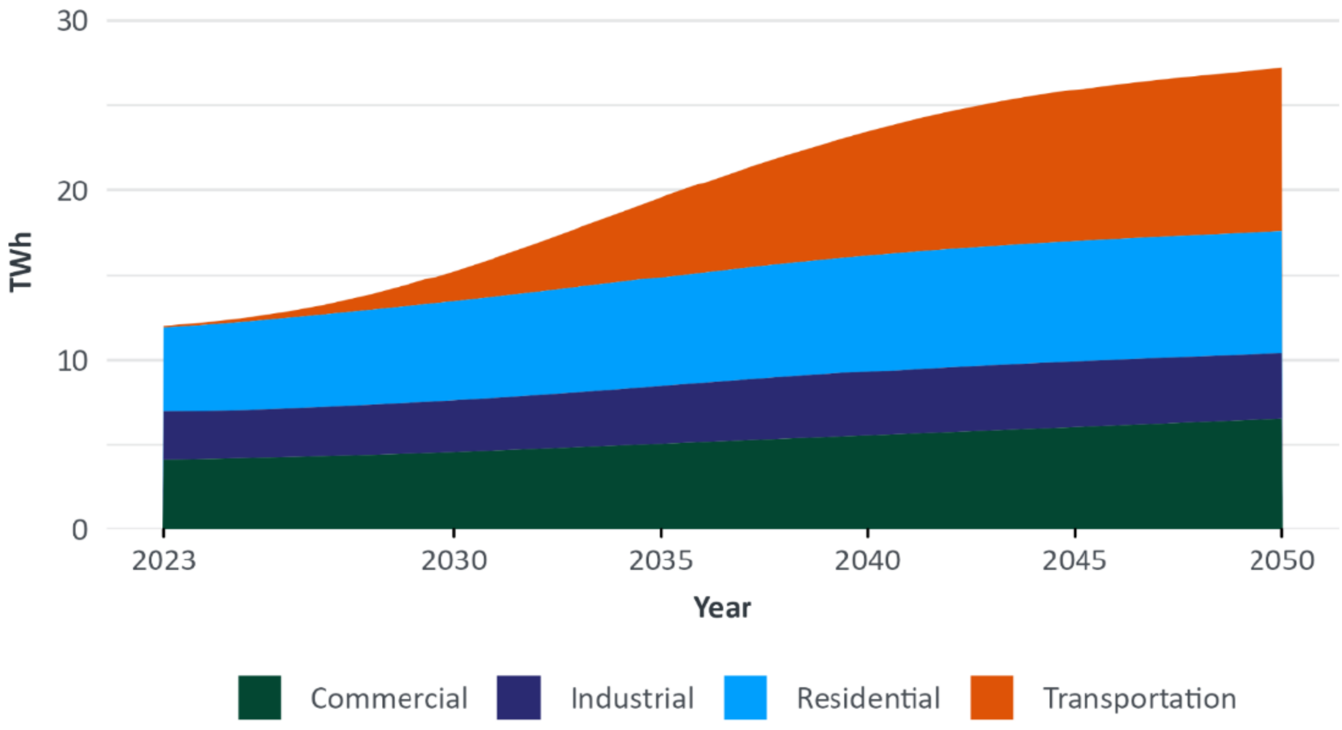
Integrated Grid Plan: Align with Maine Energy Goals

- By 2050, about 60% of Maine's electricity demand growth is expected to come from transportation electrification, as the state shifts from fossil fuel-powered vehicles to EVs.

FIGURE ES-1: ELECTRICITY CONSUMPTION IN MAINE BY SECTOR, CORE PATHWAY



Source: Maine Governor's Energy Office (2024). Maine Pathways to 2040: Analysis and Insights

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Integrated Grid Plan: Align with Climate Resilience Plan

- Versant Power has conducted a climate change resilience plan and climate vulnerability study
- Identified risks and specific actions for addressing expected effects of climate change on the assets needed to transmit and distribute electricity to our customers.
- These action items will be considered within our Integrated Grid Plan via the solutions identification process.

Identified Hazards

1. Extreme Heat
2. Heavy Precipitation and Inland Flooding
3. Coastal Flooding and Sea Level Rise
4. Wildfire and Drought
5. Winter Weather
6. High Winds

Integrated Grid Planning: Public Engagement

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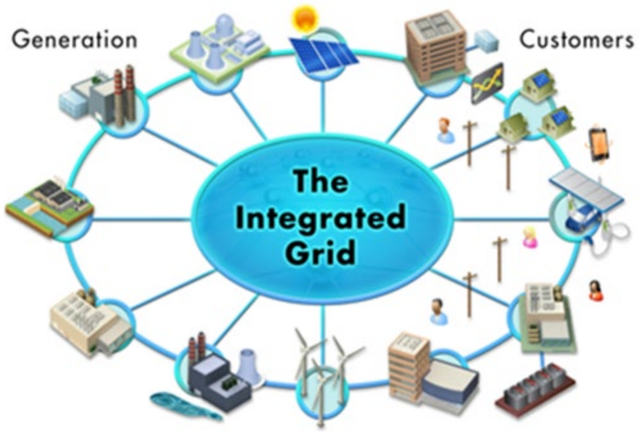
Integrated Grid Planning: Grid Modernization

- *"This is a pivotal time for Maine's electric distribution grid, which requires substantial investment to continue to serve customers safely and reliably, particularly in light of Maine's beneficial electrification goals."* MPUC IGP Order Docket 2022-00322
- The commission recognizes the changes that may be necessary to support the energy transition to achievement the state goals.

- Versant's Integrated Grid Plan will identify both near-term and long-term grid needs.
- Focus will be to identify the no-regrets solutions to meet the changing needs of customers and the grid, while also prioritizing reliability and affordability.



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Integrated Grid Planning vs Traditional Planning

Category	Traditional Planning	Integrated Grid Planning
Scope & Focus	Traditional T&D Load Growth, Reliability, Grid capacity	System-wide planning integrating EVs, DERs, resilience, and decarbonization. Identify opportunities for ‘no regrets’ investments
Stakeholder Involvement	Primarily utility facilitated	Enhanced collaboration with many stakeholders
Forecasting Approach	Near term based on Historical System Load Growth Trends	Scenario-based, considering various DER adoption and electrification penetration long term
Solution Integration	Focus on capacity and reliability upgrades to customer serve load	Enhanced solution matrix and multi-variable solution assessment considering emerging technologies

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Prior Forecasting Stakeholder Meeting

- Versant Power's IGP Milestone 0.5 Meeting was held on November 14, 2024

Topics Discussed:

- Versant's IGP initial forecasting approach: top-down and bottom-up
- Data sources for key variables
- MPUC IGP order forecasting requirements
- ISO-NE 2024 CELT forecast data review
- Feedback and collaboration with stakeholders

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Modeling Overview

What is a Planning Model?

- A planning model estimates the effects from future electricity demand and analyzes the system to develop cost-effective plans for upgrades and maintenance, ensuring reliable power delivery.
- Building an accurate and well-calibrated model is crucial for making informed planning decisions

Key Inputs to Planning Models:

Load & generation inputs

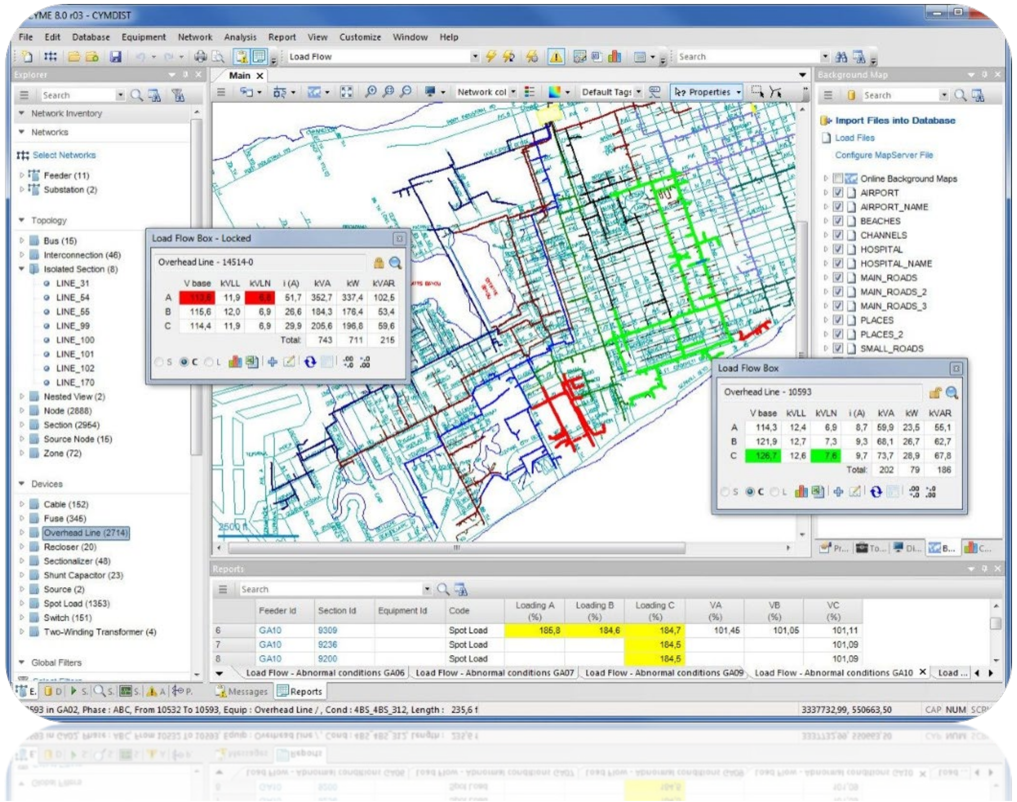
- Derived from historical and projected load data
- Includes Electric Vehicles (EVs), Distributed Energy Resources (DERs), Heat Pumps (HPs), Energy Efficiency (EE) impacts

Infrastructure Data

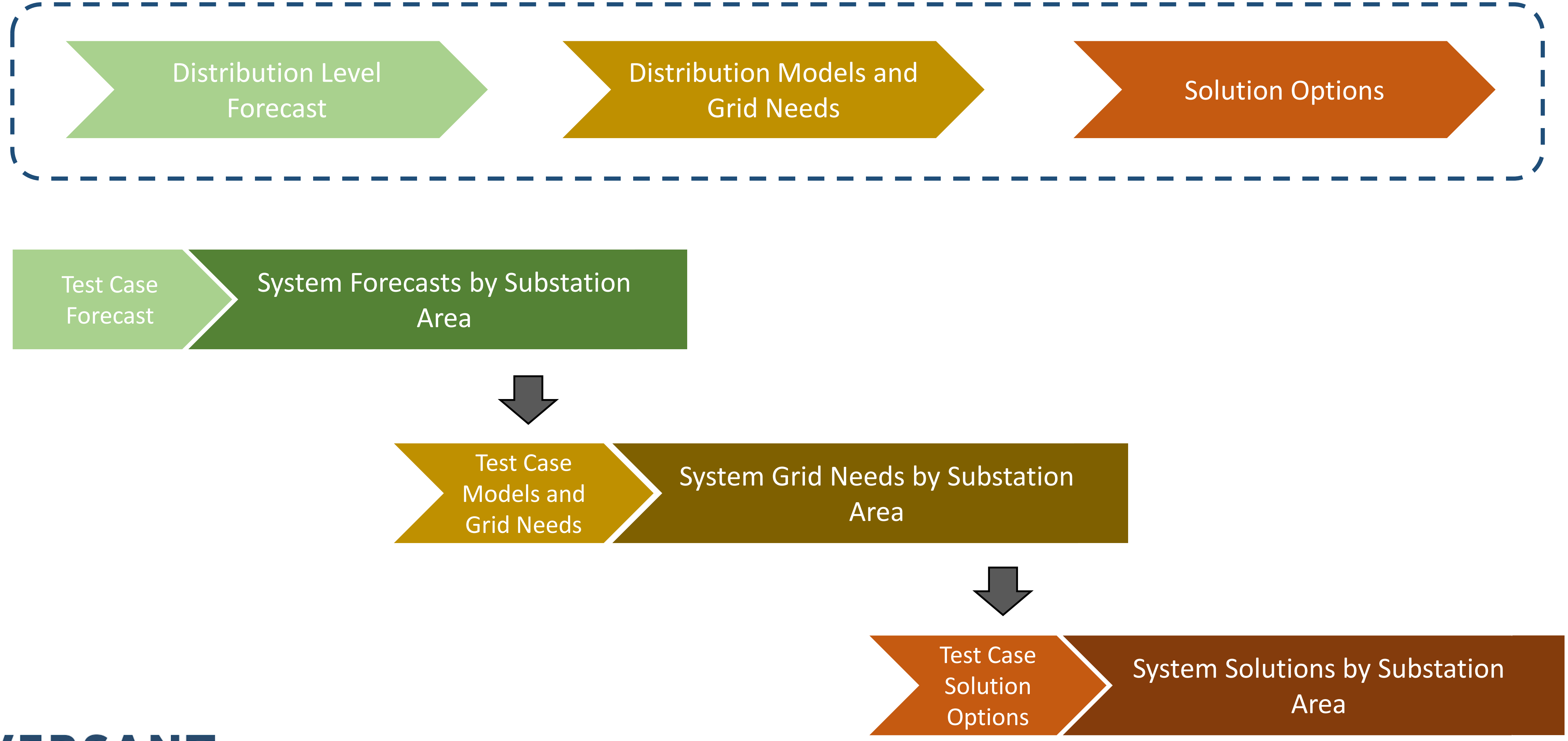
- Network topology and geospatial representation of assets
- Network assets also have density constraints & environmental considerations

Equipment Settings & Ratings

- Transformer and line capacities, voltage levels, and operational limits
- Protection schemes and switching capabilities



IGP Analysis Process



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Data Source for Top-Down Forecast

The Commission's July 12 Order directs utilities to:

*"Because the **CELT** is a transmission level forecast, the utilities preparing their grid plans must develop a method to disaggregate the CELT forecast to the level of the distribution system."*

For **Bangor Hydro District** (BHE), the VP team used the highest resolution forecasts from the 2024 CELT: the Subarea 8760 hourly load forecasts. For **Maine Public District** (MPD), 7-Year Northern Maine Independent System Administrator Outlook and 10-Year New Brunswick (NB) Power IGP report were used. This top-down framework is the same for both regions, with slightly different datasets.

2024 CELT Subarea 8760 Hourly Load Forecasts

hrly_sa_fcst_eei2024_sub_area_raw

File Edit View

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** BHE 2024
0101241 2 177 171 162 161 162 169 177 186 201 212 219 222
0101242 2 228 221 220 225 252 273 269 263 243 229 202 185
0102241 3 173 174 172 170 180 199 238 250 257 255 252 248
0102242 3 245 241 243 246 270 290 282 268 249 236 199 180
0103241 4 170 168 165 166 172 190 228 251 256 250 246 243
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0104242 5 246 246 248 237 253 272 265 253 243 235 207 182
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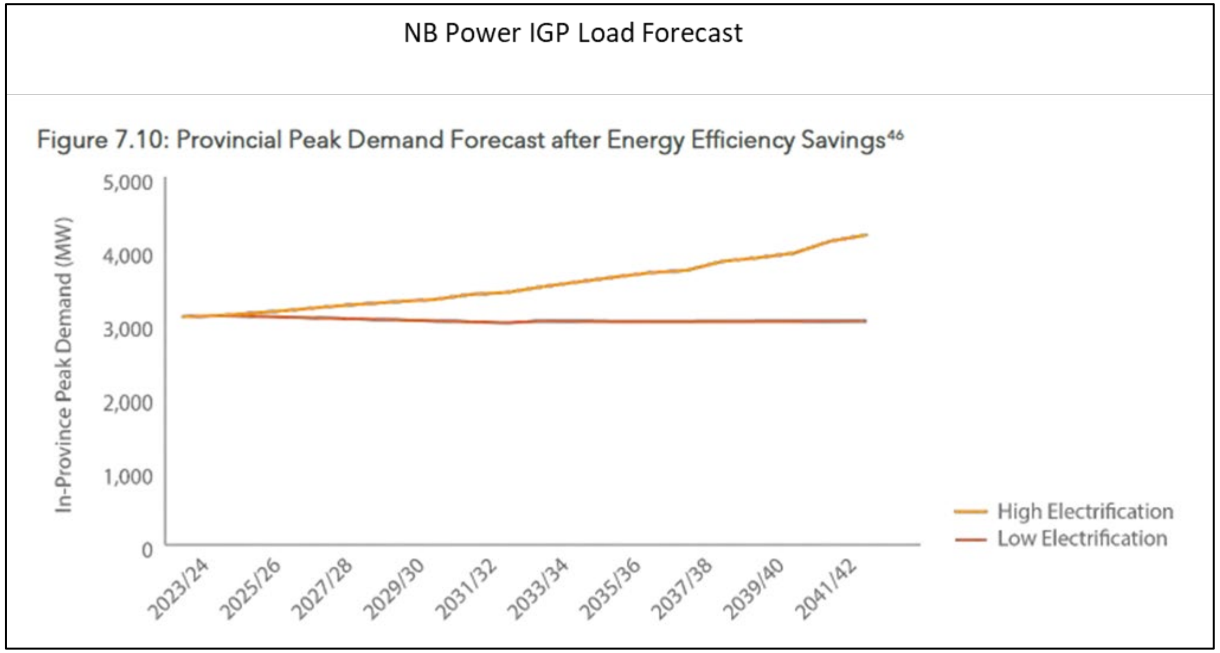
NB Power IGP Load Forecast



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Source: ISONE 2024 Forecast Data File & CELT Reports & NB Power 10-Year IGP

ISO-NE CELT Forecasts

The Commission's IGP Order directs utilities to:
"use two different forecasts, each derived from the most recent CELT (i.e., the 2024 CELT released May 1, 2024), the **50/50 weather year** and the **90/10 weather year** and consider **six different seasonal load snapshots** of each forecast."

Two Forecasts

50/50 Weather Year

- 50/50 weather year reflects average weather projection, meaning there is a 50% chance that peak demand will be above or below the forecast.

90/10 Weather Year

- 90/10 weather year reflects above-average heat and humidity in the summer, and colder-than-average temperatures in the winter—meaning there is a 10% chance that peak demand will be higher than the forecast.

Note: the 50/50 and 90/10 scenarios in ISO-NE's 2024 CELT only change the weather factors. Adoption of technologies (EVs, DER, Heating, etc.) remains unchanged between the two forecasts.

ISO new england

2024 CELT Report

2024–2033 Forecast Report of Capacity, Energy, Loads, and Transmission

© ISO New England Inc.
System Planning

May 1, 2024

Six Seasonal Load Snapshots

- Summer Daytime Peak Load; Summer Evening Peak Load; Winter Evening Peak Load; Daytime Minimum Load; Evening Minimum Load; Spring Minimum Load

Defining the Load Snapshots

Defining the 6 load snapshots required in the order:

- 3 Peak Snapshots: Summer Daytime Peak Load; Summer Evening Peak Load; Winter Evening Peak Load
- 3 Minimum Snapshots: Daytime Minimum Load; Evening Minimum Load; Spring Minimum Load

The Versant team utilized historical data, rate schedules, and local solar irradiance data to define the seasons and time periods in these 6 seasonal load snapshots below.

Season	Winter	Spring	Summer	Fall
Months	DEC-FEB	MAR-APR	MAY-SEPT	OCT-NOV
Daylight Hours	8am-4pm	7am-7pm	6am-8pm	8am-6pm
Evening Hours	4pm-7pm	7pm-10pm	8pm-11pm	6pm-9pm

Load Allocation Process

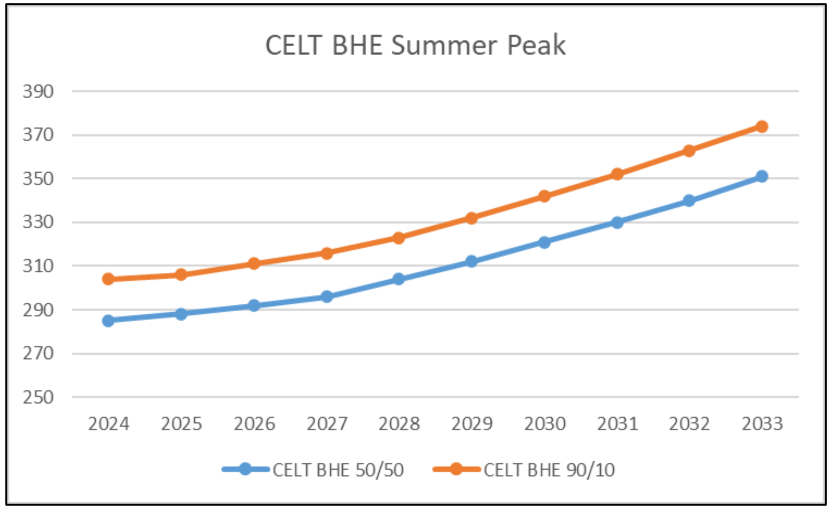
Historical Circuit Data

Identify System Peak/Minimum Hour per Load Snapshot

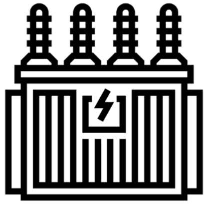
Calculate Contribution Ratio per Circuit for Peak/Minimum Hour

Create Load Allocation Table for each Load Snapshot

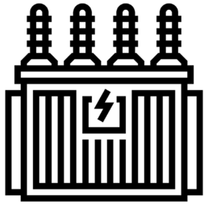
Top/Down BHE Forecasts for 6 Load Snapshots Using 2024 CELT 8760 Load Forecasts and Versant Seasonal Definition



Feeder #1



Feeder #2



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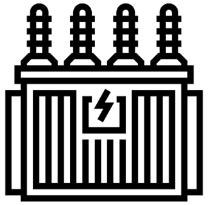
Feeder #84



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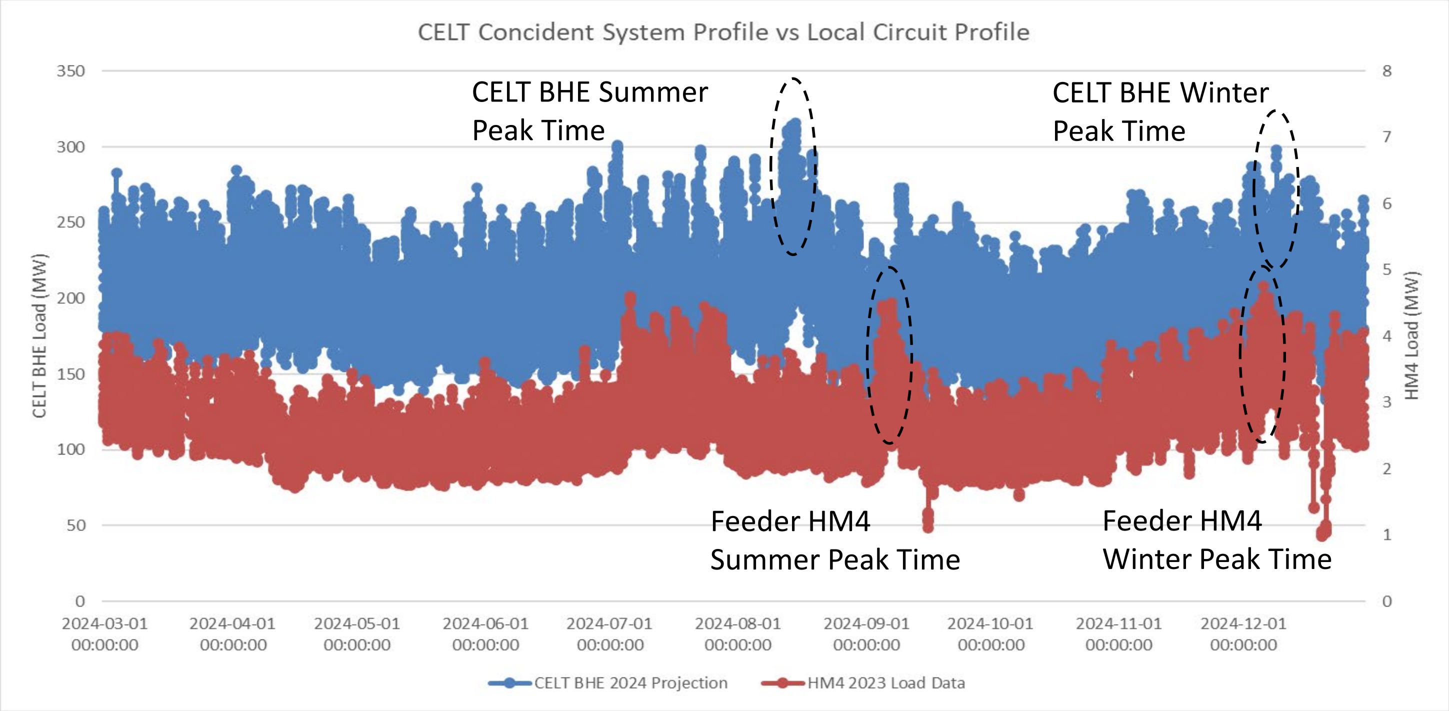
Top-Down Forecast Considerations

After carefully reviewing CELT's assumptions and the top-down load forecasting methodology, Versant identified two important considerations.

1. The ISO- NE CELT forecast represents a regional system coincident peak, whereas localized non-coincident peaks at each distribution substation/circuit vary and are what is typically used for distribution planning.
2. The ISO-NE 2024 CELT report's 50/50 and 90/10 scenarios adjust only for weather factors, keeping adoption rates for all technologies unchanged.

- It is challenging to identify distribution grid needs by using a transmission level forecast.
- The impact of varied transportation, heating, and solar growth rates is not considered in the CELT's forecast.
- As a result of this Versant elected to include a third bottom-up forecast in addition to the two required forecasts.



Observation: The difference between coincident system peaks and noncoincident circuit peaks can lead to under/over allocation of load per feeder under each of the 6 load snapshots.

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Versant's Bottom-Up Forecast

What is a Bottom/Up Forecast?

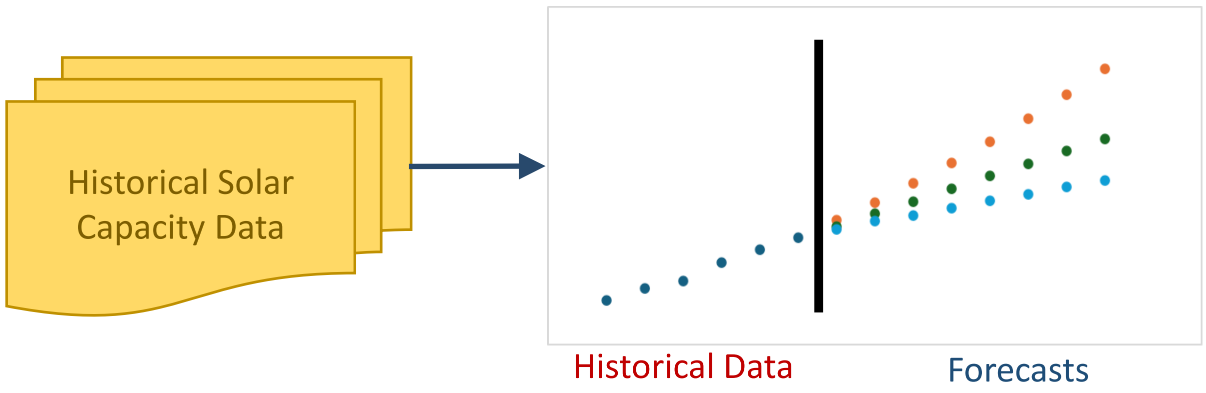
- The bottom-up forecast is a comprehensive approach that focuses on circuit-level data.
- Developing a 10-year forecast for each circuit using localized and historical data including: SCADA data, GIS information, solar interconnection queue, and electric vehicle registration data.
- This approach ensures we are using the most granular data available and accounts for local variables, ensuring we identify distribution circuit level grid needs.

Benefits of Bottom/Up Forecast:

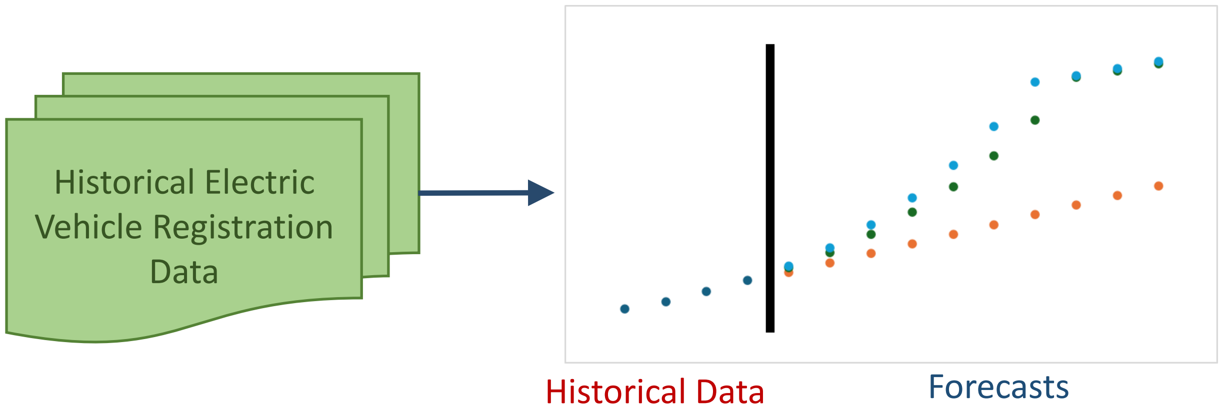
- Using circuit level SCADA data as input to the forecasting model enables us to focus on localized, non-coincident peaks.
- Provides more precise visibility into local electrification and DER trends using granular historical data.
- Allows for comprehensive analysis of various forecasting scenarios (combination of low/med/high growth rates).
- Increased transparency for stakeholders and supports data-driven decision-making for community-focused planning.

Data Sources for Bottom-up Forecast

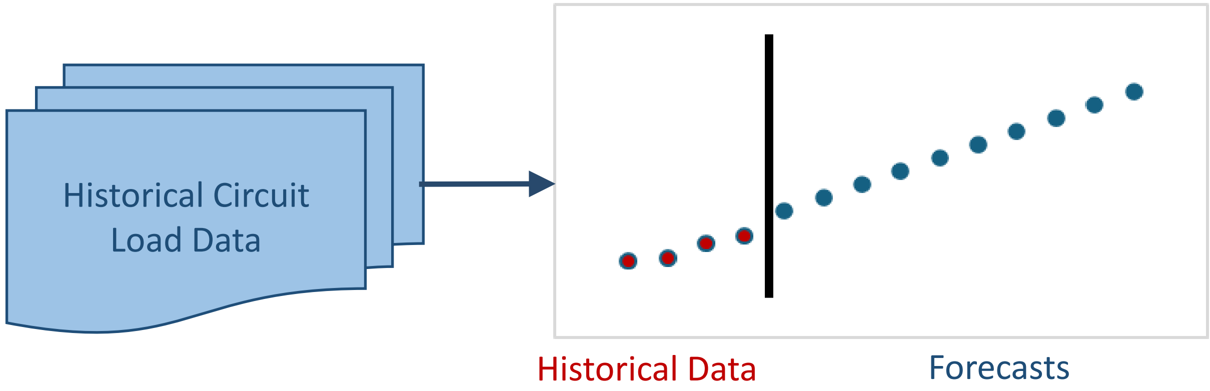
3 different solar growth scenarios
(based on local solar data and growth models)



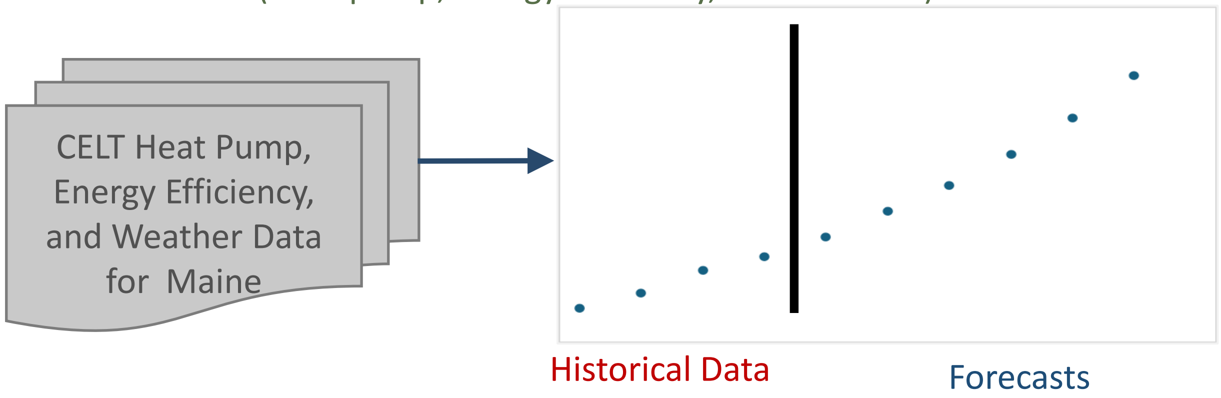
3 different electric vehicle growth scenarios
(based on local electric vehicle data and growth models)



Local traditional load growth



CELT Projection on Maine
(Heat pump, Energy Efficiency, and Weather)



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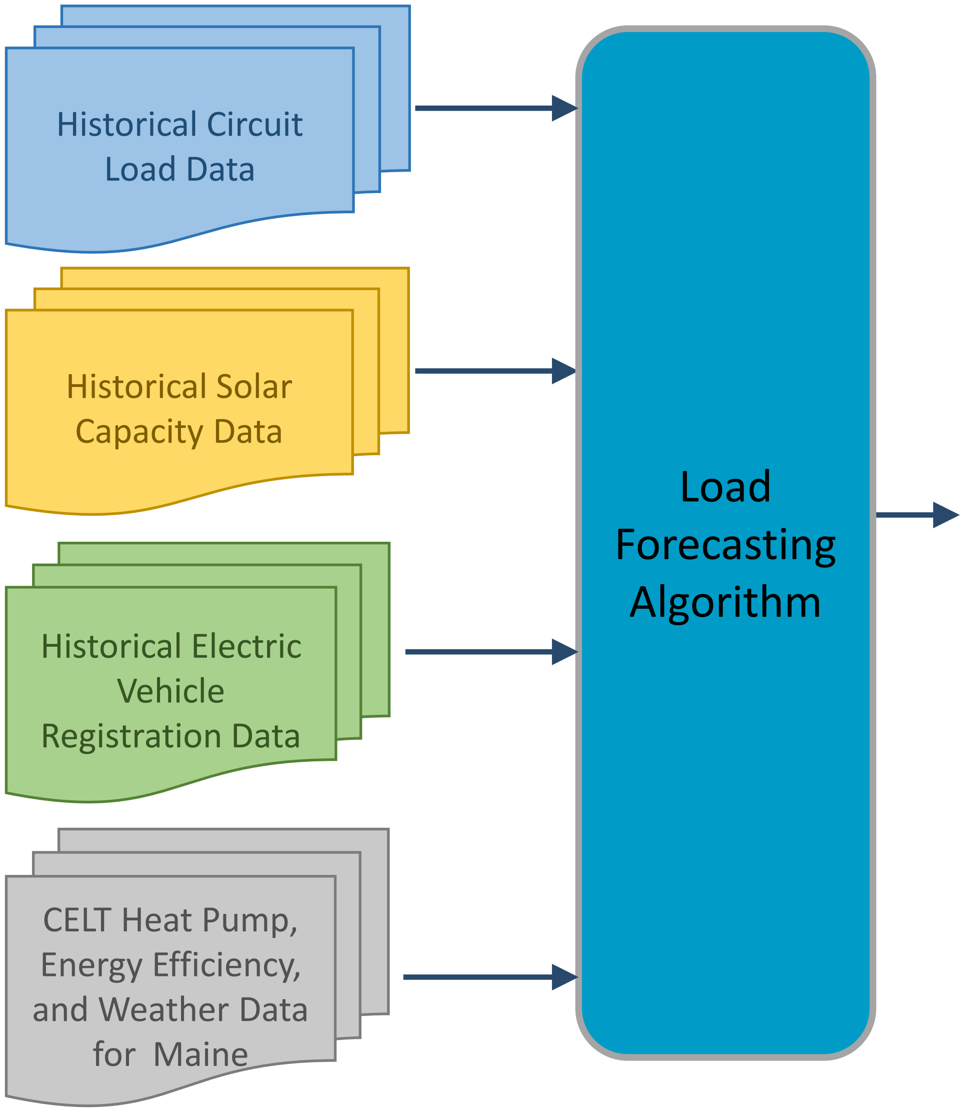
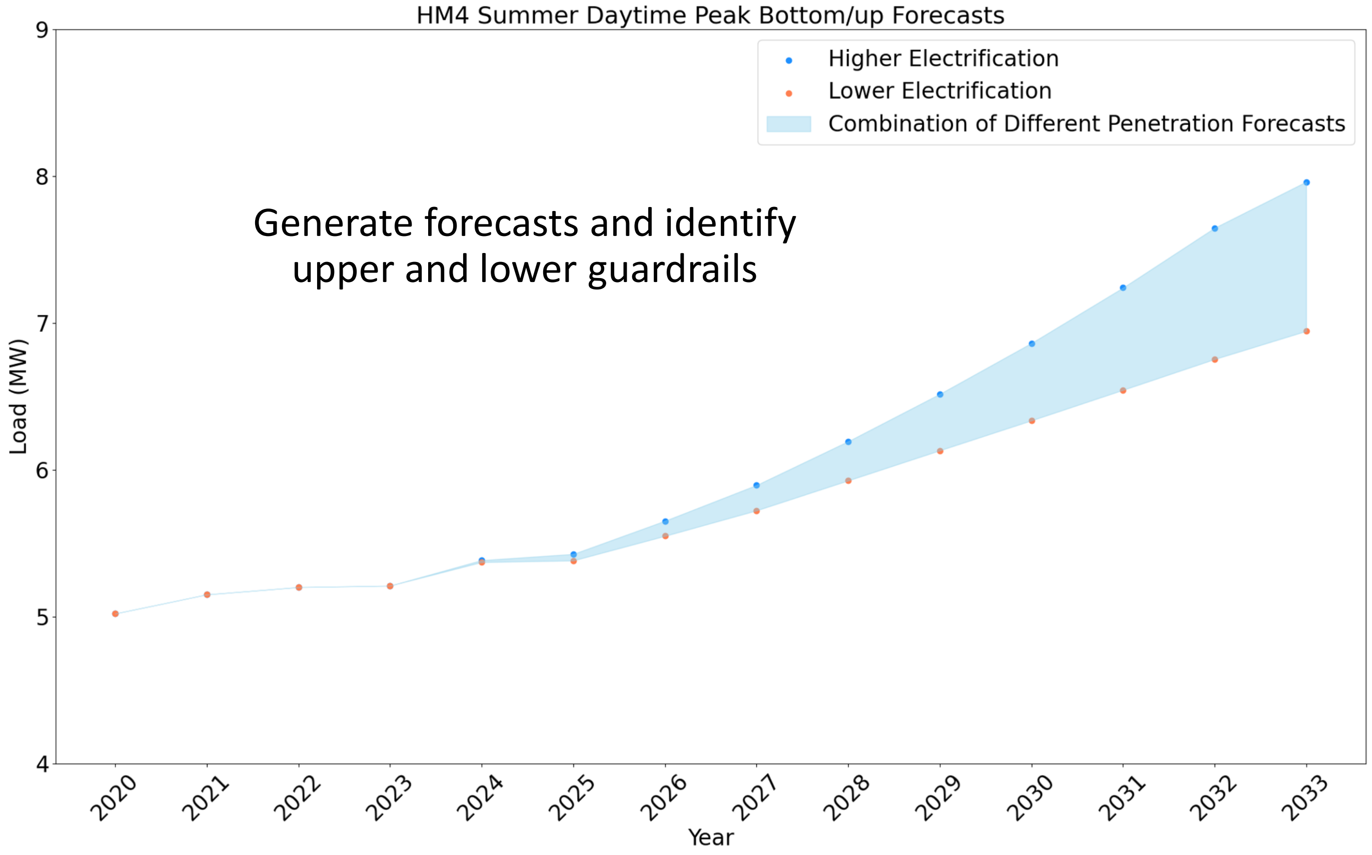
Bottom-Up Load Forecast Methodology





- Bottom/up method includes multiple forecasts per circuit and per scenario
- Forecasts cover a range of various adoption combinations, such as low/medium/high adoption of Electric vehicles, low/medium/high adoption of solar, etc.
- These resulting forecasts are the inputs to the models.

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Summary Bottom-Up and Top-Down Forecasts

Category	Top/Down	Bottom/Up
Methodology	Start with upstream load forecasting and disaggregates to lower level (coarse granularity)	Develop forecasts for individual circuits and include historical and local data (fine granularity)
Data Source	Upstream forecasts, Regionally based, Allocation ratios	Historical data including: SCADA, DER queue, Electric vehicle registration data, Weather data, census, Upstream itemized forecasts, State goals
Strengths	Consistent with upstream assumptions and Well-suited for transmission level/system-wide view	Focus on distribution level grid needs and capture localized variations and trends
Challenges	Potential to over/under allocate data on the distribution level, challenging to analyze different scenarios for EV and DER adoption	Requires more extensive and local data, less effective for transmission level/system-wide view

Forecasting Summary

Versant will be developing the following forecasts:

- Top/down Baseline Forecast:
  - As required by the MPUC, we will use the 2024 CELT 50/50.
- Top/down High Adoption Forecast:
  - As required by the MPUC, we will use the 2024 CELT 90/10.
- Bottom/up forecast:
  - Will develop distribution level substation and circuit forecasts using localized data, ISO-NE forecasts, and state policy targets accounting for base load, heating electrification, transportation electrification, DER adoption, and energy efficiency.
- Scenarios:
  - As required by the MPUC, we will develop the 6 required snapshots for each of the Top/down forecasts.
  - Additionally, we will develop scenarios that vary the level of adoption for each of the Bottom/up forecasts and include those within the same 6 snapshots.
- This comprehensive approach enables us to create the most granular and insightful forecasting scenarios and identify the boundary cases for modeling analysis.

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Next Steps

Milestone 1.0 Meeting: 2/28/2025	Milestone 2.0 Meeting: Target Q2	Milestone 3.0 Meeting: Target Q3	1/12/2026
Determine Model Inputs	System Modeling and Grid Needs Identification	Identify System Solutions	IGP Filing

Remaining IGP Timeline

Any comments or feedback are encouraged to be submitted within 30 days in order to be incorporated in our analysis.

What's next?

1. Submit comments within 30 days
2. Watch for email updates
3. Check content posted on website
4. Join our discussions

gridandclimate@versantpower.com

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Thank you!

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