Achieving Our Commonwealth's Climate Goals

An Electric Load Forecasting Overview

Prepared for the GMAC
May 11, 2023

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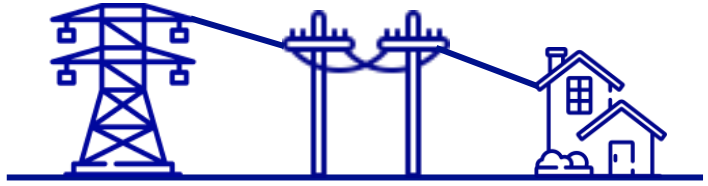
Load Forecasting & Analytics



Peak Forecast

- Company
- ISO Zone
- Study Area
- Feeder

Enabling state goals

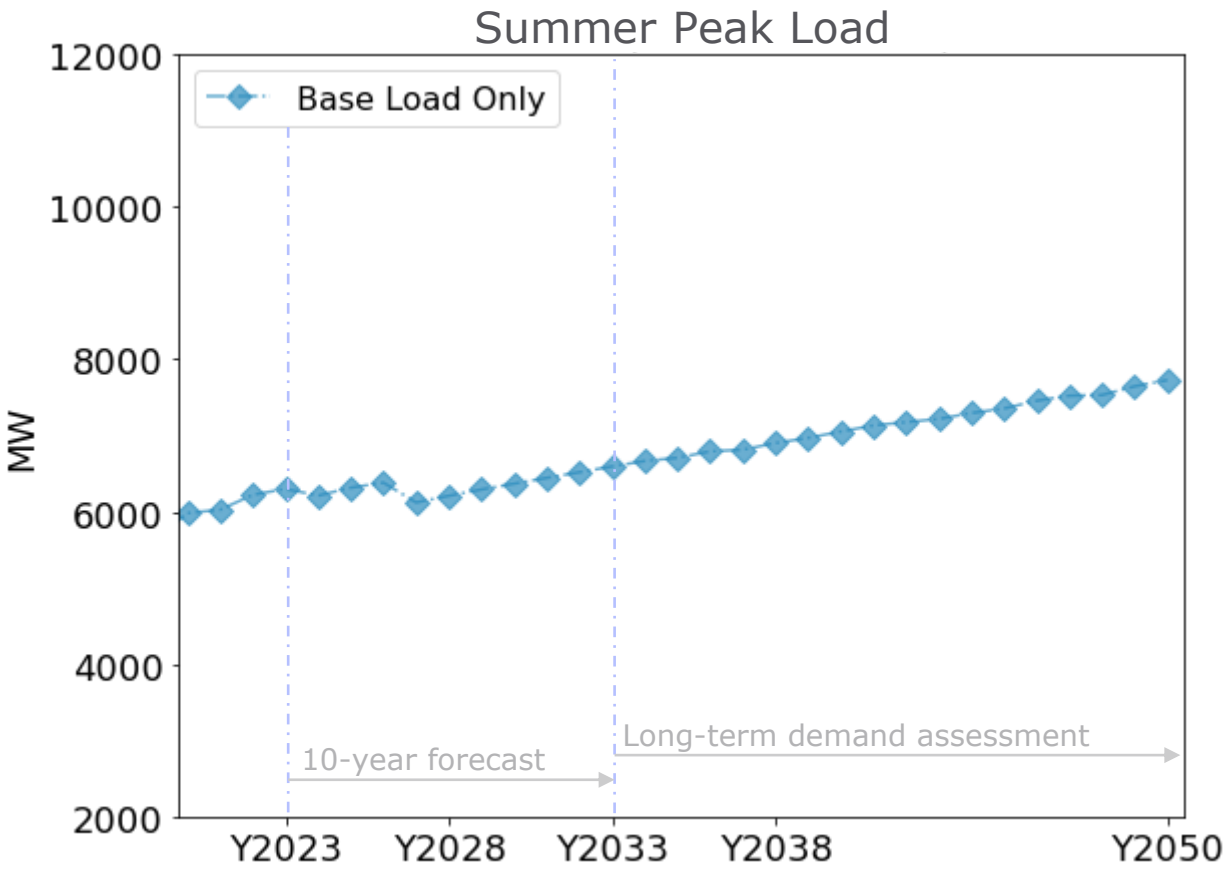
- Clean energy resources
- System reliability
- Climate resilience
- Economic development
- Environmental justice strategies

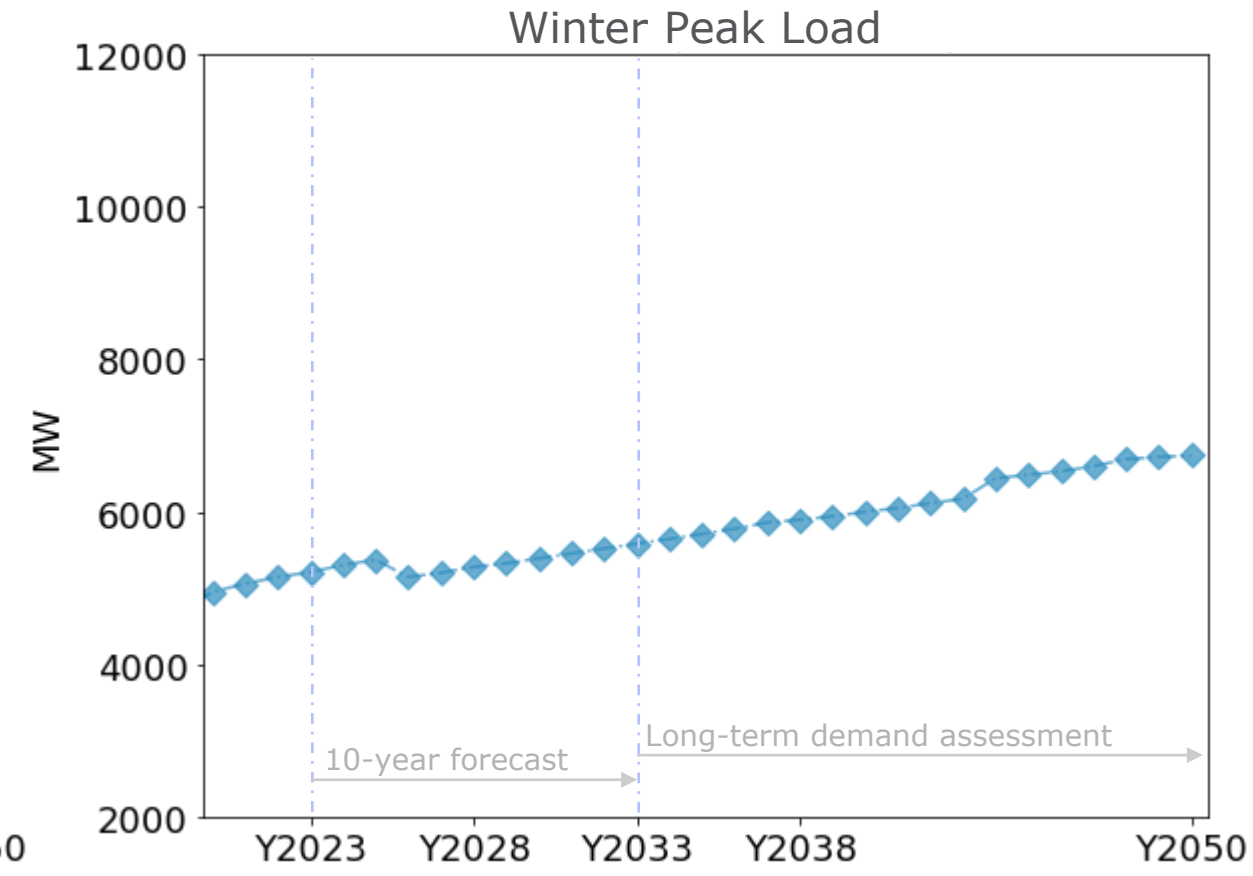
Advancement of DER technology modeling

- Adoption analysis
- Load impact quantification

Econometric base load forecast and demand assessment

Base load removes impact of solar, storage, energy efficiency, demand response, heat pumps, electric vehicles

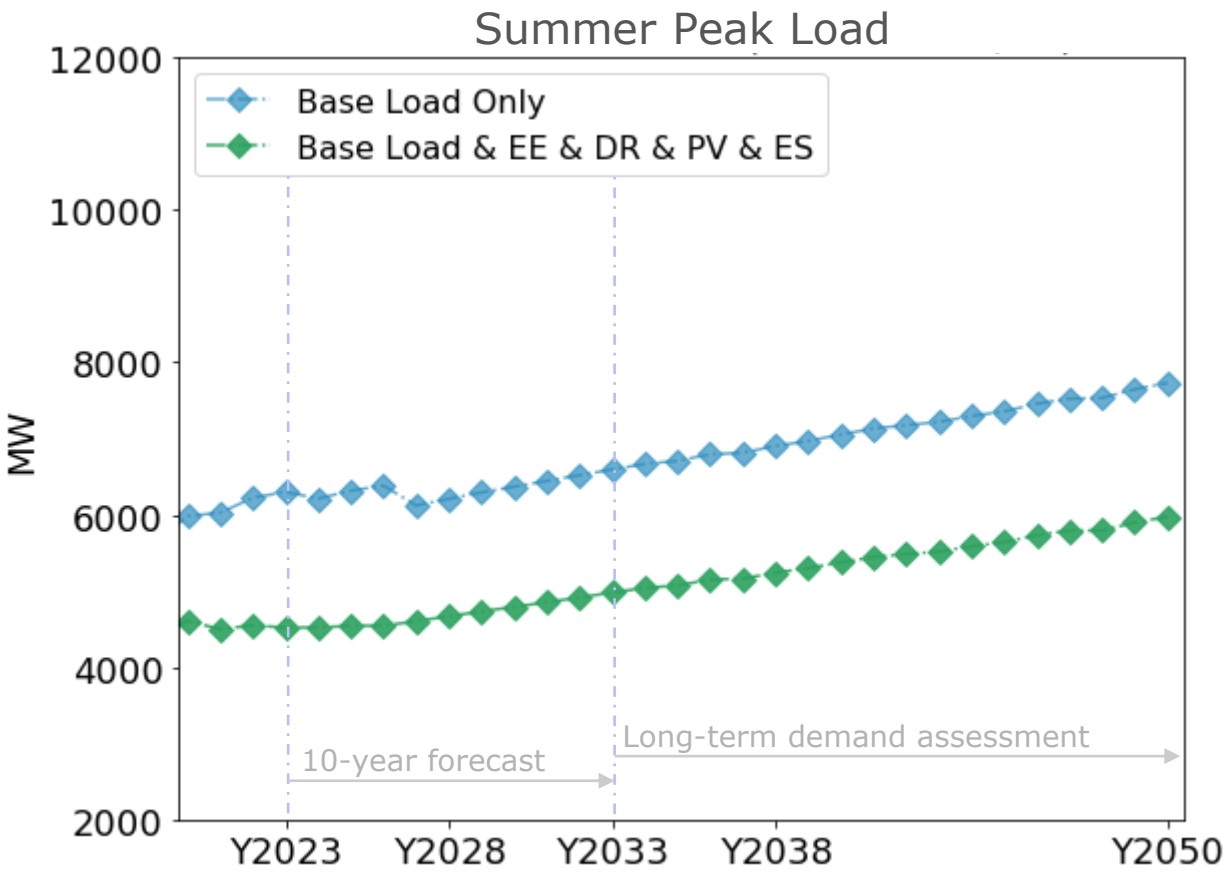


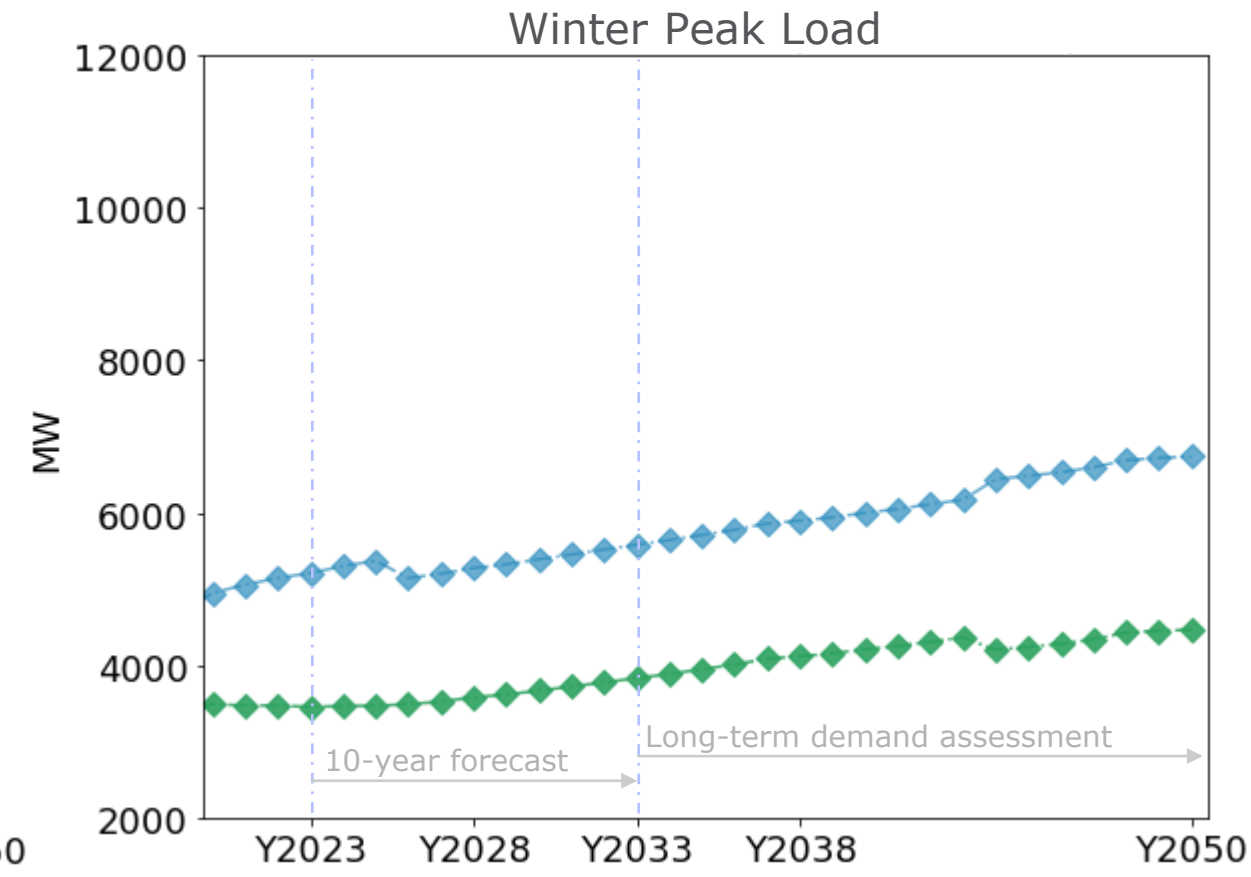


Note: Seasonal peak hours will change due to adoptions of different DERs

Add impact of PV, EE, DR, storage, consistent with state goals

Net load with DERs

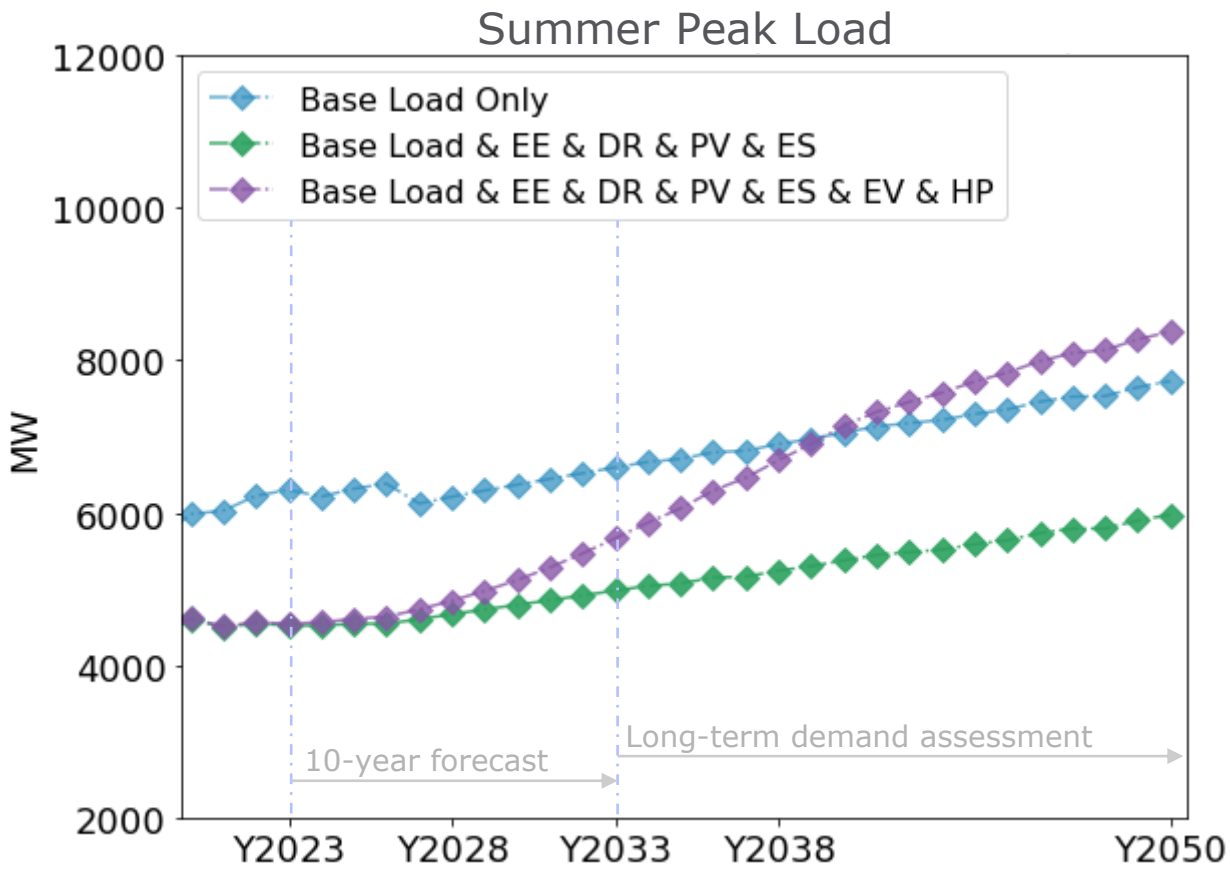


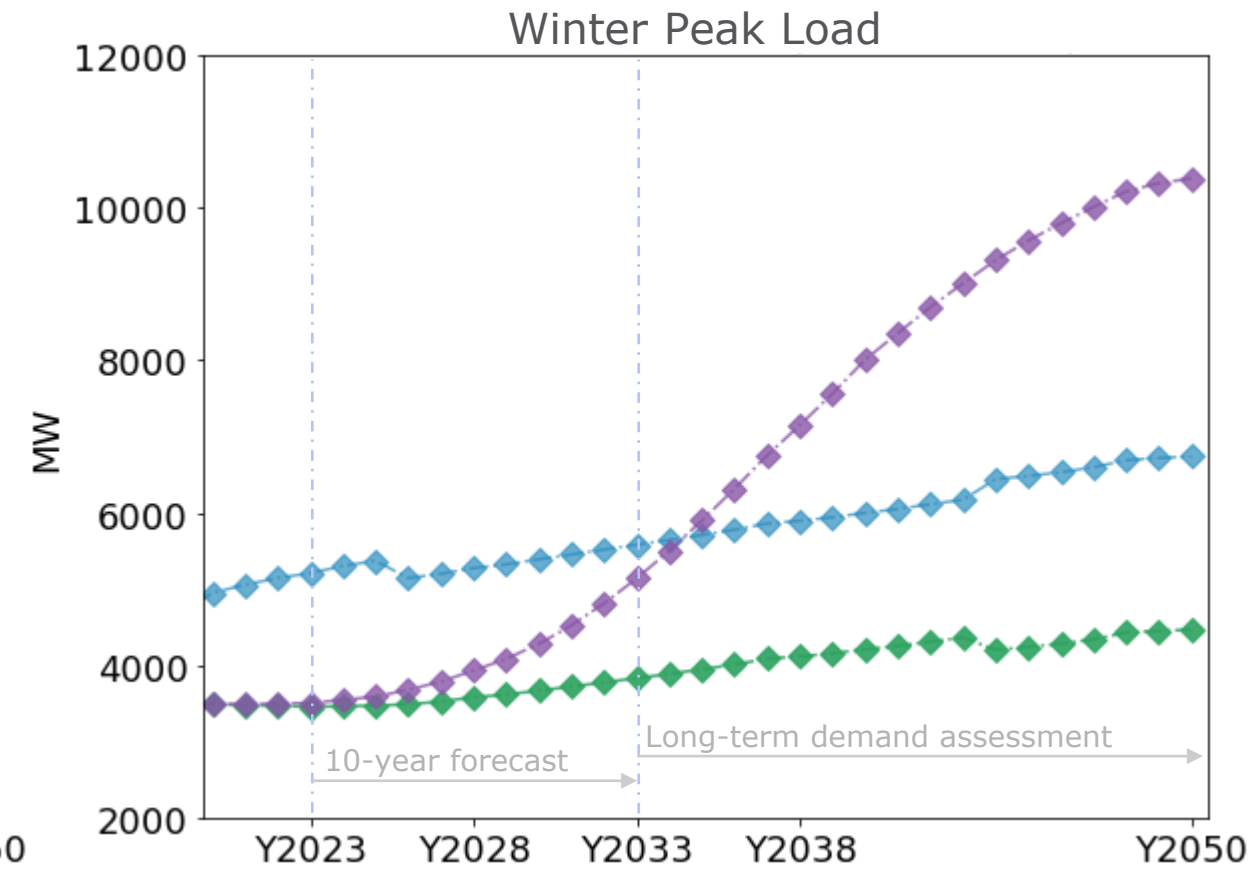


Note: Seasonal peak hours will change due to adoptions of different DERs

Add impact of beneficial electrification consistent with state goals

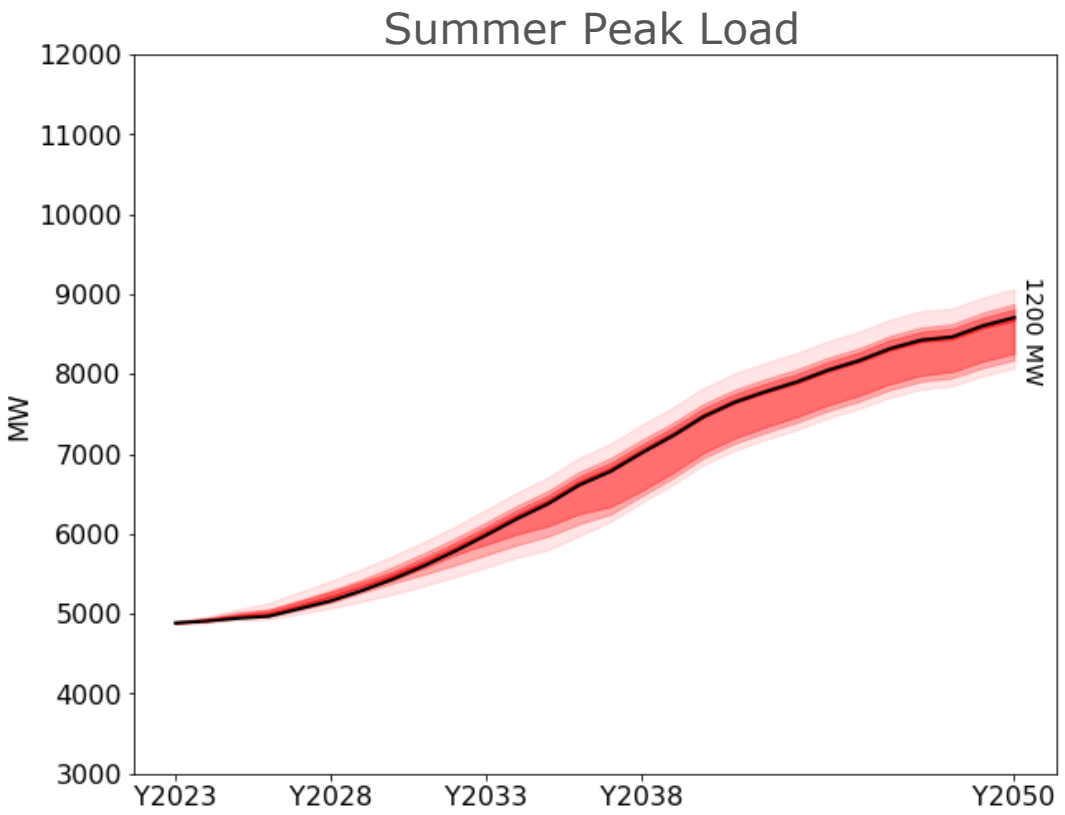
Net load with DERs and beneficial electrification

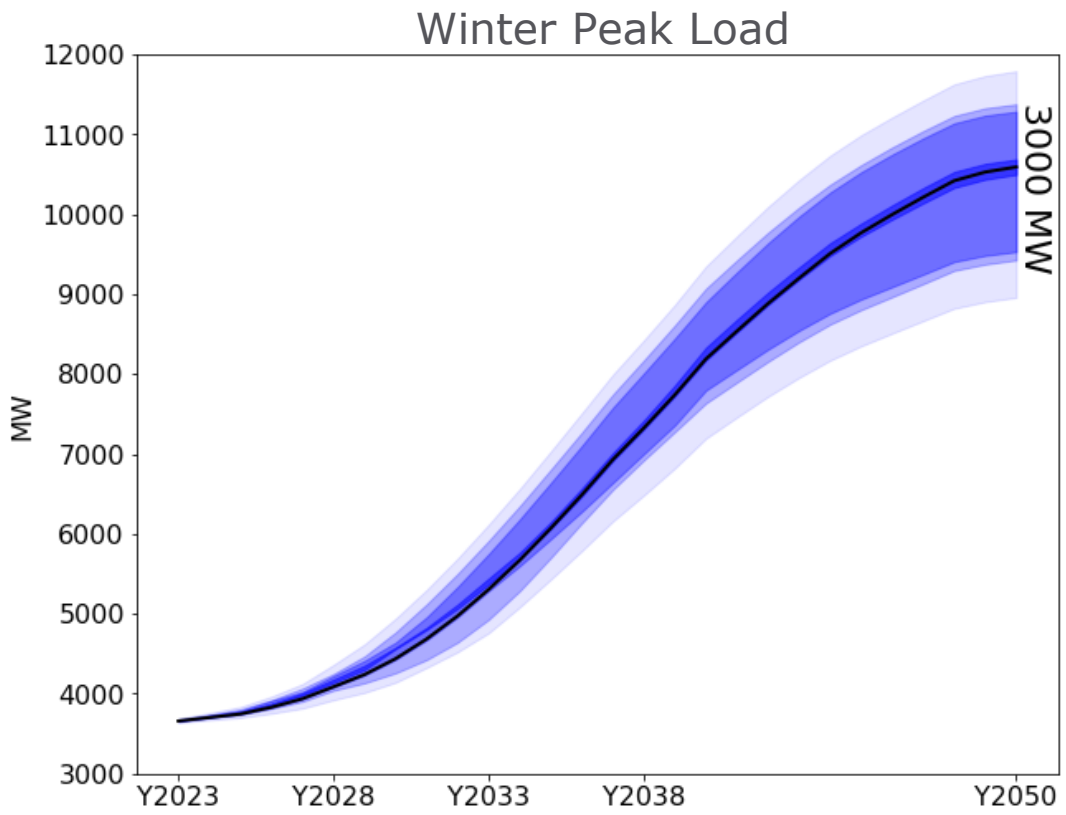




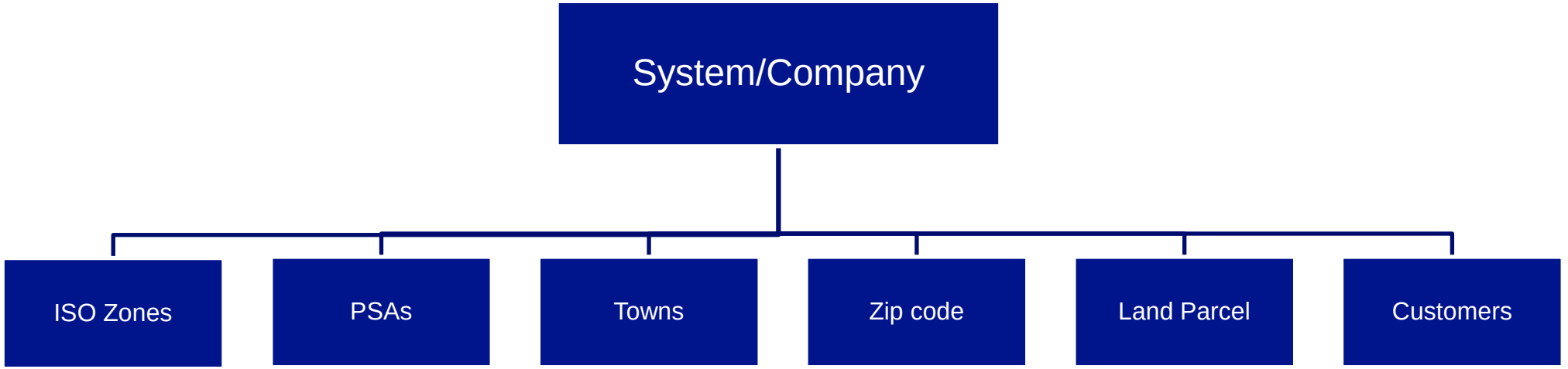
Note: Seasonal peak hours will change due to adoptions of different DERs

Generate 2000+ scenarios





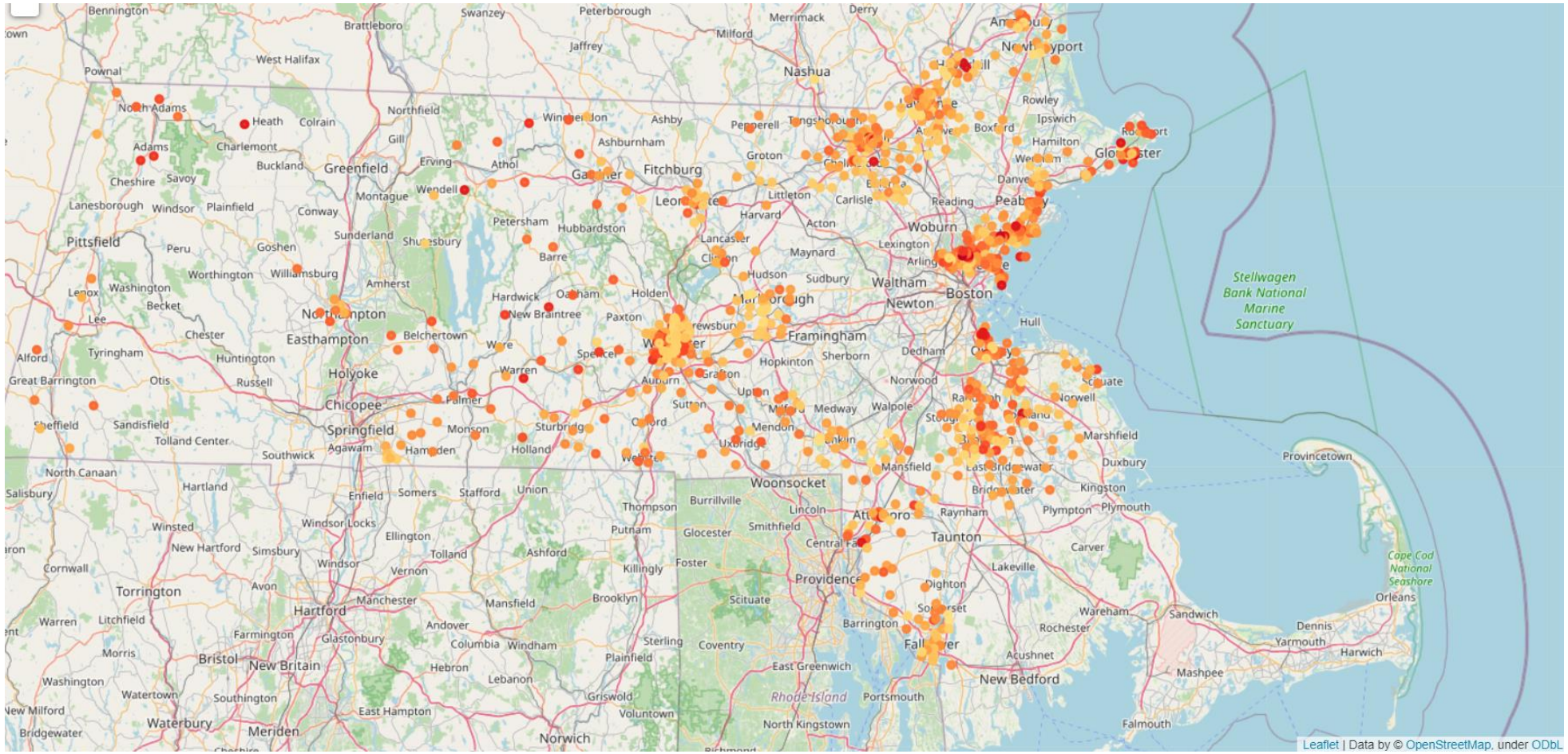
Advanced Spatial Modelling



Different top-down allocations are implemented for different DER technologies:

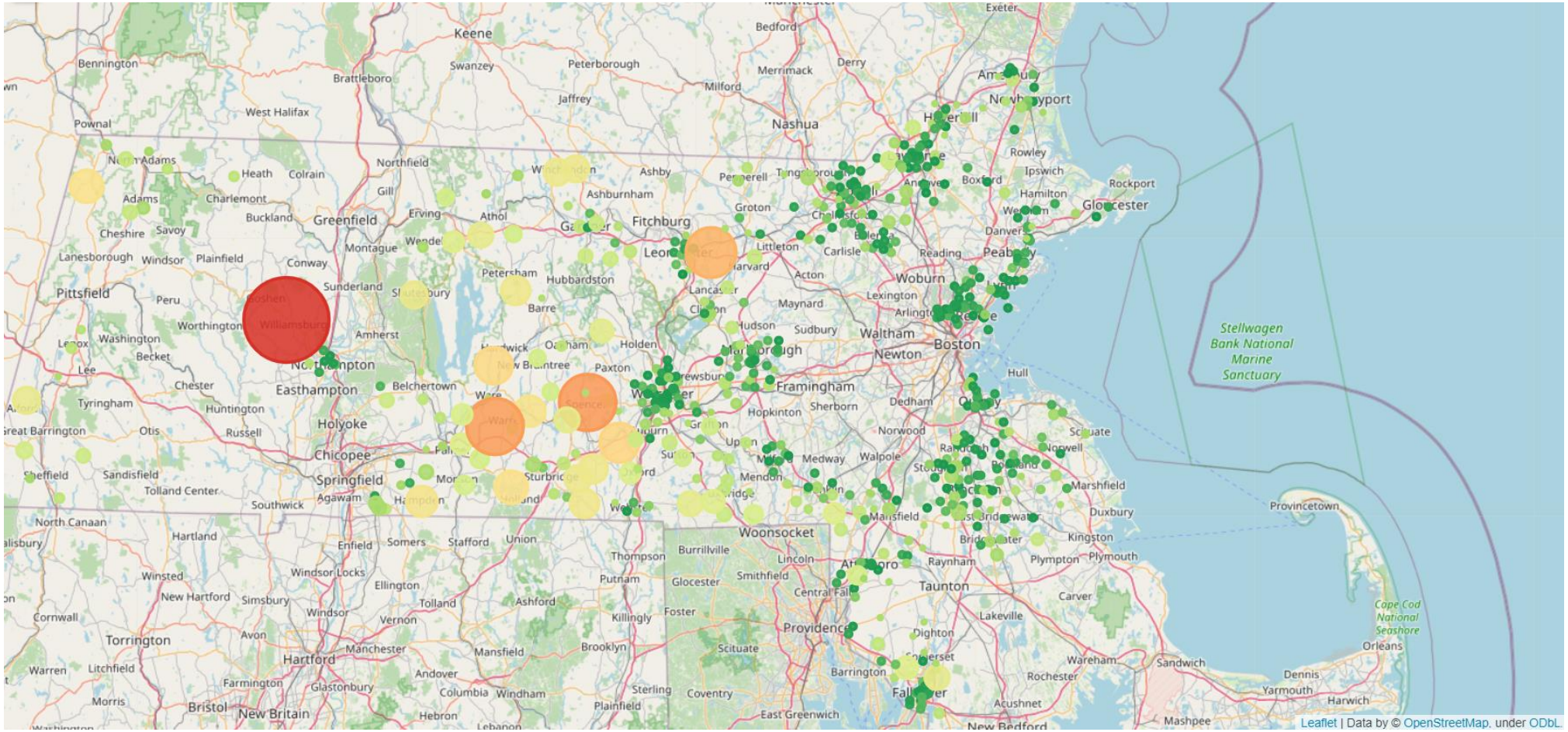
- Ground mounted PV utilizes land parcel availability and profitability analysis
- EE is based on ISO-zonal level saving trends and customer energy usage information
- EV and EHP allocations leverage zip-code level household characteristics, socioeconomic information and commuting demands from Census Bureau

Local prediction of load growth



Local prediction of ground mounted PV

2050 Ground-mounted PV Forecast Heatmap



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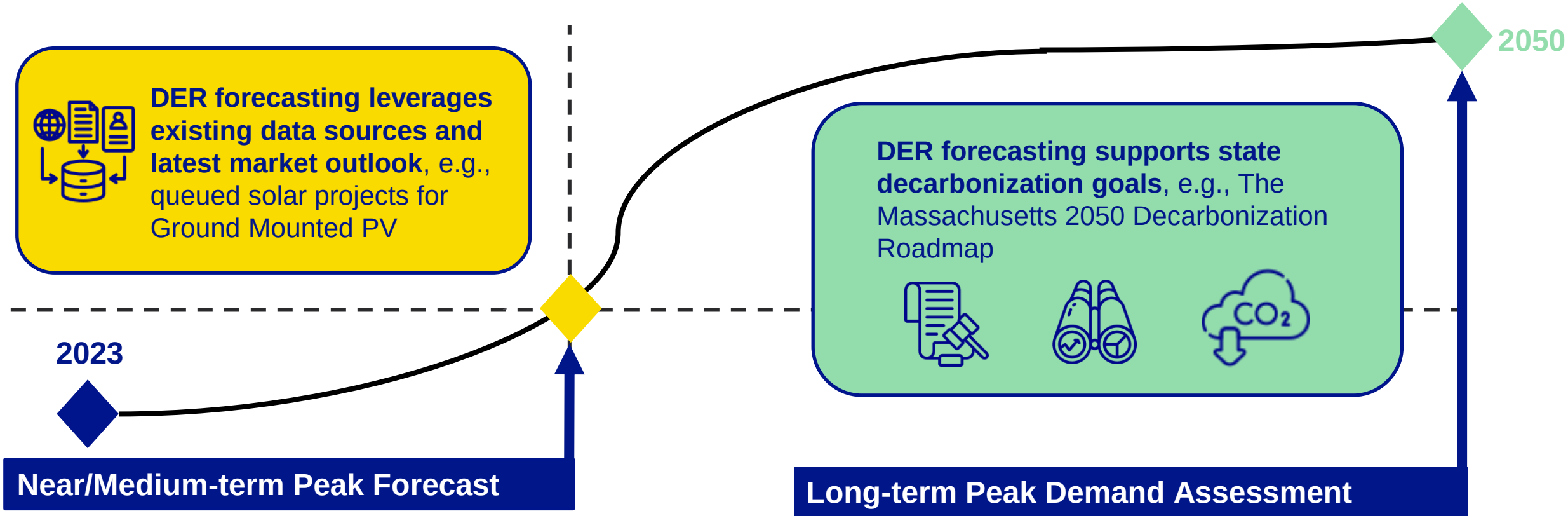
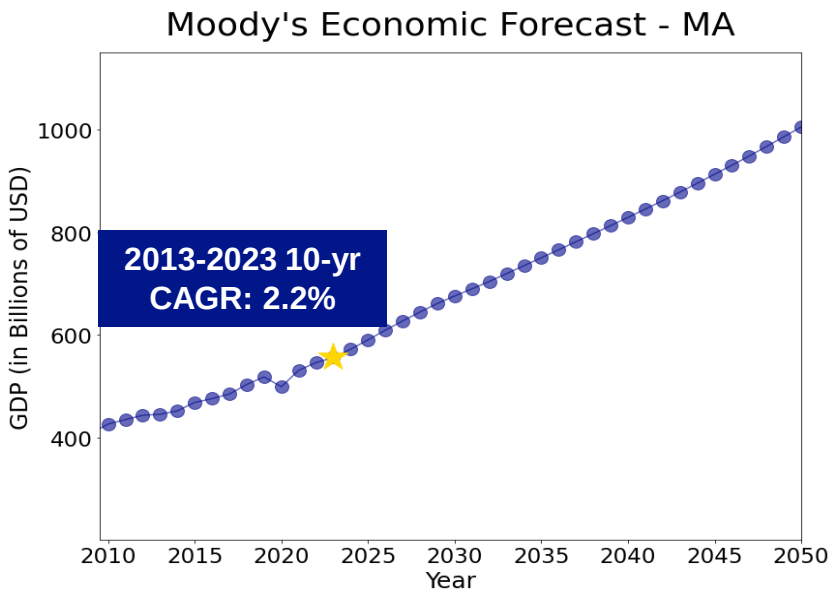
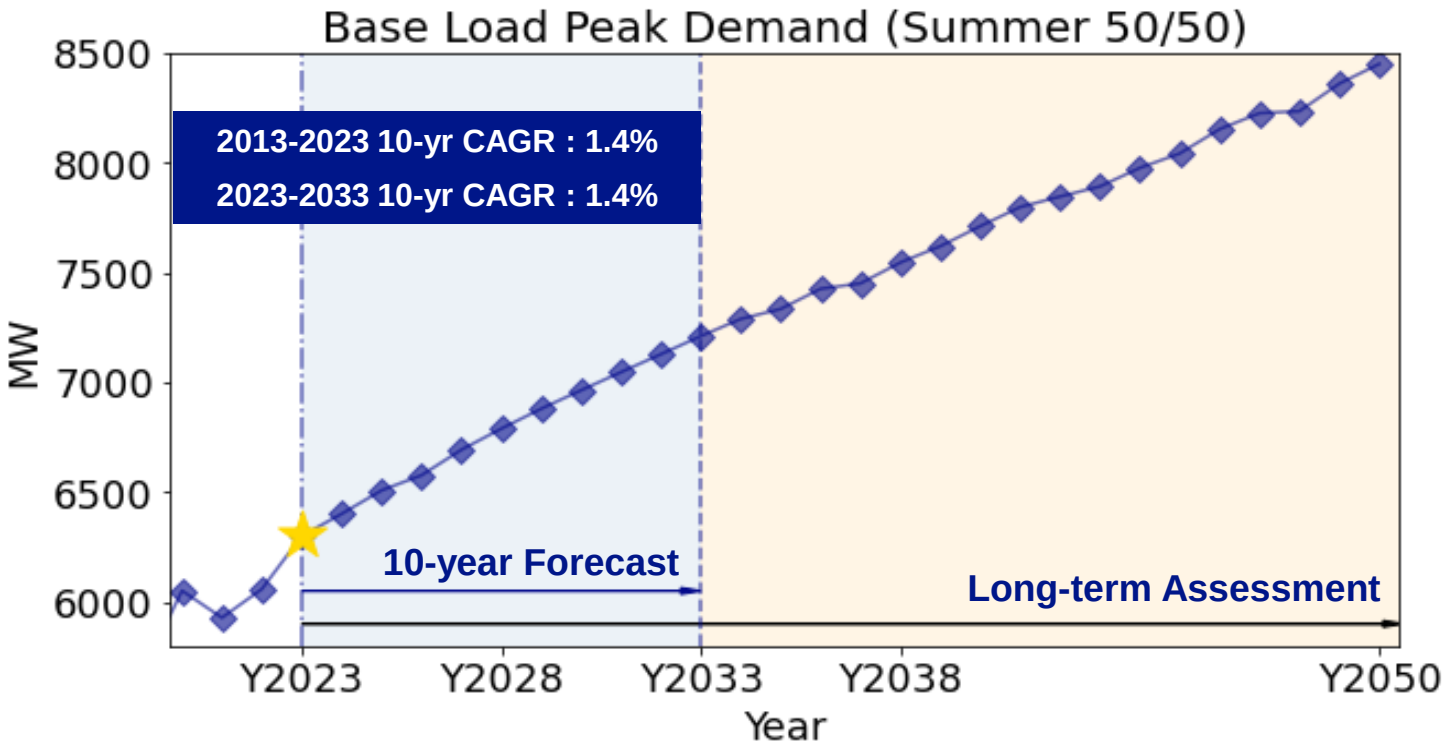
Overview of Peak Forecasting

- **Pre-DER Load Forecast** (Econometrics, Weather/Seasonality, Major Shocks (e.g., pandemic) etc.)
- **Post-DER Load Reconstitution**
  - Direct modeling of different DER/policy/scenario impacts (EV, PV, EHP, EE, DR etc.)

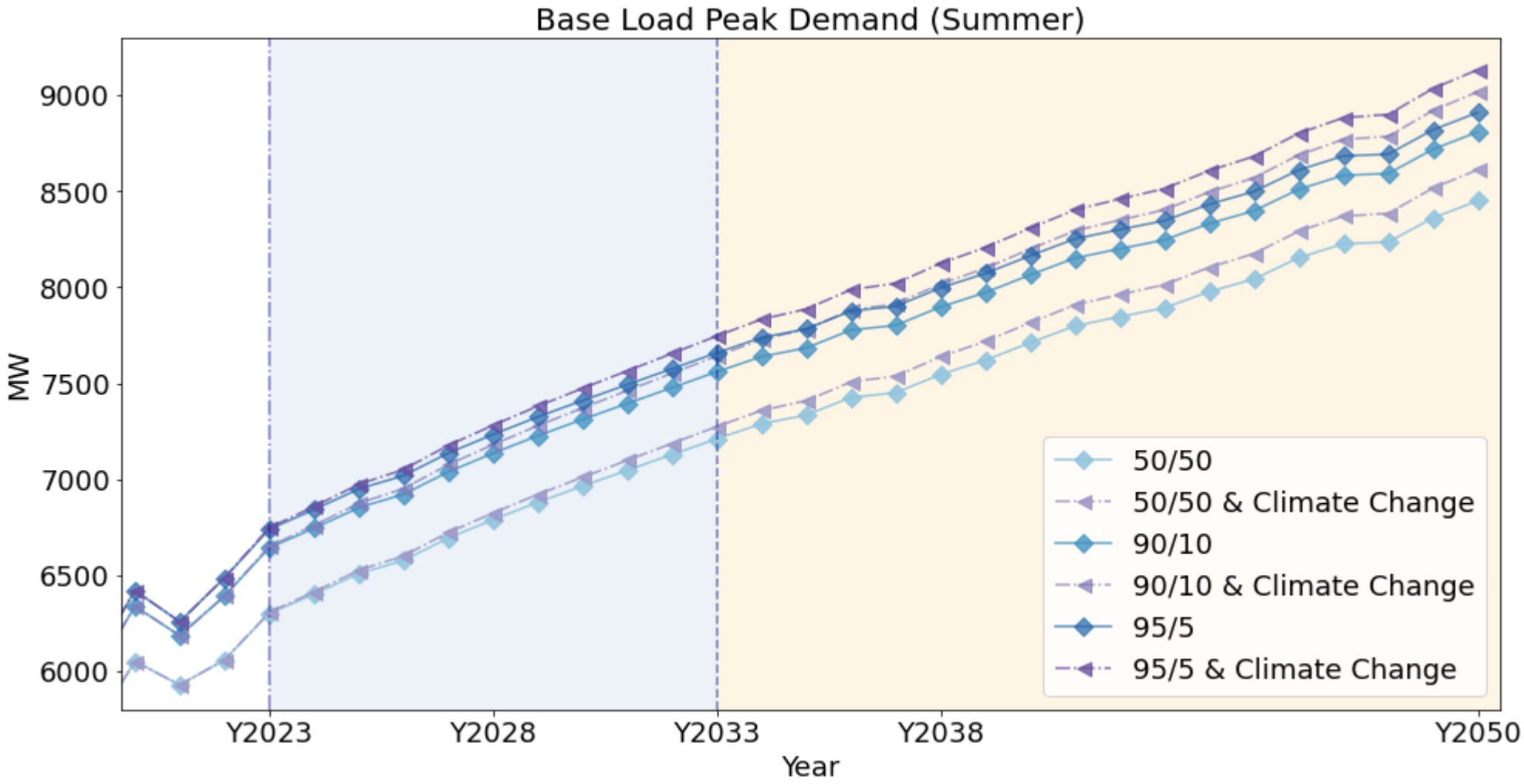


Base Load Growth Modeling





Base Load Forecast (Weather Scenarios)



Scenarios/Assumptions

DER Technology	Base	High	Low
Energy Efficiency	Company plan till 2024	Slower decline in persistent saving, higher incremental for residential saving.	Lower incremental saving
Electric Vehicles (On-road)	California Advanced Clean Car (ACC)-II with flexibility California Advanced Clean Trucks (ACT)	California ACC-II California ACT with accelerated	Same adoption as base Managed Charging on Light Duty EV
Electric Heat Pumps Installations	Company plan till 2024 Clean Energy and Climate Plan (CECP) Phased scenario	Company's plan till 2024 CECP Full Electrification scenario	Company's plan till 2024 CECP Hybrid scenario
Solar PV Nameplate (Distribution-level)	Meet pro-rata of All-Options-scenario in 2050	Meet the goal slightly earlier	Meet the goal slightly later
Energy Storage Nameplate (Distribution-level)	Meet pro-rata of 2025 state-wide goals. All-Options and 100%-Renewable targets in 2050	Accelerated adoption and higher achievement	Earlier saturation