Improve EV demand forecasting and planning by reimagining data-sharing practices

Bryan Jungers, Director of Mobility

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Speakers

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Director of Mobility, Customer Energy Solutions

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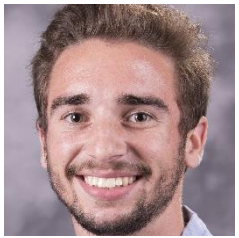
Stephanie Leach

Principal Business Analyst

BGE



Derek Dinsmoor

Data Scientist, Data Science

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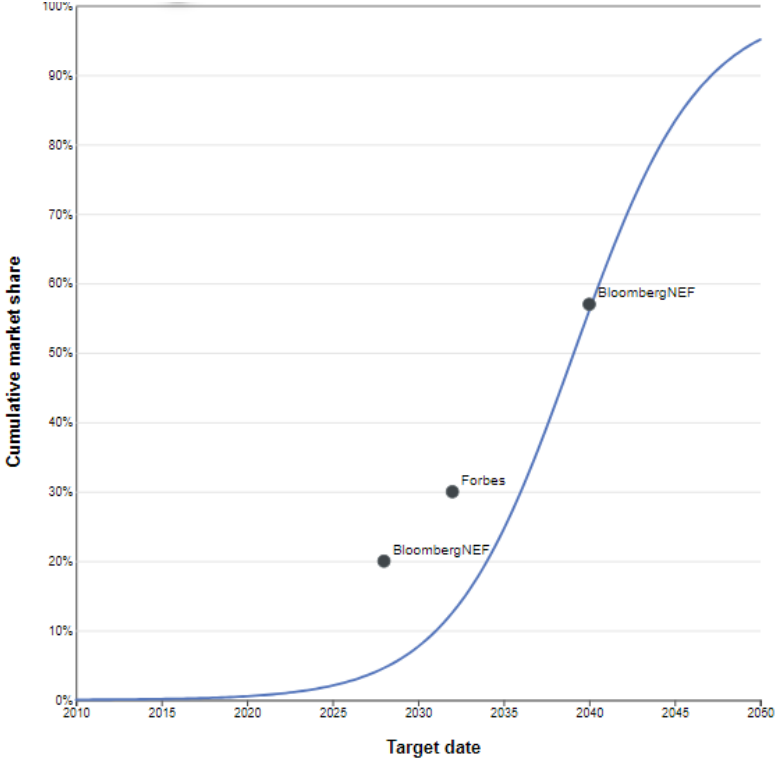
EV demand forecasting

Forecasts come in many flavors

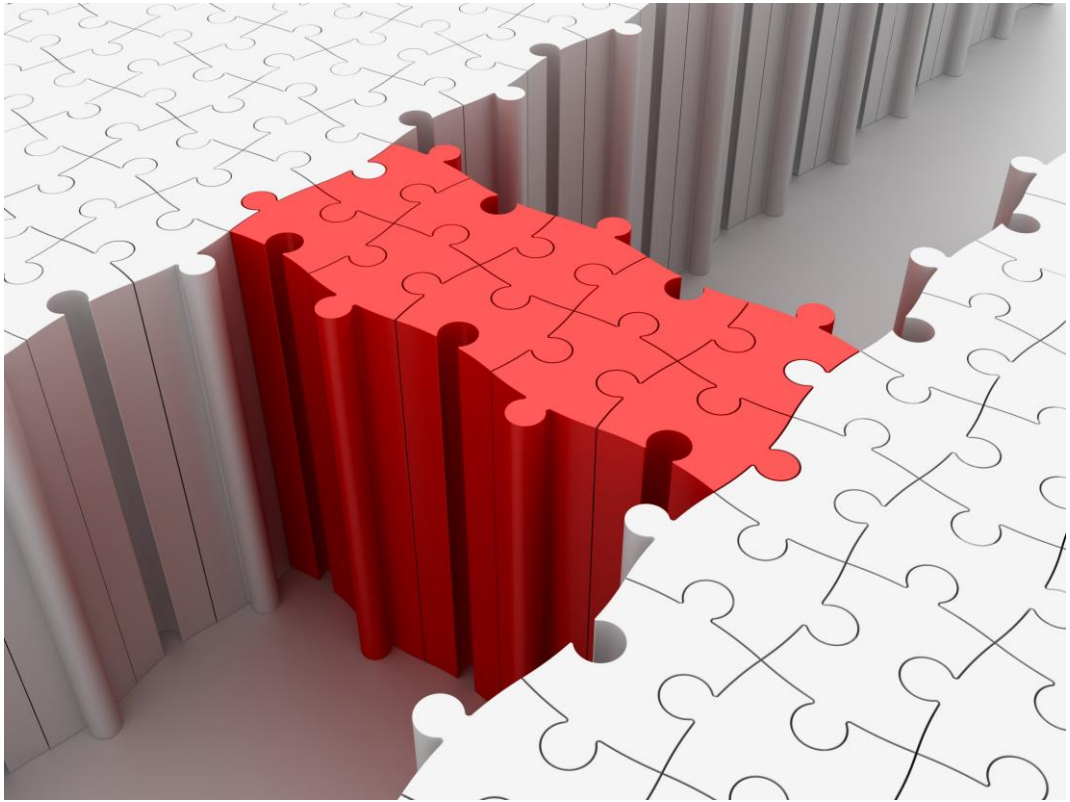


- Static versus dynamic
- Annual versus cumulative
- Top-down versus bottom-up
- Reg, sales, shipments, etc.
- Temporal granularity
- Spatial granularity
- Ground-truthed (or not)

E Source Technology Market Insights

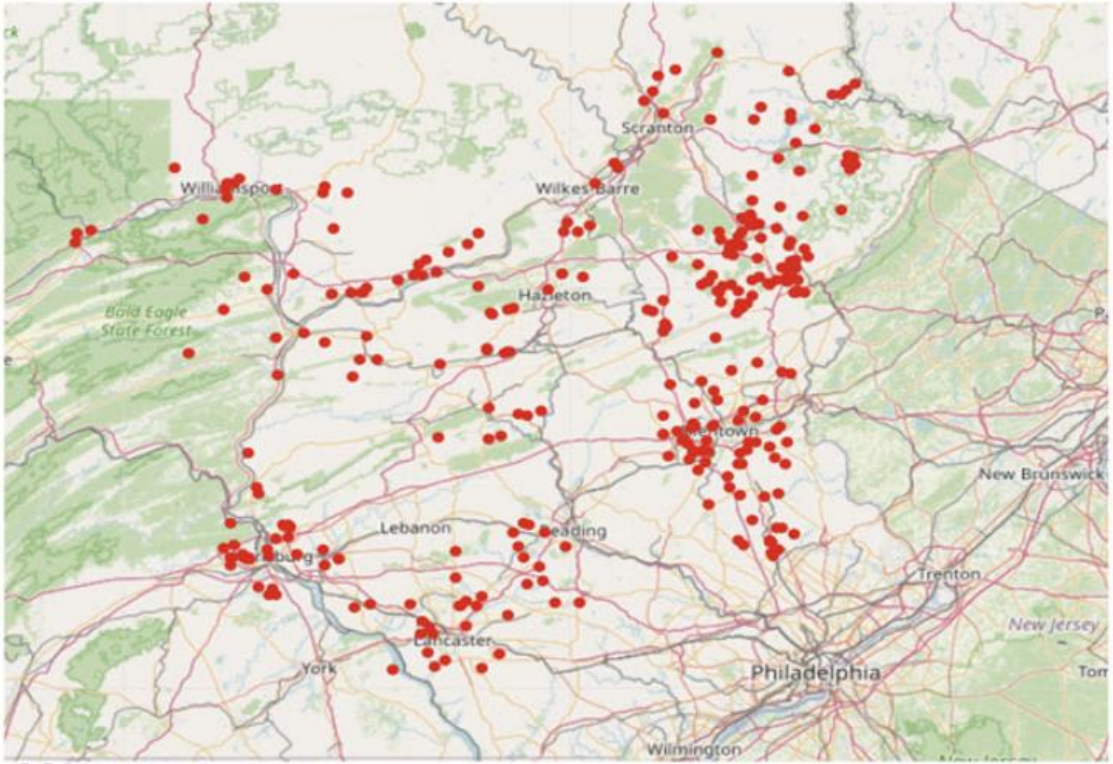
A useful forecast is actionable

Forecasts are wrong, some are less wrong



- No forecast of the future is perfectly true or accurate
- A forecast should serve as a bridge between what we think we already know and what we have yet to observe
- It helps to start by being clear and honest about your knowns and unknowns
- State all assumptions, inputs, and model limitations
- Validate and update your forecast models over time

Ground-truthing and calibrating forecasts

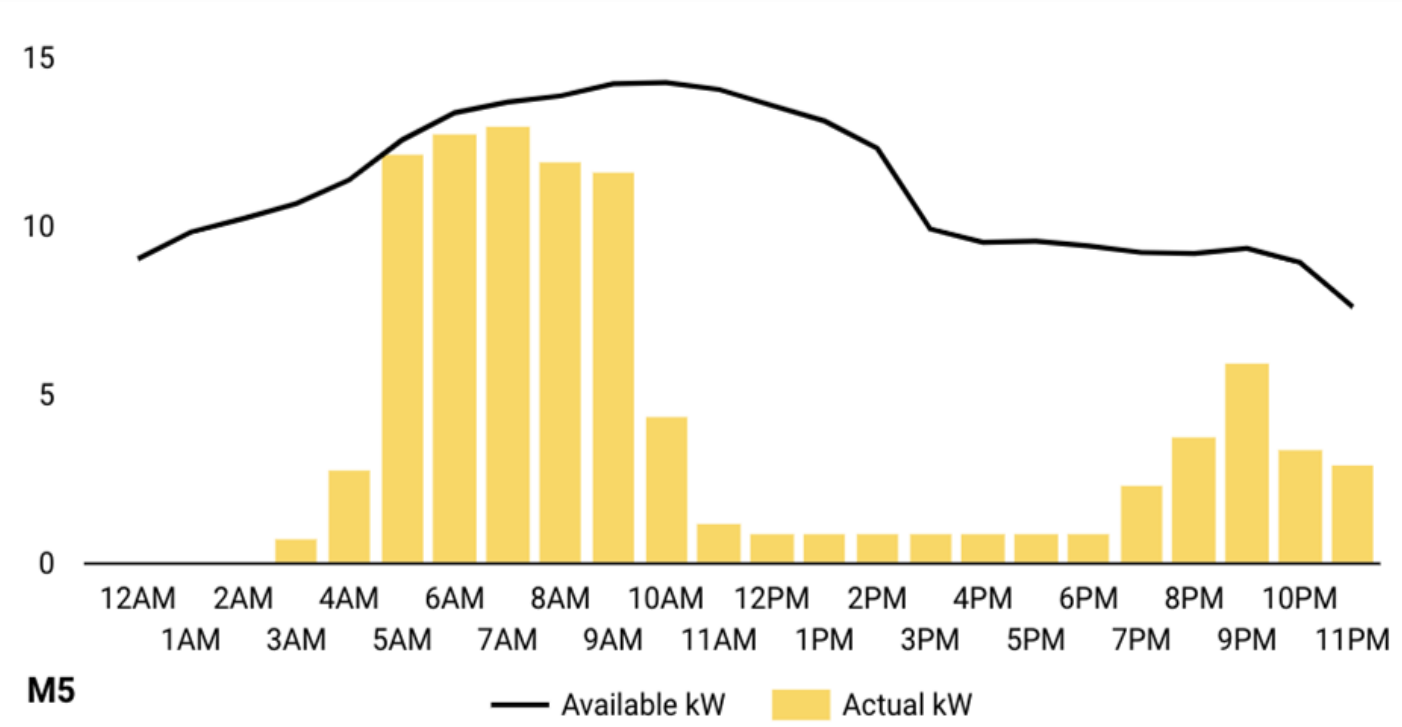


- Vehicle registrations
- EV sales and shipments
- Utility advanced metering infrastructure (AMI) data
- EV charger data
- EV telematics data
- Mobile device and Internet of Things data
- Other customer data

Pictured here: A map of predicted future EV buyers in a utility service territory

[Which customers have Level 2 EV chargers and what programs should you offer them?]

Forecasting grid impacts: Transformers



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Data sharing

A rising tide lifts all boats

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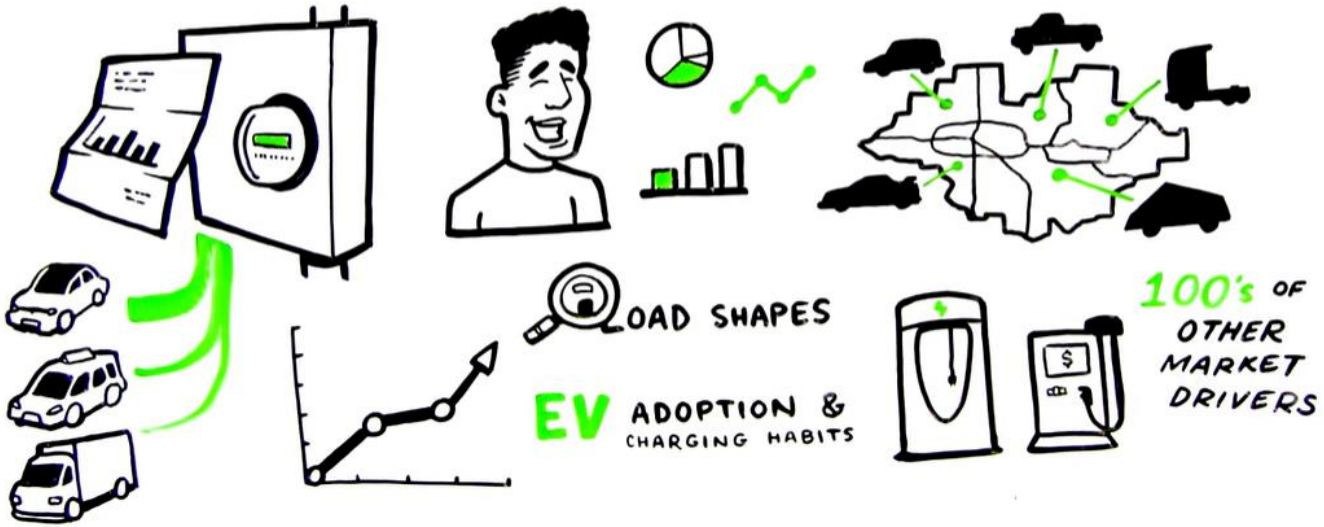
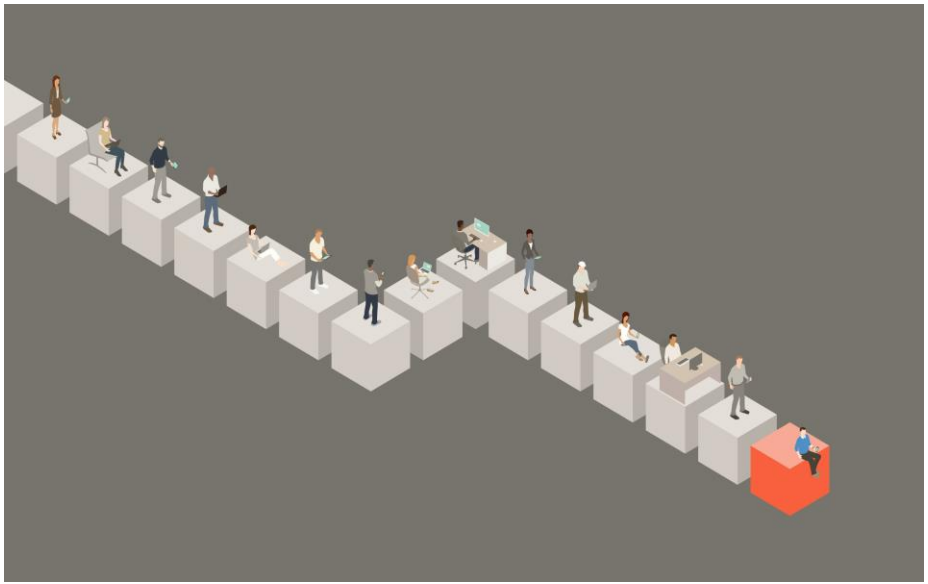


Data access, privacy, and security



New York Integrated Energy Data Resource (IEDR)

Statewide centralized energy data visualization and analytics platform

NEW YORK STATE

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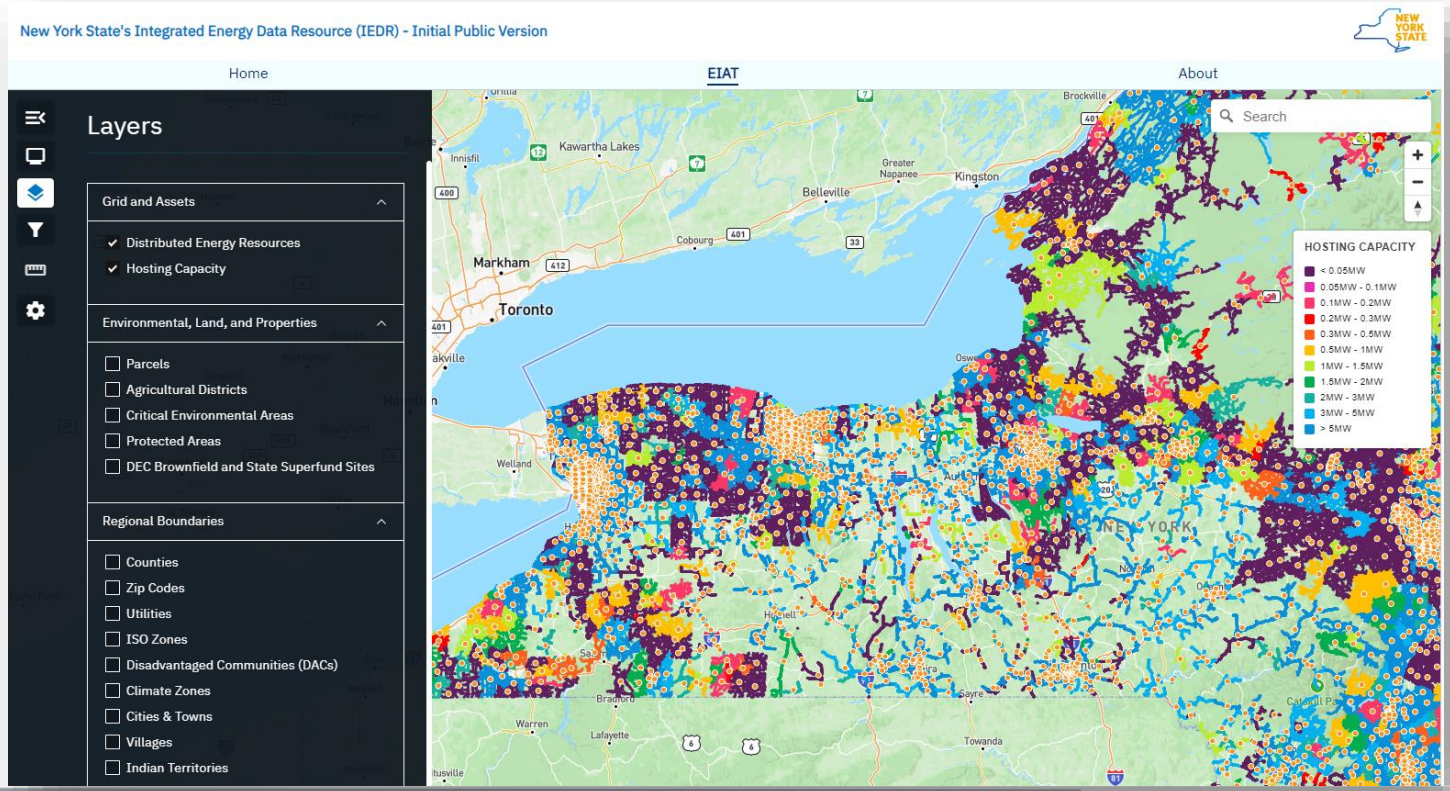

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Improve EV demand forecasting and planning by reimagining data-sharing practices

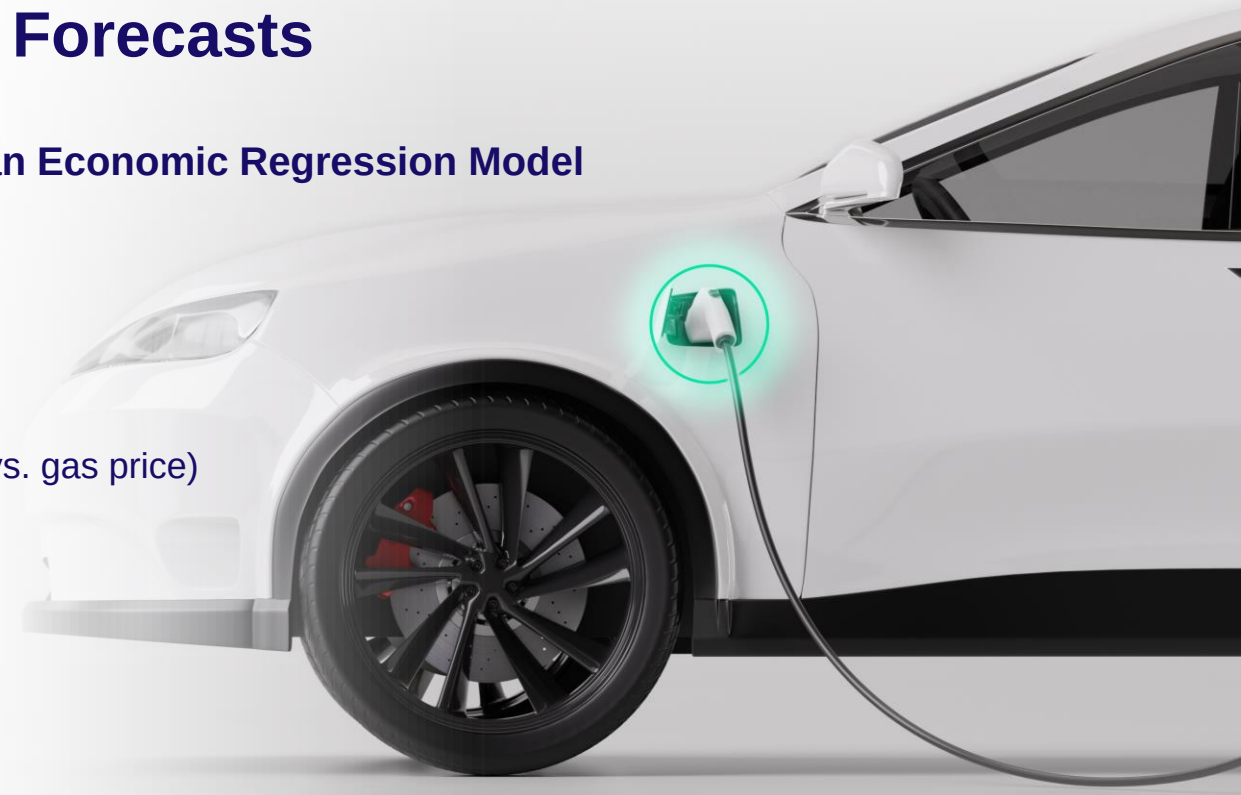
September 21, 2023

Stephanie Leach
Principal Business Analyst, BGE Strategy

Step 1: Creating EV Forecasts

Historical Drivers – Building an Economic Regression Model

- Vehicle price (ICE vs. EV)
- EV models available
  - PHEV &. BEV
  - Range of vehicles
- Fueling cost (available EV rates vs. gas price)
- Availability of incentives
- Public charger availability
  - 60 L2s per 1,000 EVs
  - 3 DCFCs per 1,000 EVs
- Political landscape (red vs. blue)



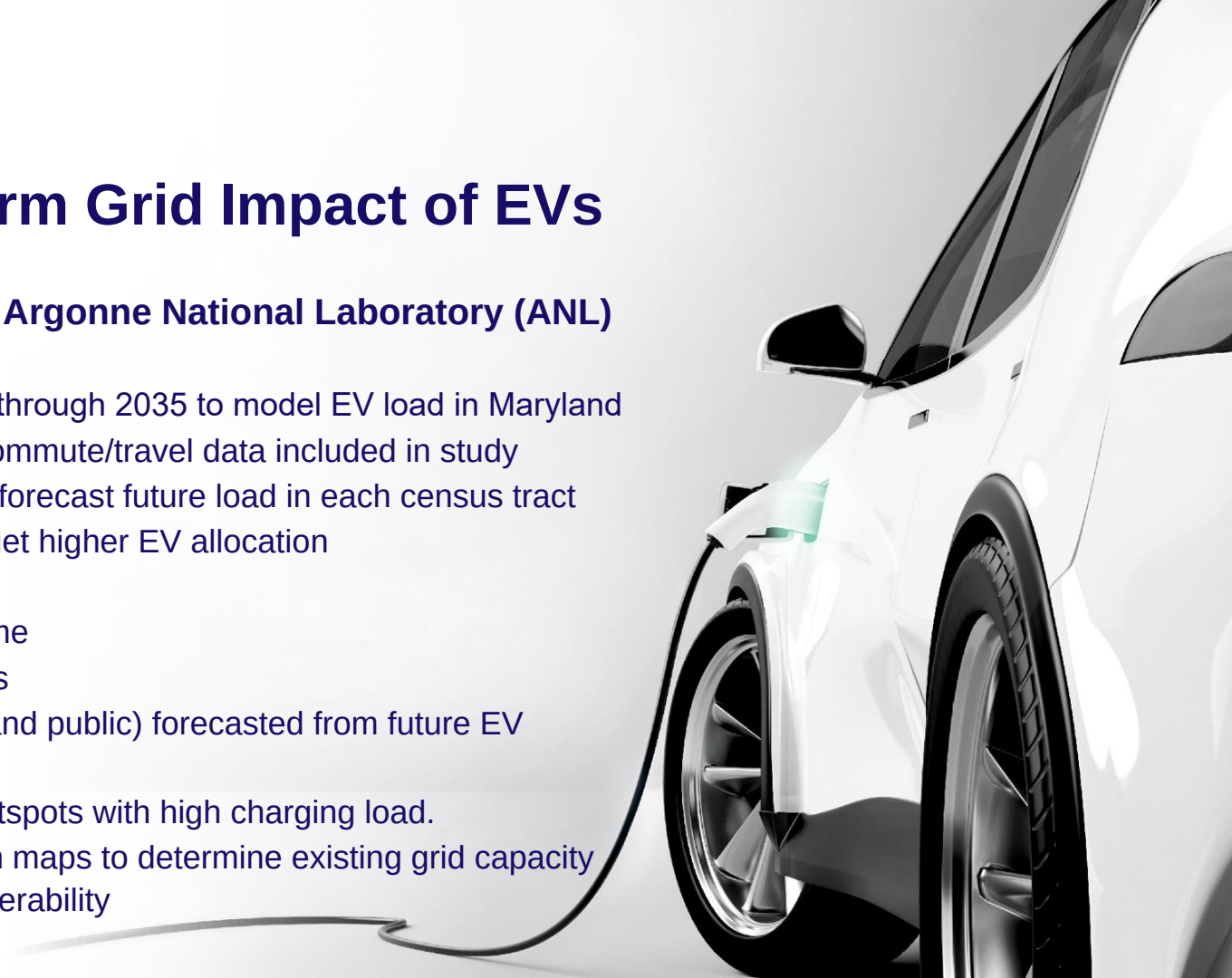
NOTE: Need to understand the specific drivers in your state and service area

Step 2: Long Term Grid Impact of EVs

Grid Impact Analysis by Argonne National Laboratory (ANL)

Using BGE's EV projections through 2035 to model EV load in Maryland

- 2,000 census tracts and commute/travel data included in study
- Historical EV load used to forecast future load in each census tract
- Tracts with higher values get higher EV allocation
  - Historical EV numbers
  - Median household income
  - % of single family homes
- Total EV chargers (home and public) forecasted from future EV ownership assumptions
- ANL analysis highlights hotspots with high charging load.
- BGE to overlap distribution maps to determine existing grid capacity and areas of potential vulnerability



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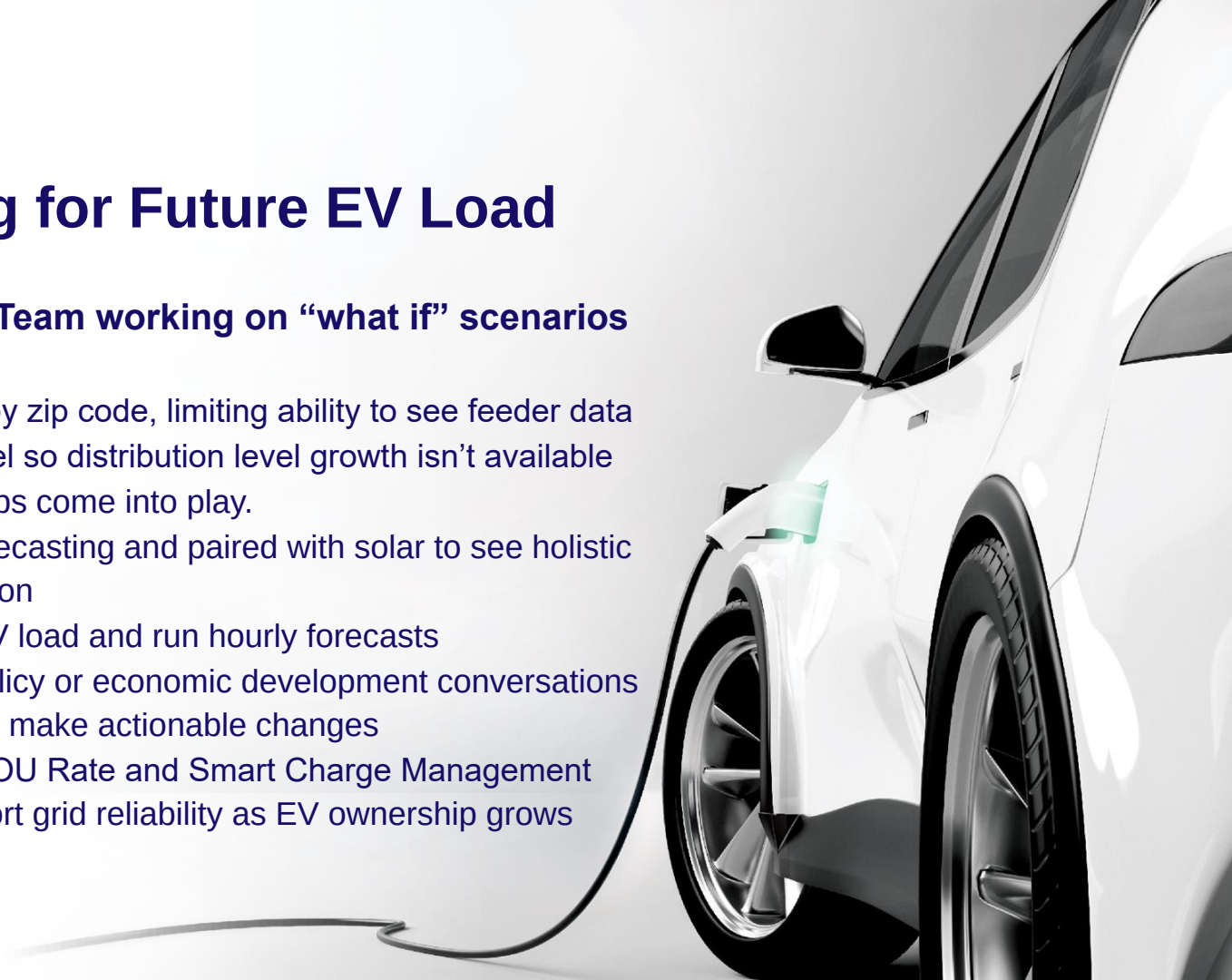
Step 3: Planning for Future EV Load

BGE Capacity Planning Team working on “what if” scenarios

- BGE model doesn’t track by zip code, limiting ability to see feeder data
  - BGE uses national model so distribution level growth isn’t available
  - This is where partnerships come into play.
- ANL data used for load forecasting and paired with solar to see holistic view of demand + generation
  - Disaggregate EV and PV load and run hourly forecasts
- Use future forecasts for policy or economic development conversations to encourage customers to make actionable changes
- BGE’s Vehicle Charging TOU Rate and Smart Charge Management program are helping support grid reliability as EV ownership grows



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Thank You

Stephanie Leach
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EV detection and forecasting with E Source

Methodology

EV detection

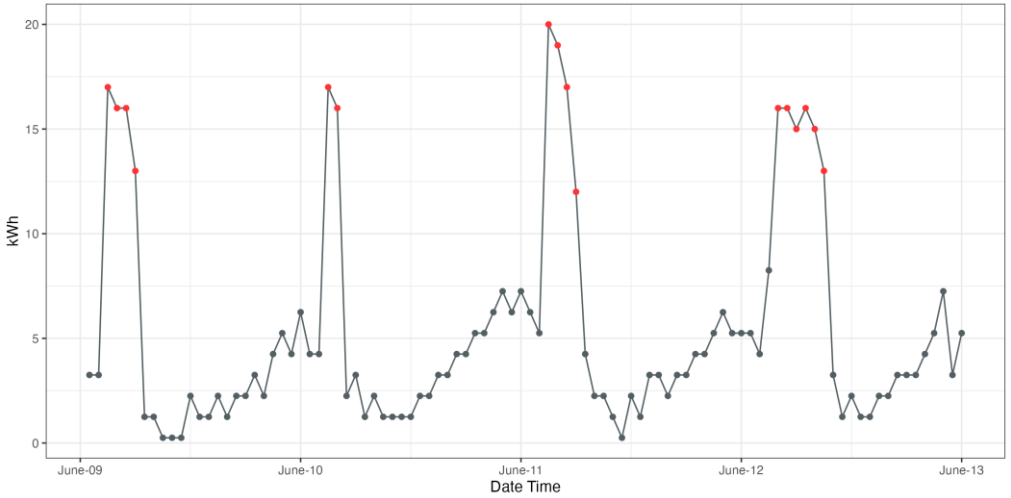
Detection steps

Compile **ground truth** AMI data for known EV customers

Develop **algorithms** to detect the charging patterns in the ground truth data

Apply the algorithms to identify EV customers

Detected L2 charging

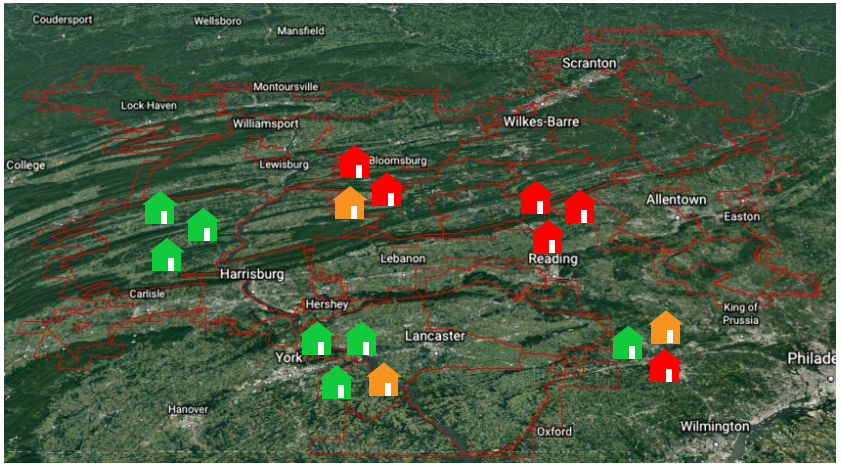


EV adoption propensity

Adoption propensity steps

- Perform **feature engineering** for each customer
- Build **machine learning** models to identify which features have strong correlation with EV adoption
- Apply the model to **predict** a household's likelihood of adopting an EV

Predicted adoption



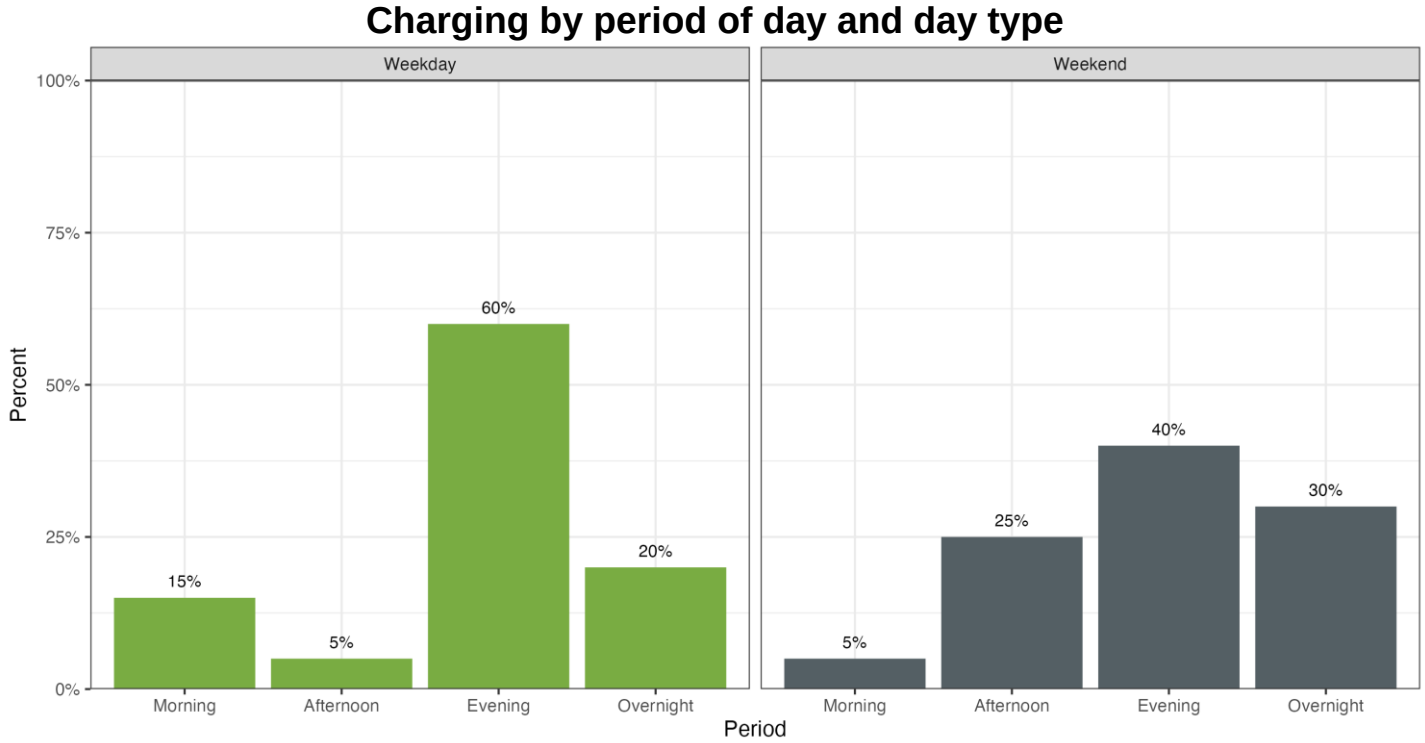
EV owner

Non-EV owner, likely to adopt

Non-EV owner, unlikely to adopt

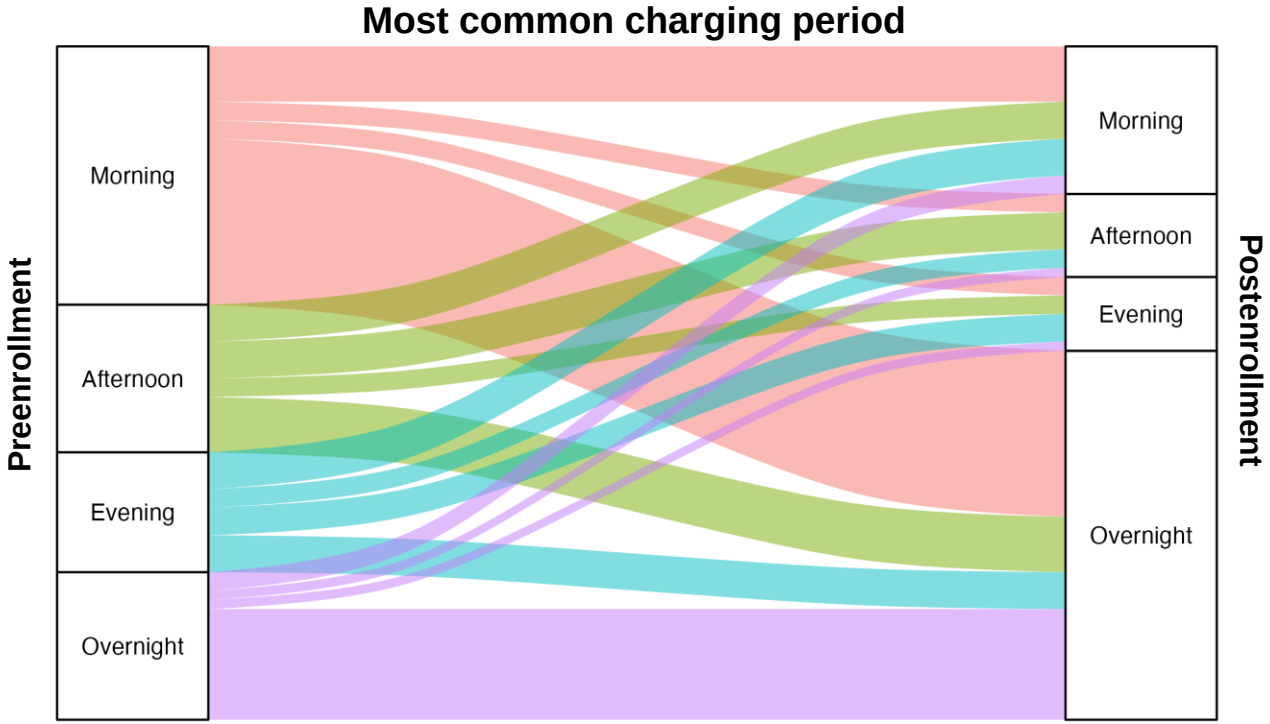
Use cases

Charging behavior



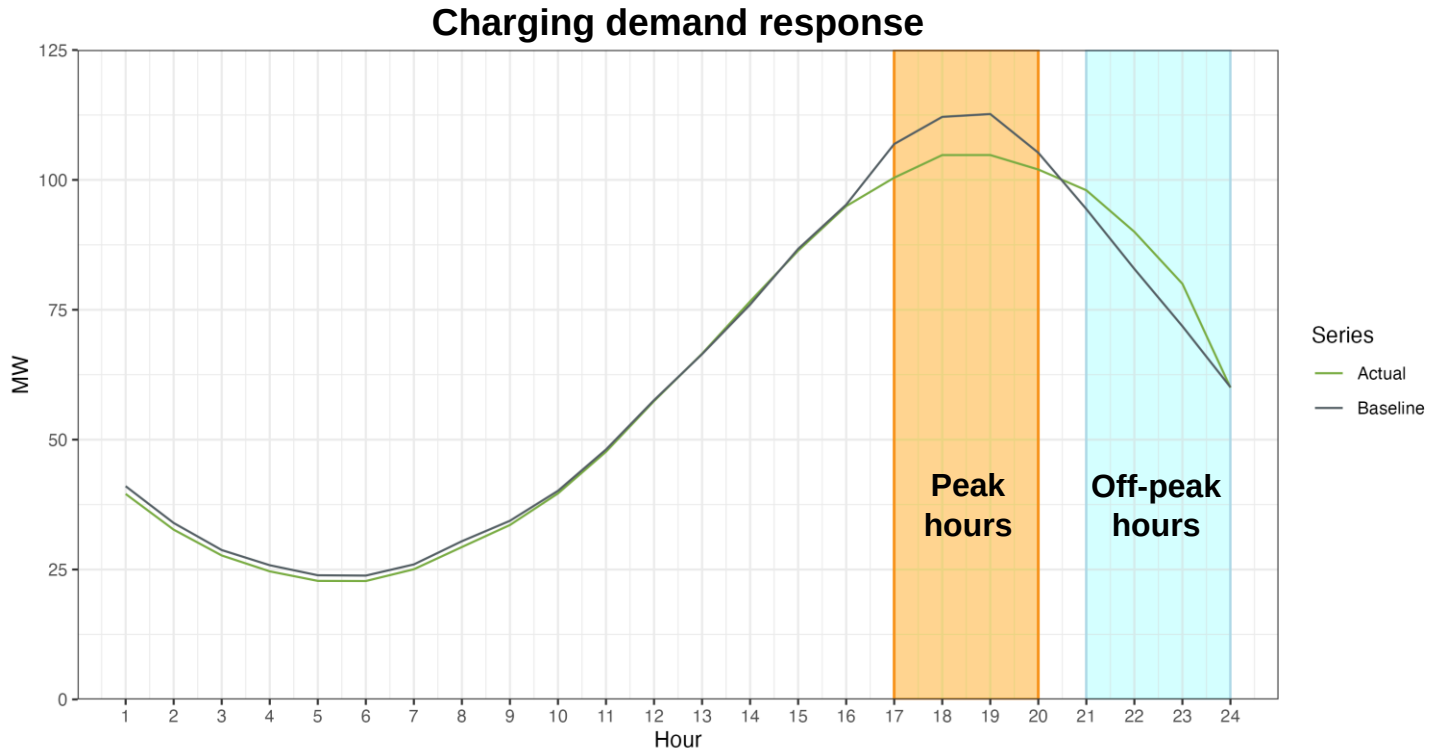
Use detection data to better understand current state of EV charging

EV rate impacts



Monitor effectiveness of intervention strategies to shift charging behavior

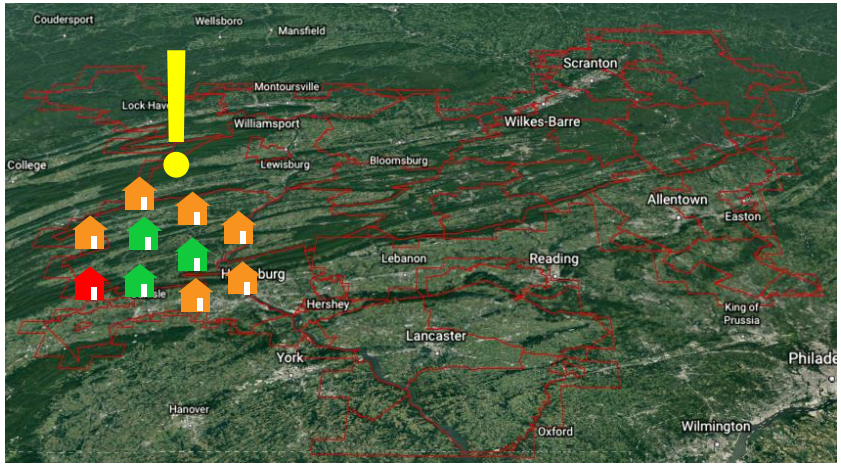
Demand response



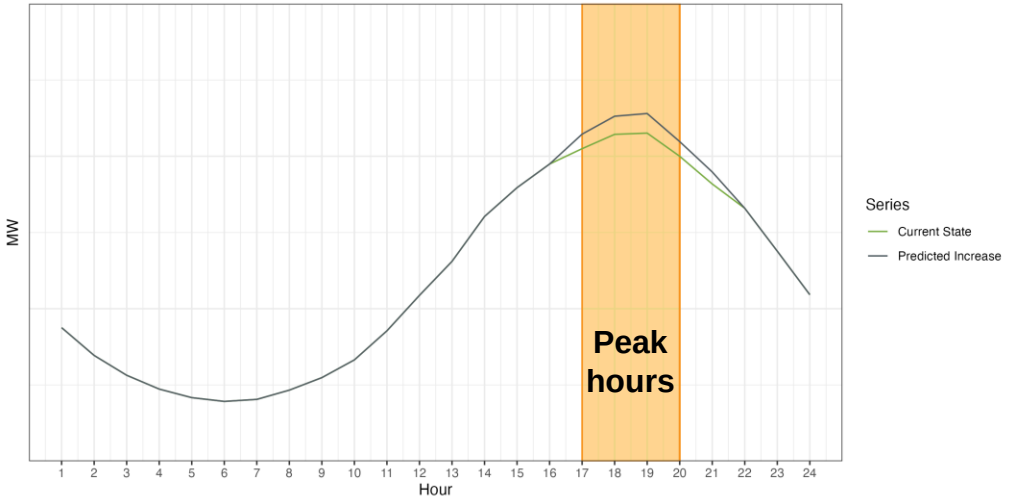
Detection results coupled with load forecasting provide insight into load shifting potential for demand response

Grid impacts

Predicted EV adoption



Load increase from EV adoption



Predicted adoption results coupled with load forecasting provide insight into system load increases and areas of the grid which may need infrastructure upgrades

E Source content to check out

- EV and mobility strategy
- How to use EV charging data to make a great transportation electrification plan
- How can utilities use AMI load curves and other tools to recognize EV charging?
- Leading data science company launches EV data science consortium
- Which customers have Level 2 EV chargers and what programs should you offer them?
- E Source Technology Market Insights: EVs

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