Integrated DER Planning

Presented at ESIG 2018
Spring Technical Workshop
Tucson 3/15/2018

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Powering forward. Together.

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Current SMUD DER Statistics

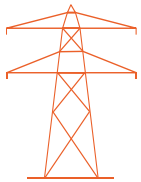
- Residential PV installs –
  - 91 MW
  - Over 20,000 PV systems
  - 5 kW average system capacity
  - Current 2020 forecast 158 MW
- Commercial PV installs –
  - 74 MW
  - 450+ total systems
  - 5 kW to 3 MW system capacity
  - Current 2020 forecast 178 MW
- Residential battery storage
  - Approx. 100 installs to date, mostly for residential with PV

- EVs
  - Current number approx. 7,000
  - Current 2020 forecast approx. 16,000
- DR
  - Current capacity approx. 80 MW
  - 2022 target 200-300 MW
- EE target
  - 150 GWh per year

- Customer investment in DERs greater than SMUD investment in large renewables
- Potential for stranded capital assets
- Public policy push to expand investment in DER technologies
- Decline in utility revenue, increasing fixed cost shifts
- Leveraging DERs to provide grid benefits

SMUD's Integrated DER Strategic Objectives

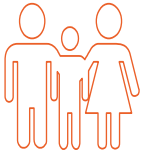
Preferred provider & advisor for customers



DERs Promote grid reliability

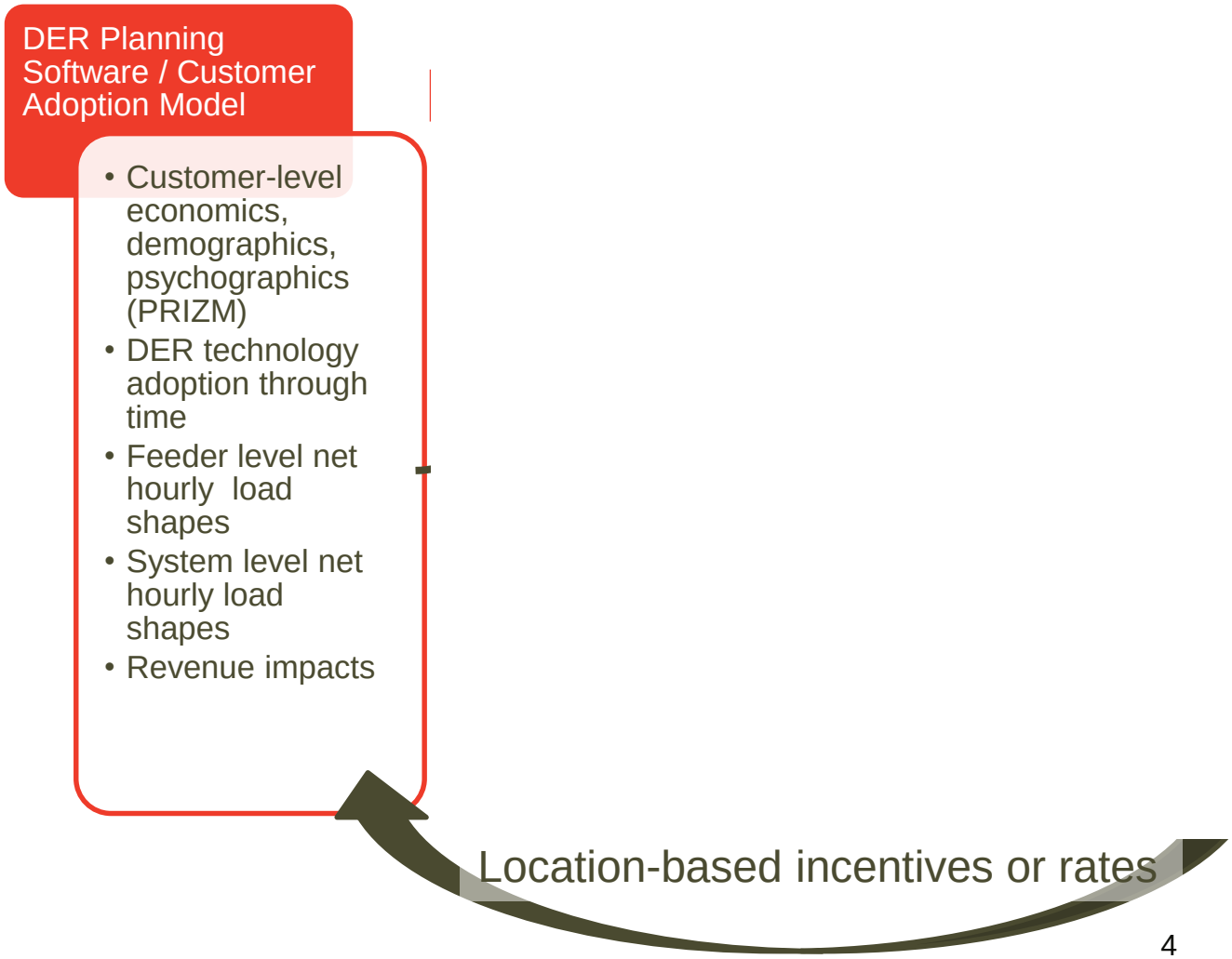
DERs create new value while reducing costs

Deliver SMUD's share of a low carbon future



Extend DER value to all customers

SMUD's Integrated DER Strategic Planning Vision



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Challenge	Past Solution	New Solution
An Integrated DER Strategy	Consu Stud	WattPlan Grid
Analyze multiple DERs	1-2 DERs	PV today; EVs, EE, DR, & Storage next
Adjust planning for a dynamic market	A few ra market sc	On-demand analysis
Understand locational impacts	Limited lo differen	Customer-level, feeder-level, system-level impacts

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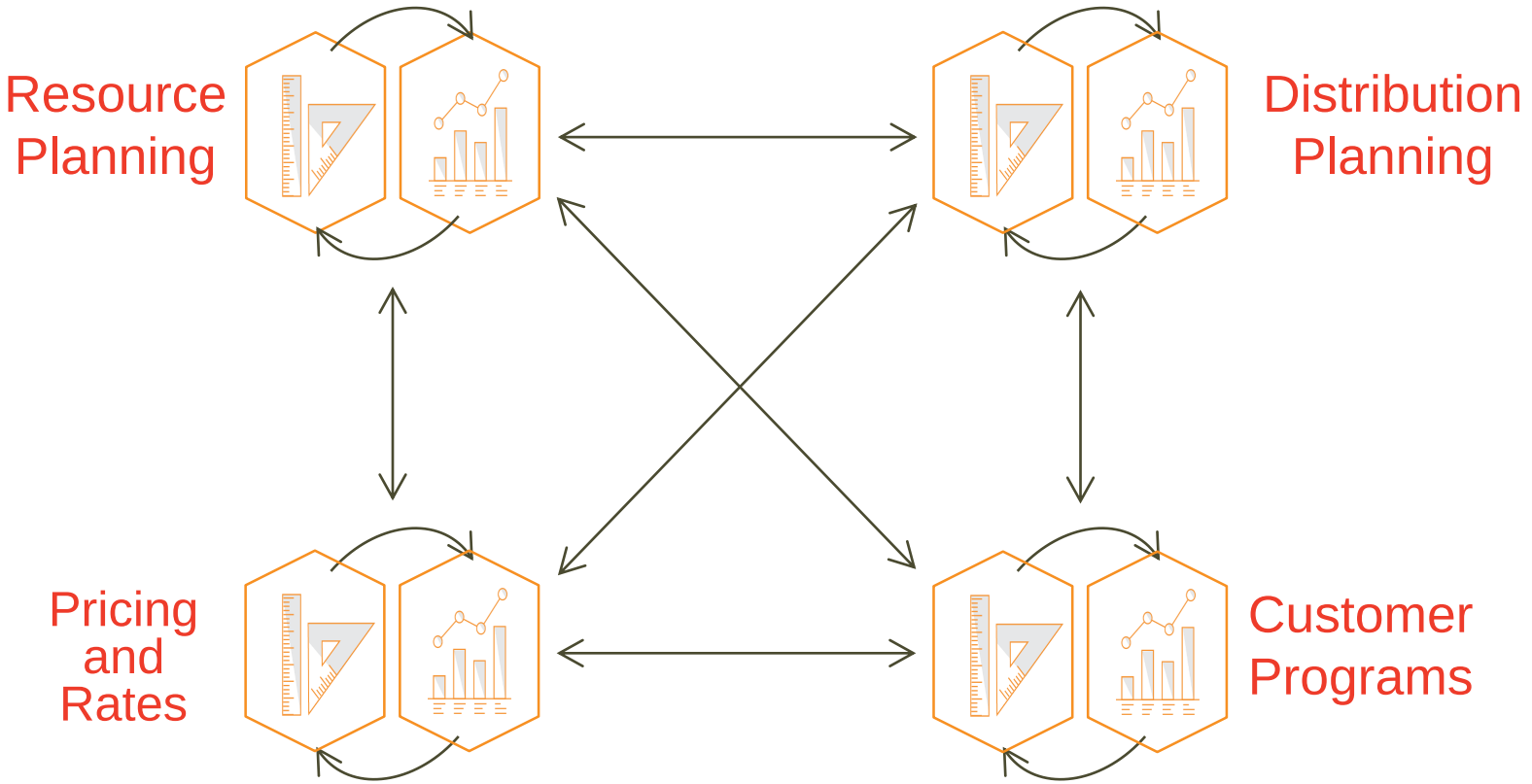
Integrated DER Planning Software



Planning for Customer DER Adoption

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- Co-funding
- Innovative utility expertise

WattPlan®

Customer-level DER planning software for utilities

Clean Power Research®

- Enterprise software development
- Foundational data and software for utilities

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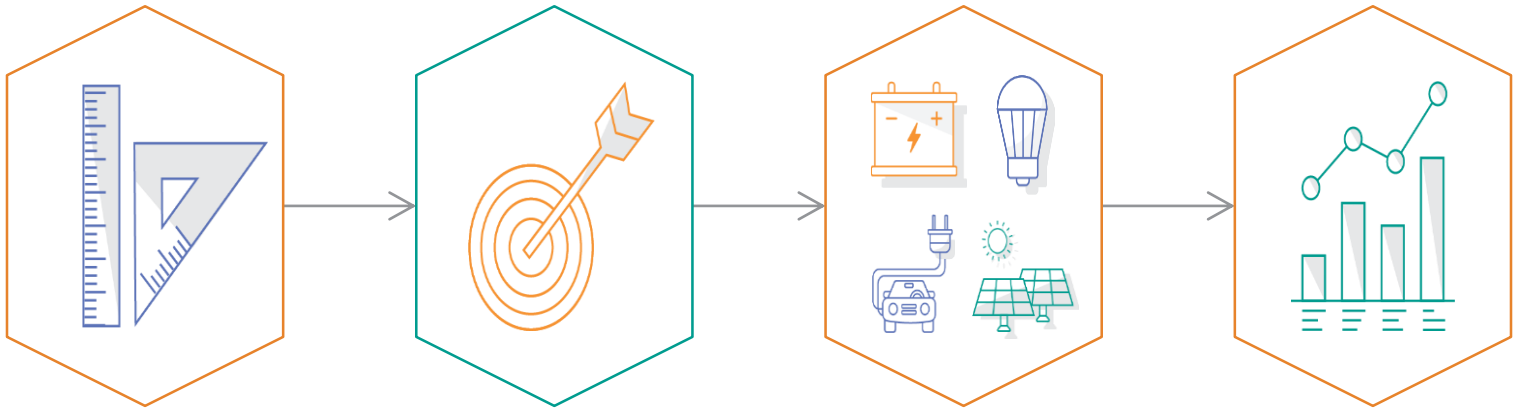
Customer-level DER Planning Software



Utility Defined Inputs

Utility defined rates and market conditions, including TOU and demand rates, various solar metering structures, incentives, & technology price

Individual Customer Economics

Individual customer economics based on usage, technology cost, individual building attributes.

Customer Adoption Propensity

Customer adoption propensity for multiple DERs based on segmentation and demographic factors matched to past program participation

Bottom-line and Load Impacts

Key outputs include revenue impacts, load impacts at the individual customer level or feeder level, and an adoption propensity score for each customer.

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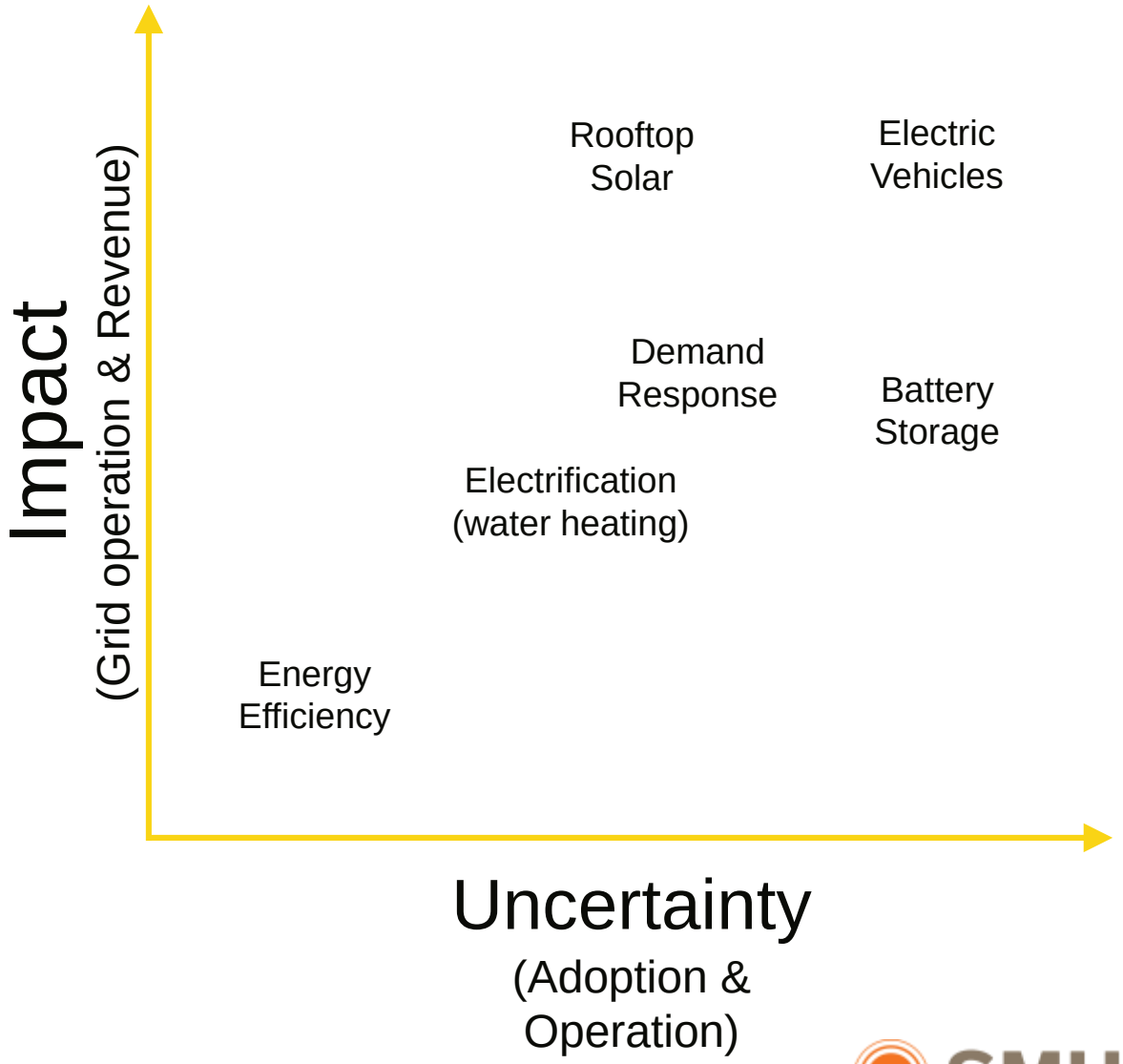
How do rates, incentives, and other market conditions change customer adoption and operation of DERs and what is the feeder level load and revenue impact?



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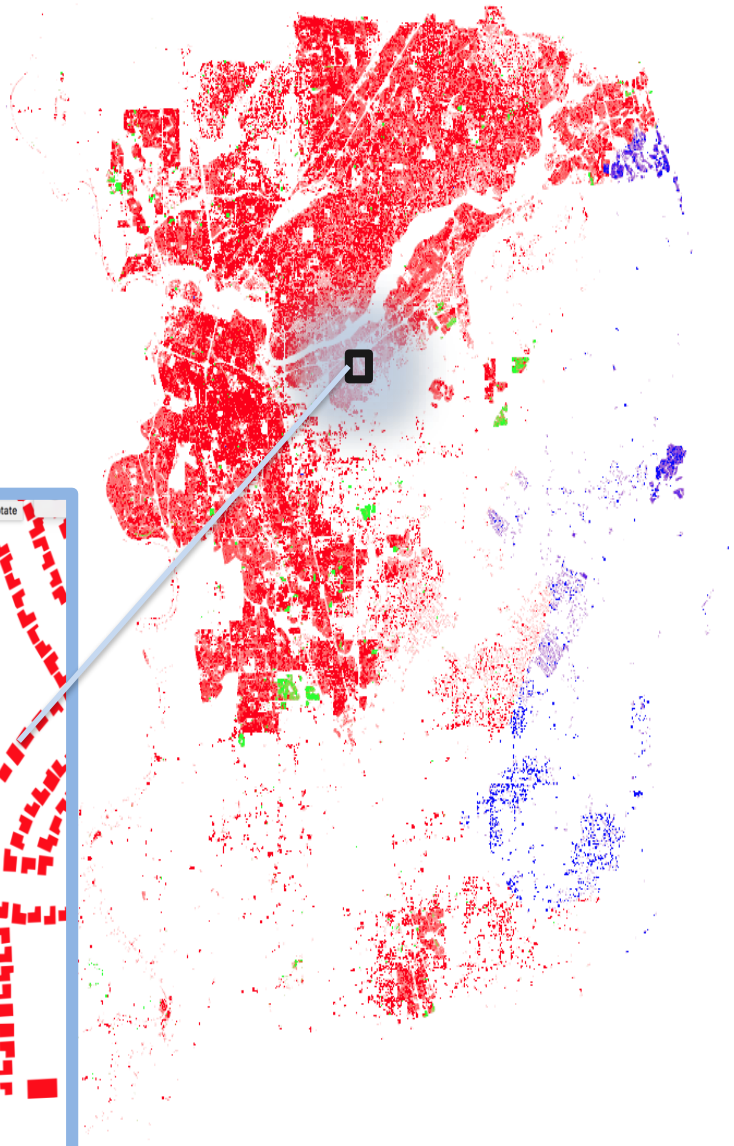
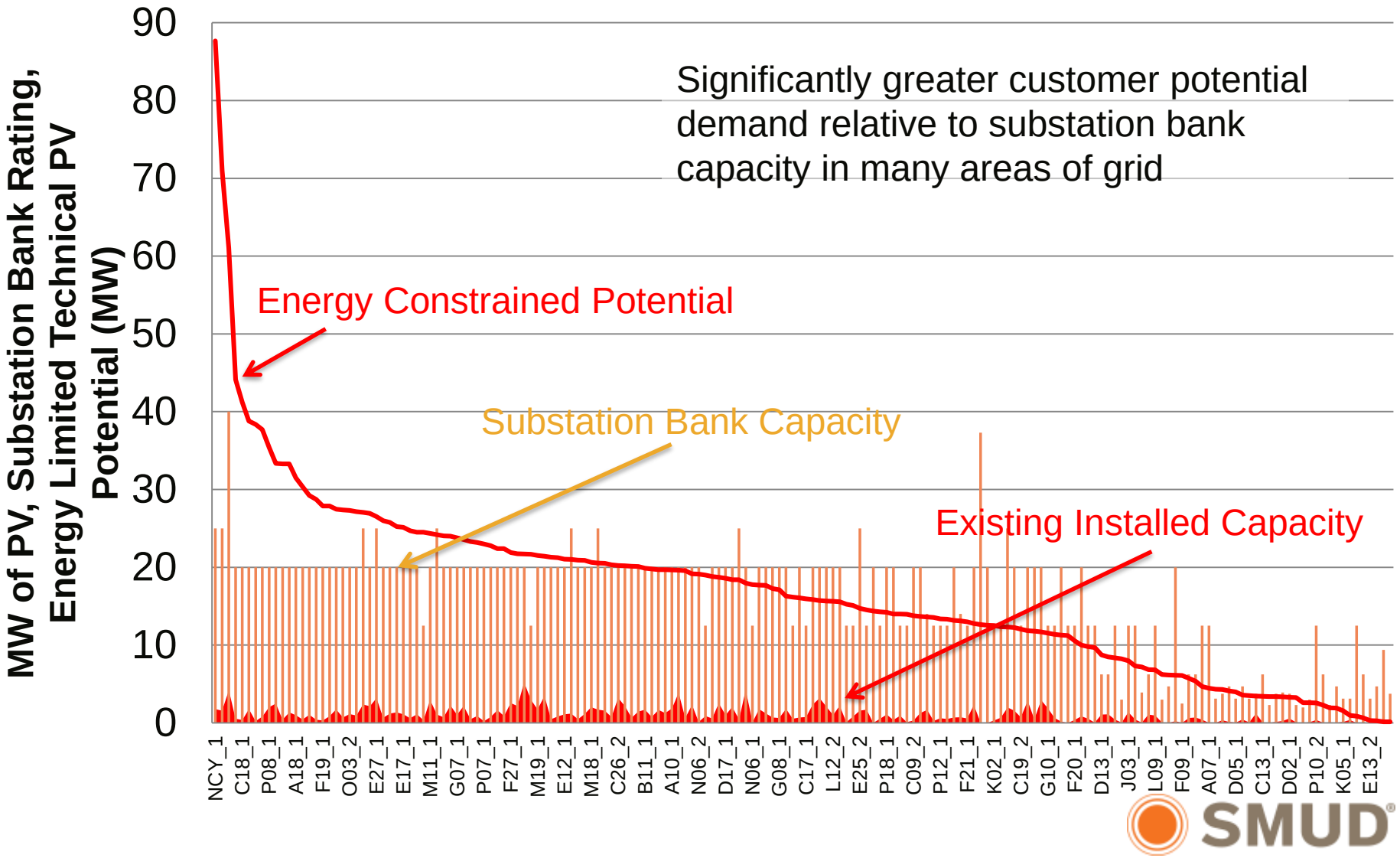
Derive rooftop characteristics

- 463,881 buildings identified
- 4,095,164 roof surfaces analyzed
- Detailed shading + SolarAnywhere® irradiance data



System sizing for every customer

Energy Constrained Potential vs. Existing Installed Capacity



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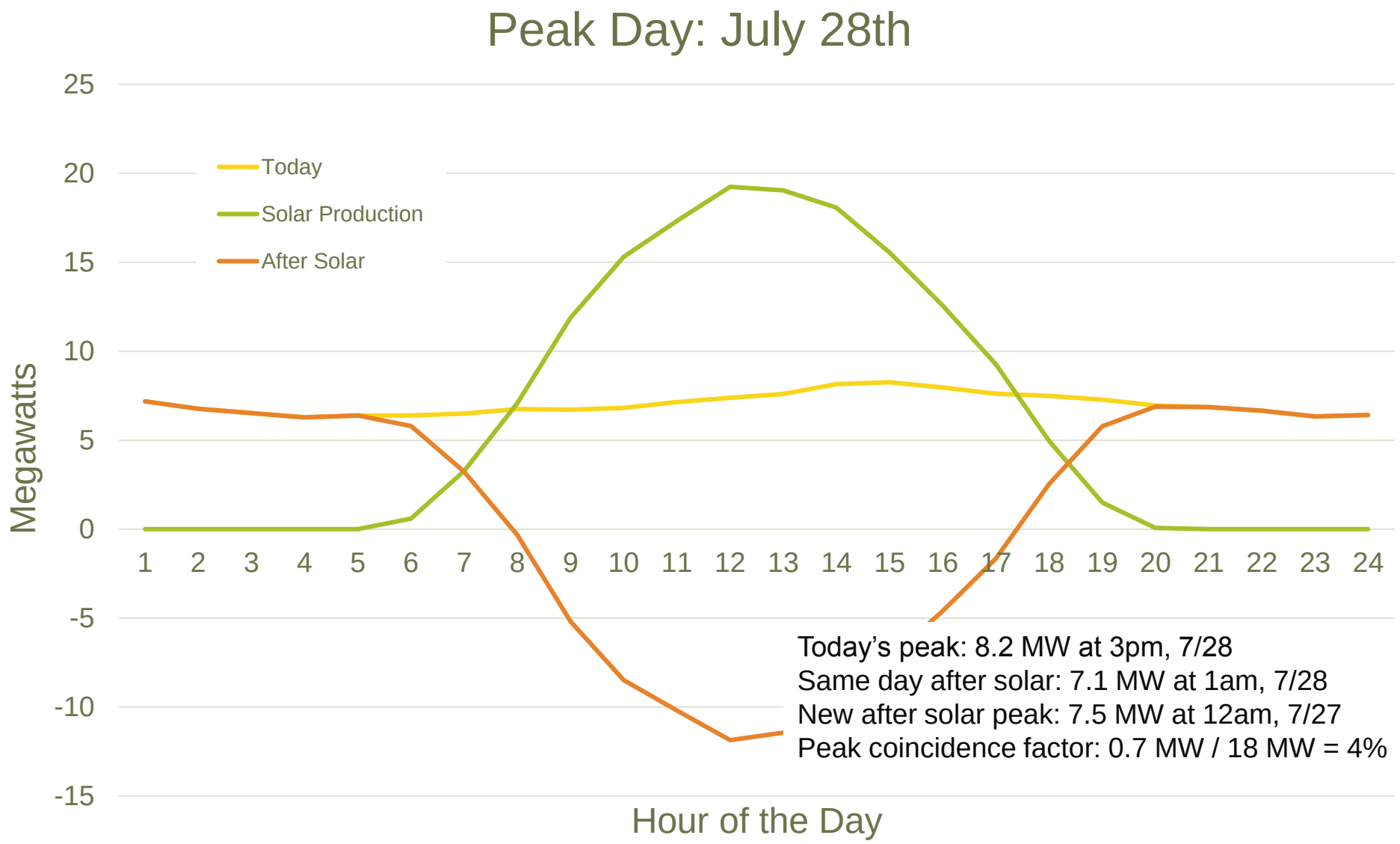
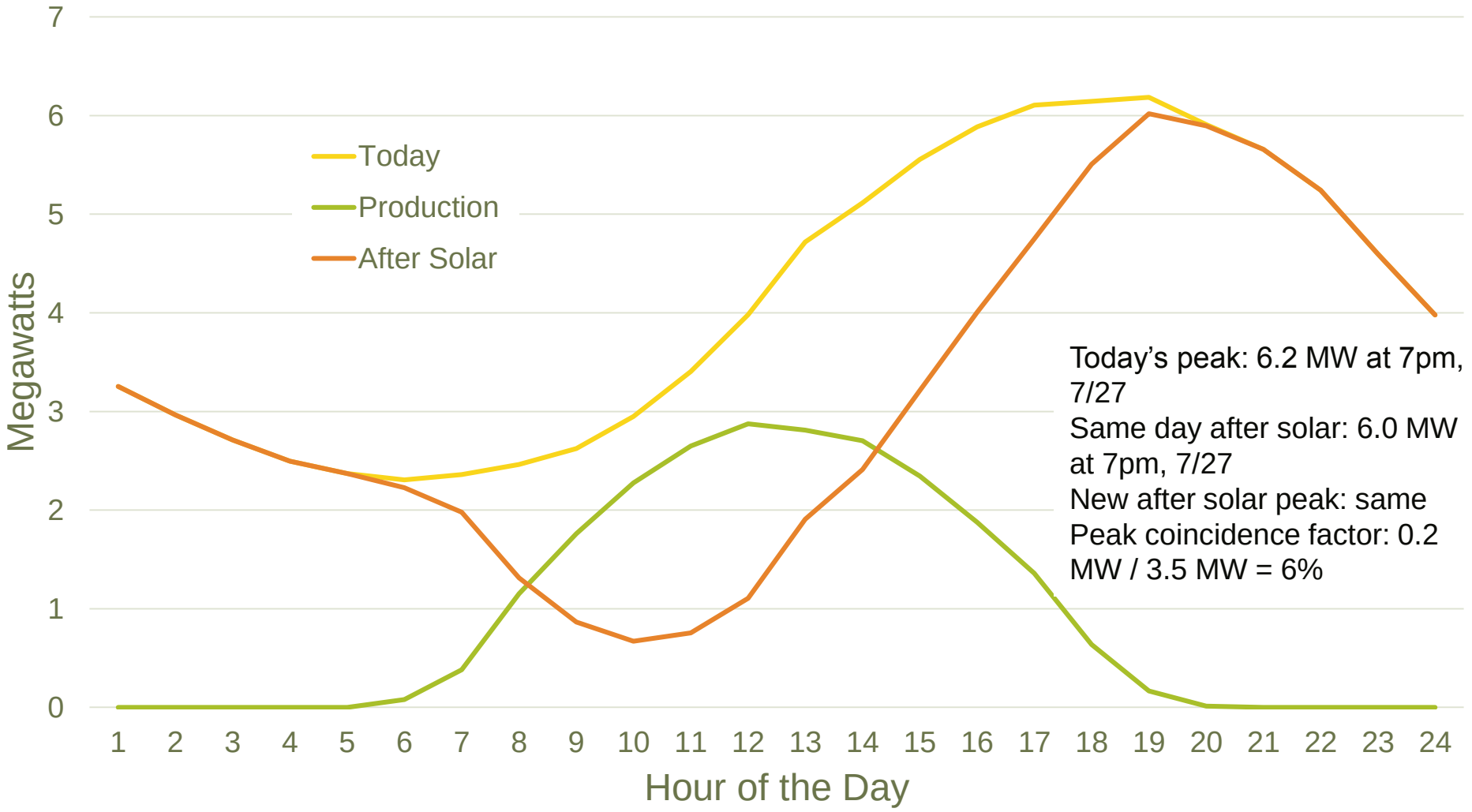
Commercial Feeder

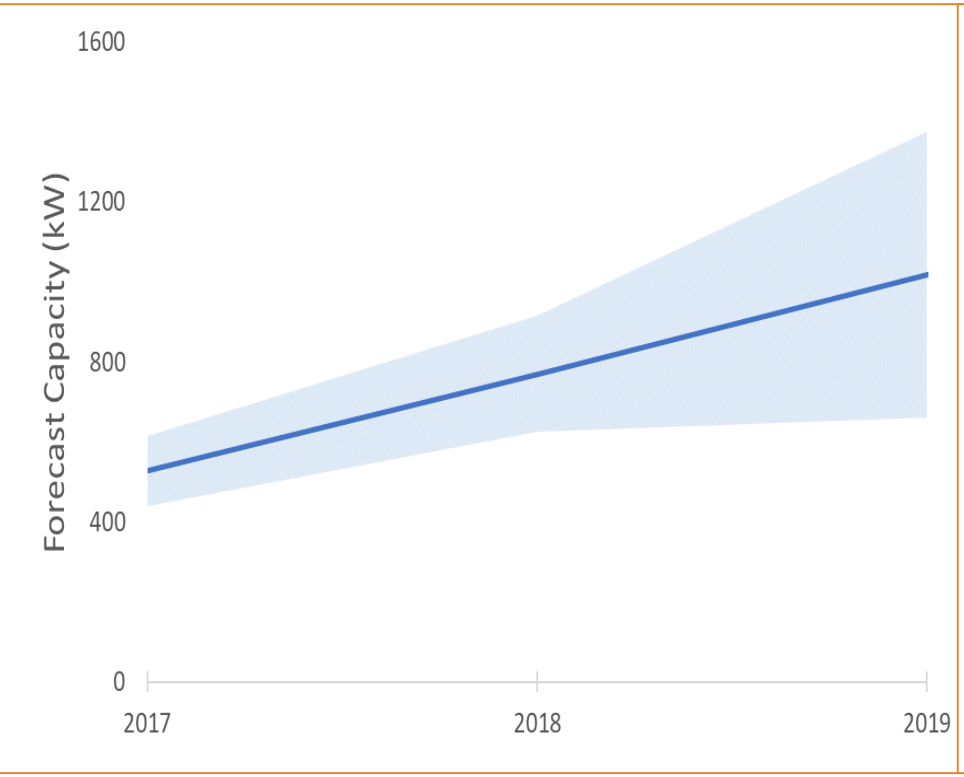


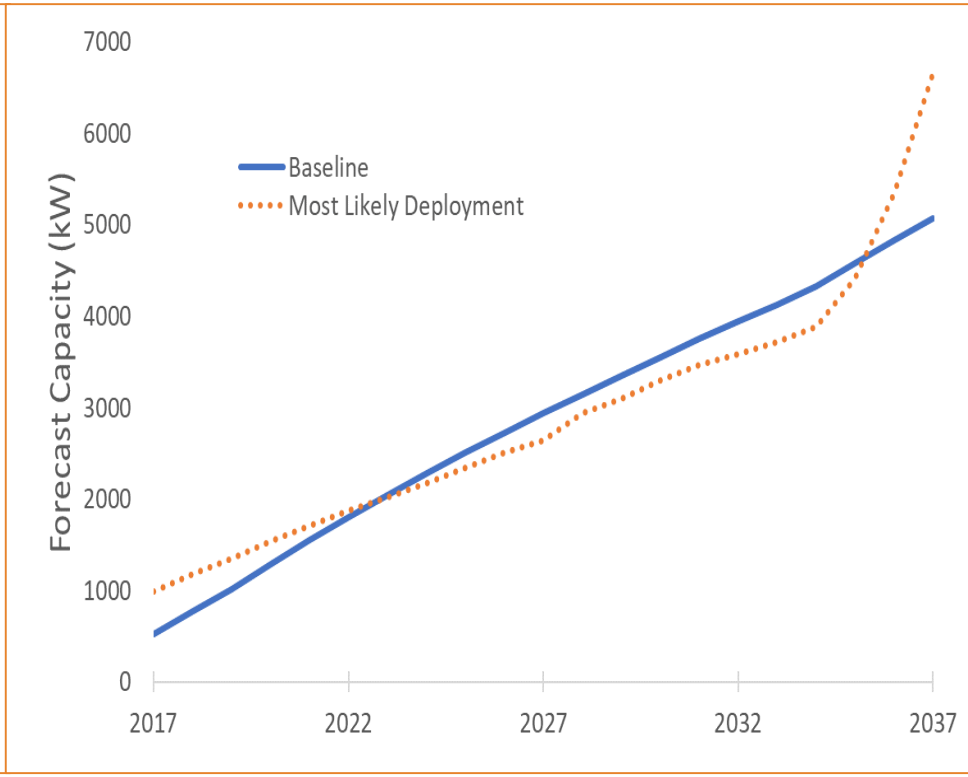
Residential Feeder

Peak Day: July 27th



Adoption Model





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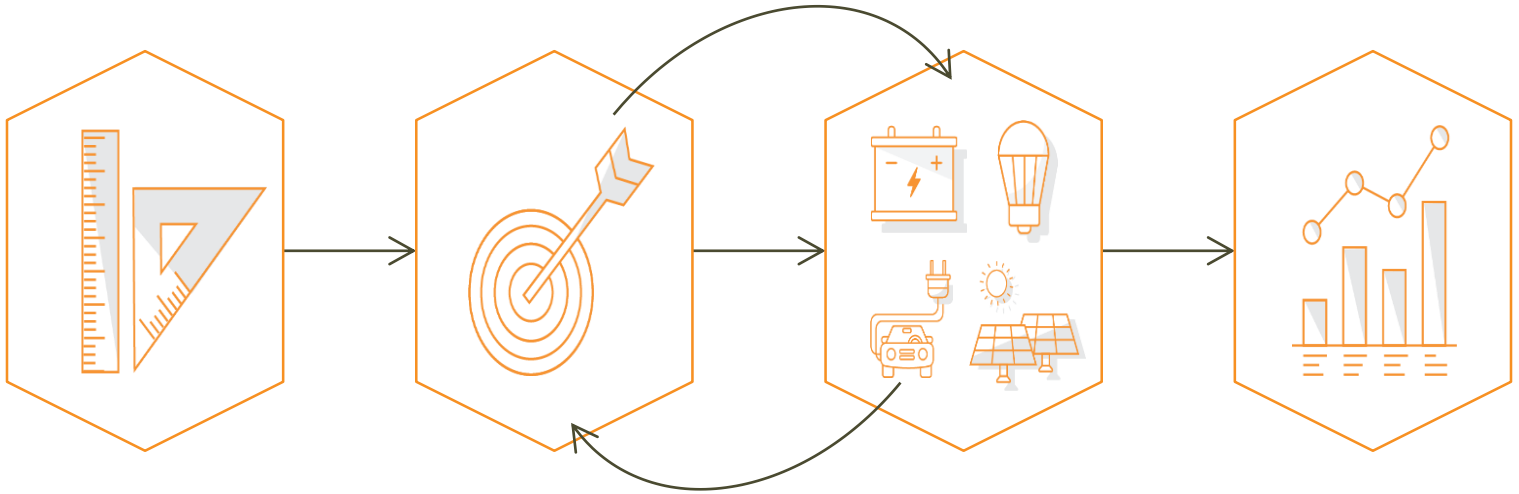
Customer-Level DER Planning Software



Utility Defined Inputs

Individual Customer Economics

Customer Adoption Propensity

Revenue and Load Impacts

Thank You!

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