

# Value of DERs – A Utility Perspective

ESIG Spring Technical Workshop  
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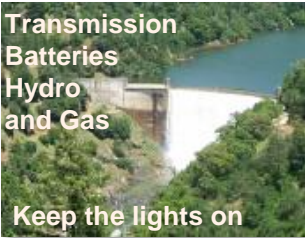






Powering forward. Together.

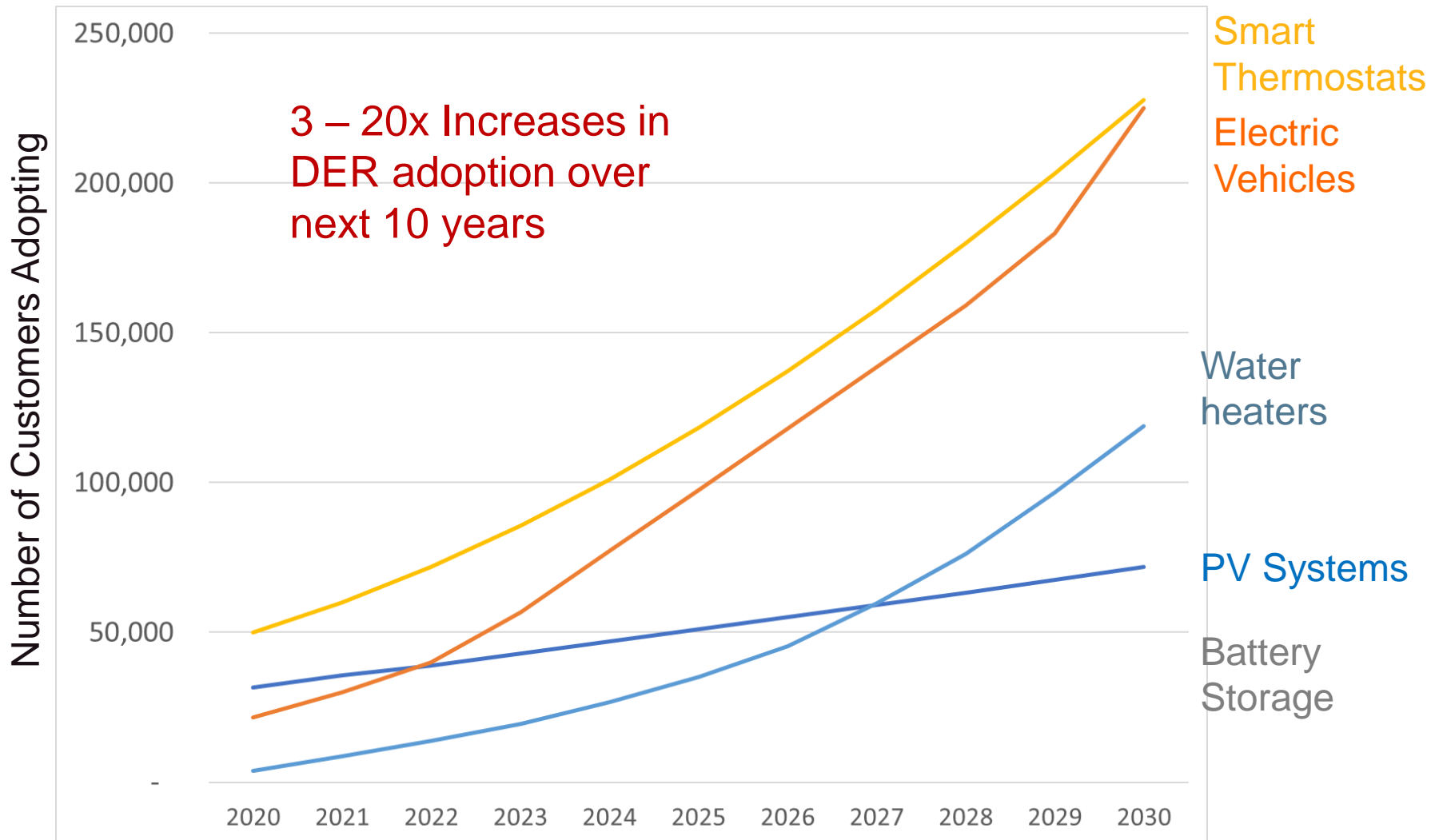


# SMUD's 2019 Integrated Resource Plan

## NET-ZERO-CARBON ELECTRICITY BY 2040

<div>Electrification</div> <div></div> <div>\$1.7B</div> <div></div> <div>880k EVs</div>	<div>Renewables</div> <div></div> <div>\$3.9B</div> <div></div> <div>290 MW Rooftop PV</div>	<div>Reliable Power</div> <div></div> <div>540 MW Local Storage</div> <div>\$800M</div> <div></div> <div>Transmission Batteries Hydro and Gas</div> <div>Keep the lights on</div>	<div>Maximize Community Benefits</div> <div></div> <div>Affordable Rates Local Energy DAC Benefits Local Air Quality</div> <div></div>	<div>Lower GHG Emissions</div> <div></div> <div>SMUD 70% Below 1990 Sacramento 64% Below 1990</div> <div></div> <div>405k All Electric Smart Homes</div>
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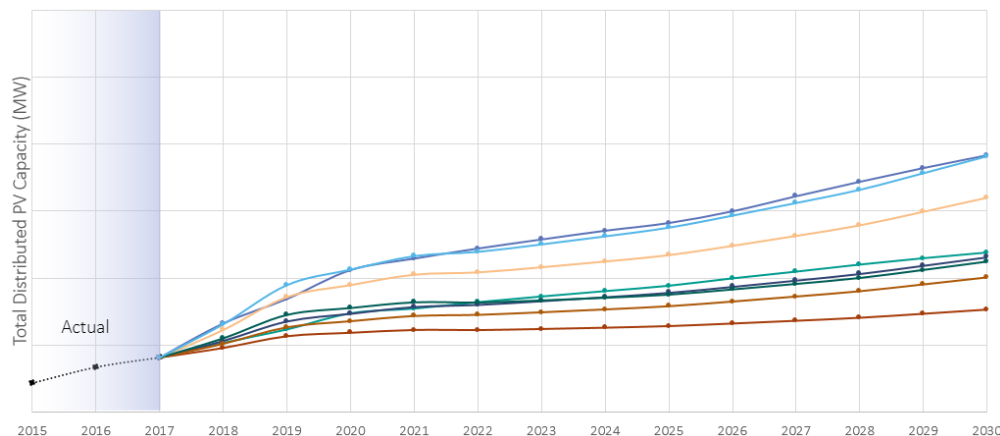
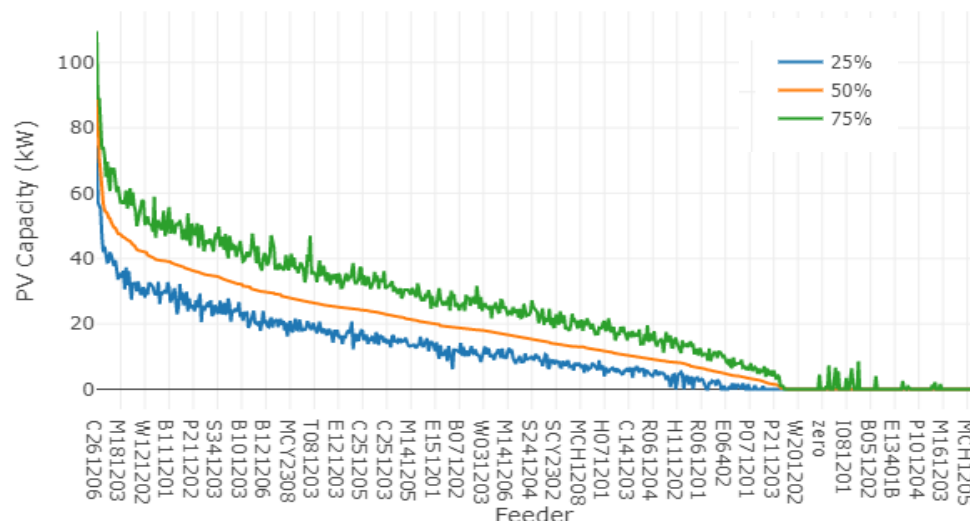
# DER Adoption Forecasts in IRP



# Valuing DERs in Grid Planning – Predicting Adoption

- To provide value in planning for grid upgrades, need confidence in ability to predict adoption
  - Spatial and temporal confidence ahead of normal planning lead-times
- SMUD co-developing WattPlan Grid with Clean Power Research to model individual customer DER choice
  - Scenario analysis based on rate design, technology costs

PV Adoption Capacity Quantiles by Feeder

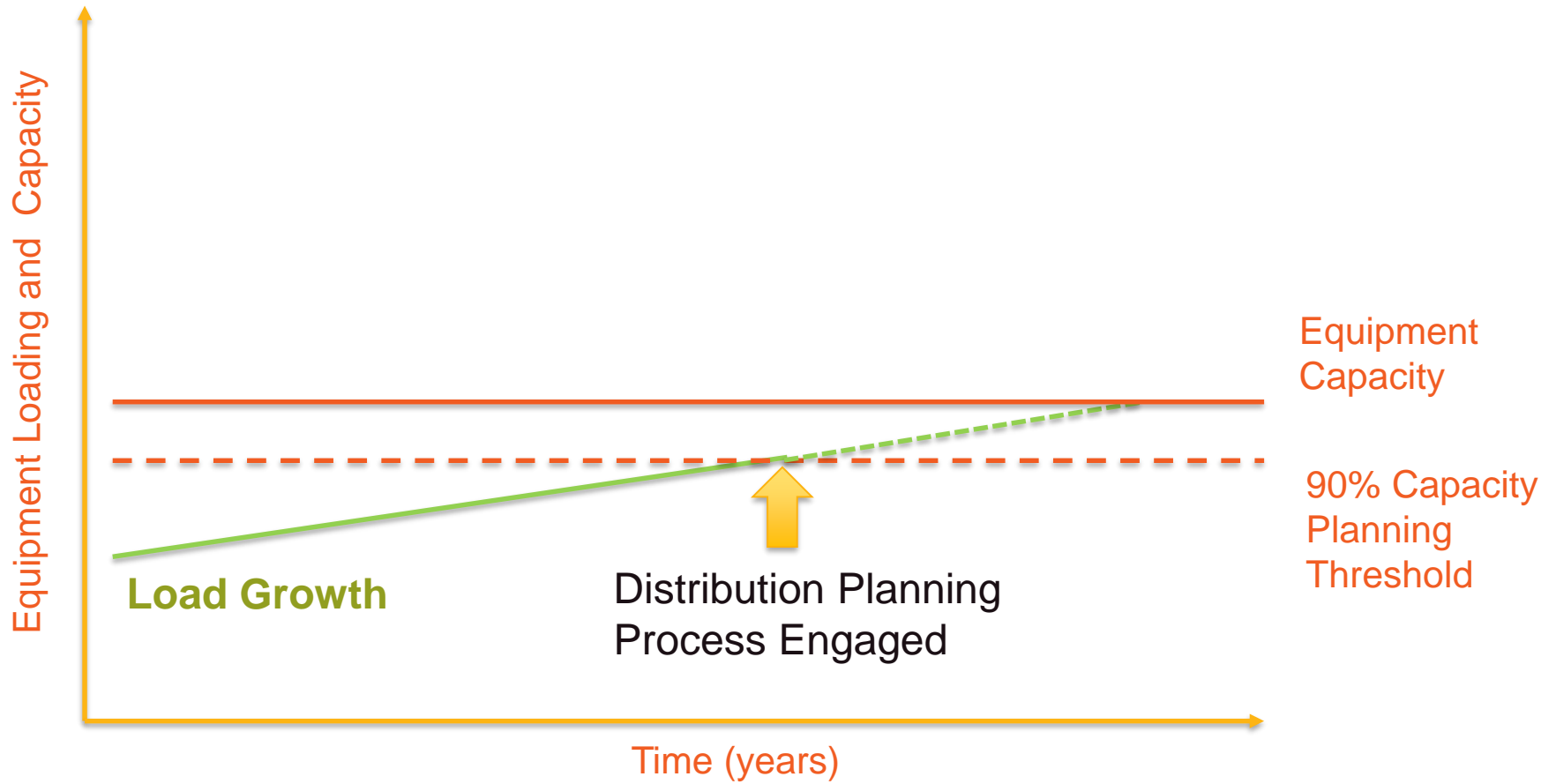




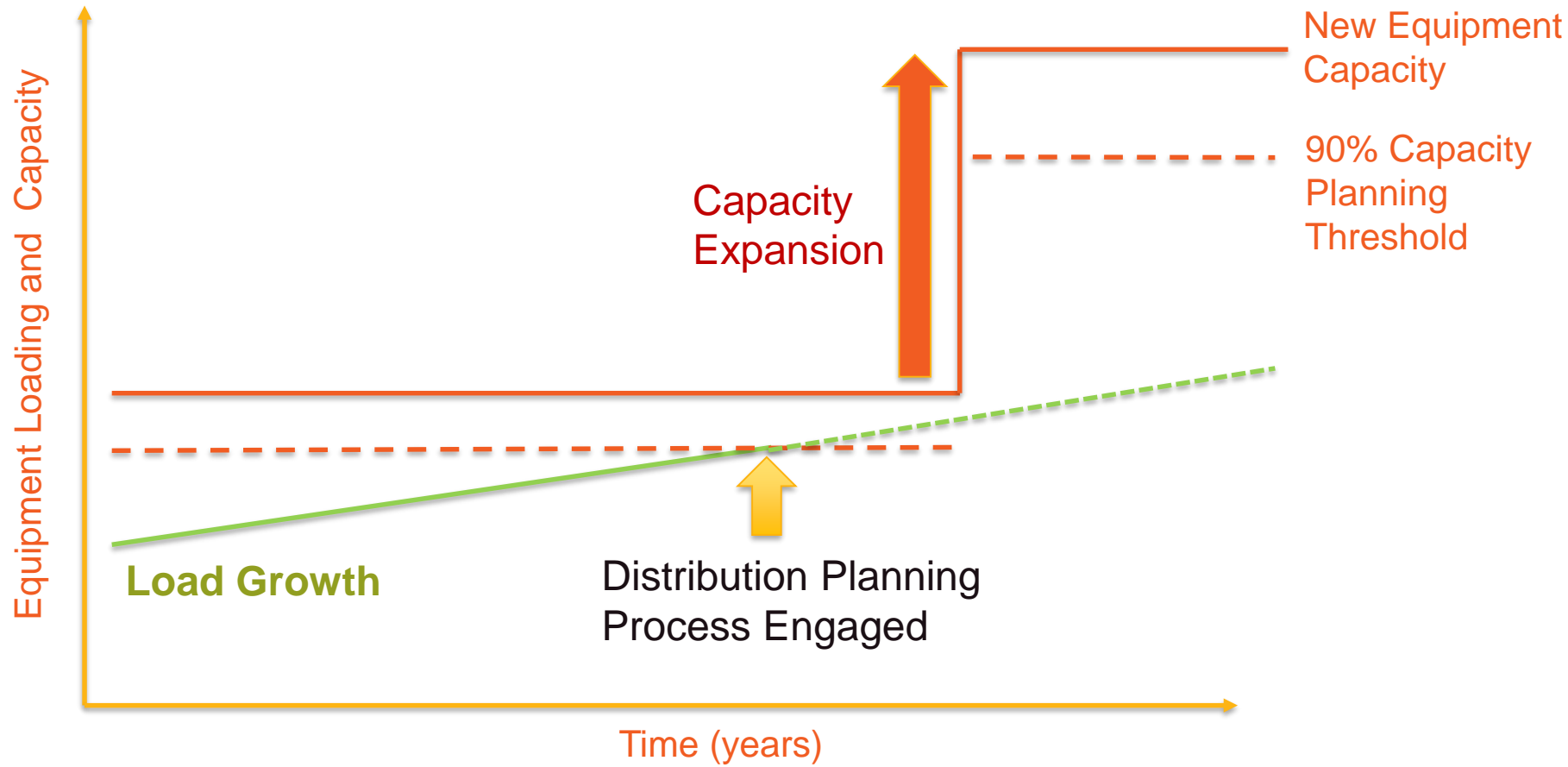
# Specified and Unspecified Capacity Deferral

- Specified capacity avoidance – DERs contracted to displace wires solution as part of distribution planning process
  - Challenges to fit within timing of typical process make it difficult to leverage organic adoption, lead to higher cost DER solutions (e.g. contracted storage)
- Unspecified capacity avoidance – Organic DER adoption reduces demand ahead of distribution planning process / capacity upgrade being triggered
  - Leverages organic adoption, attribution of capacity value to DERs challenging (many actors, considerations to attribute value)
- DER Planning Threshold – concept for threshold to be set ahead of Distribution Planning Process threshold, triggering modest locational benefit adder
  - Leverages organic adoption with slight economic signal boost, expands set of resources that could contribute to avoiding capacity upgrade

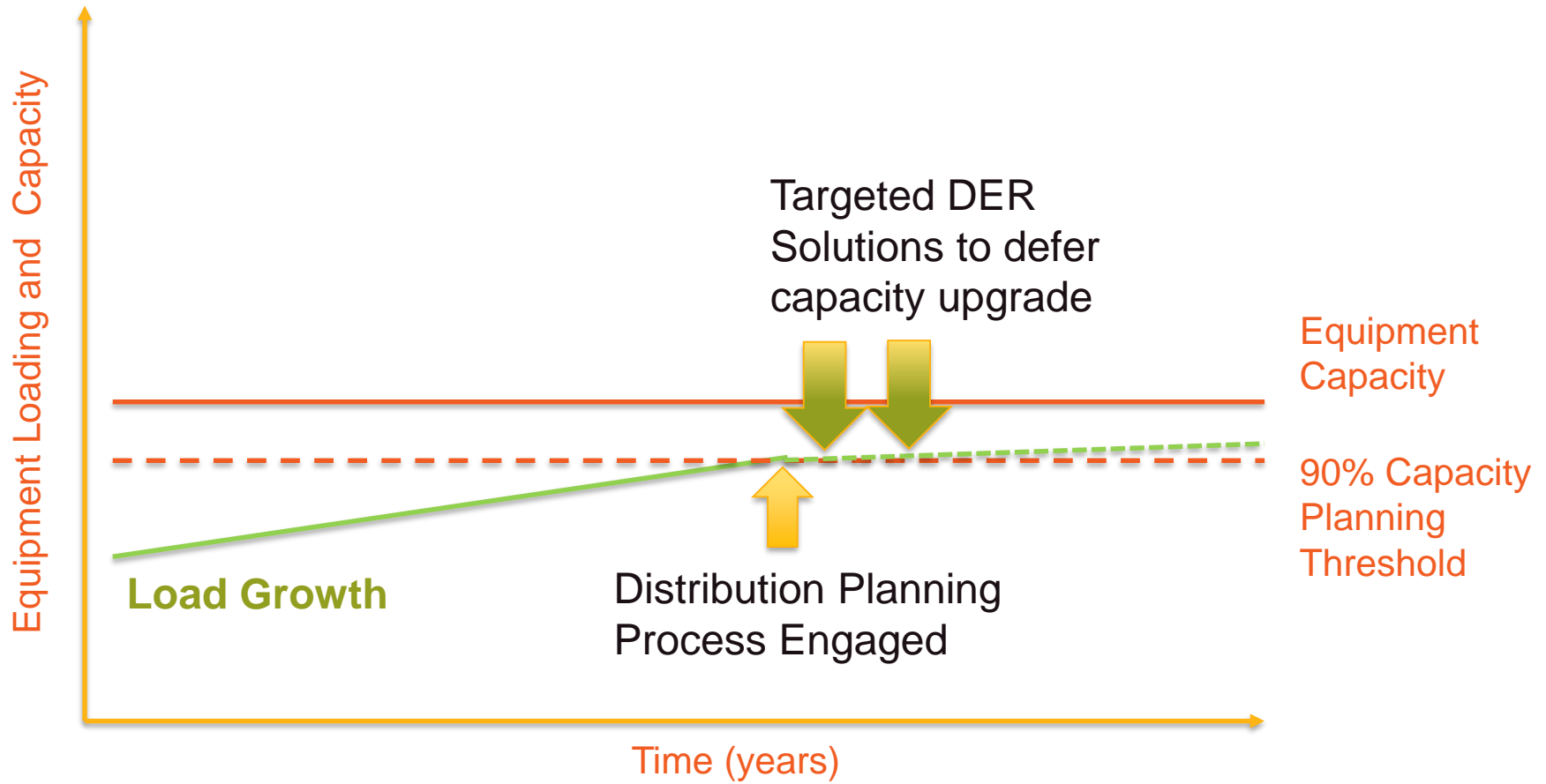
# Specified vs. Unspecified Deferral and a DER Planning Threshold Concept



# Specified vs. Unspecified Deferral and a DER Planning Threshold Concept – Traditional Upgrade

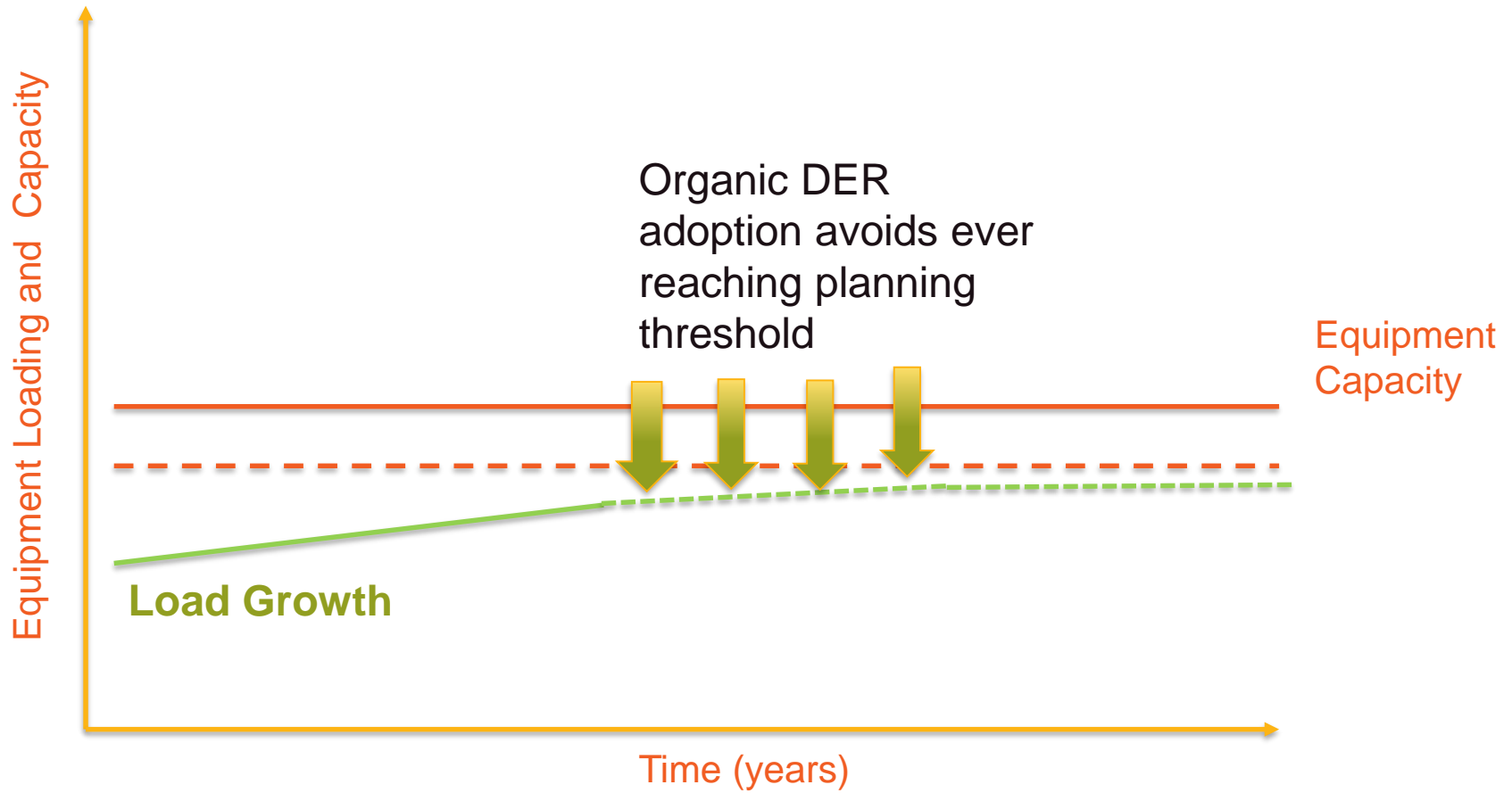


# Specified vs. Unspecified Deferral and a DER Planning Threshold Concept – Specified Avoidance

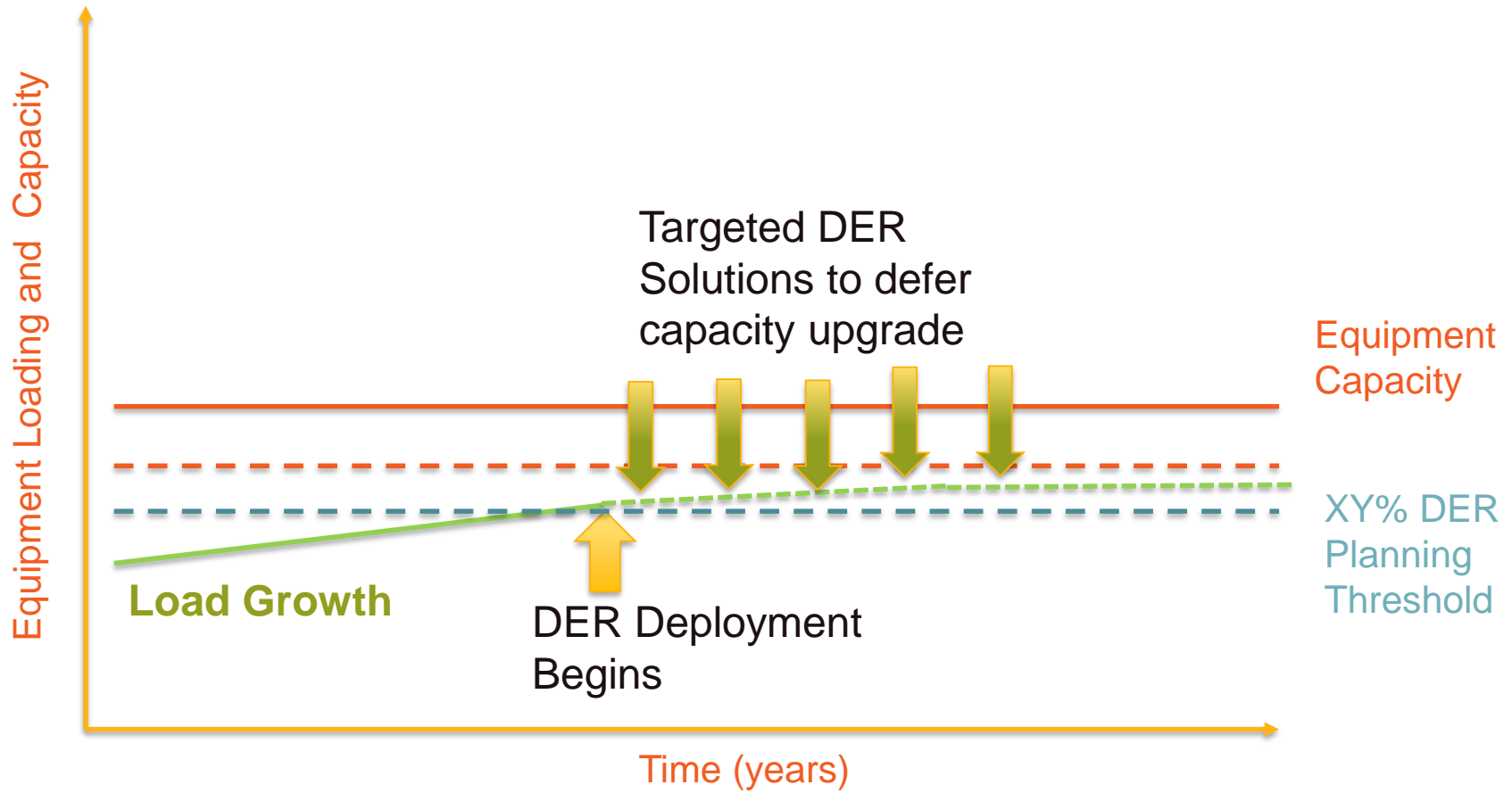




# Specified vs. Unspecified Deferral and a DER Planning Threshold Concept – Unspecified capacity deferral



# Specified vs. Unspecified Deferral and a DER Planning Threshold Concept – DER Planning Threshold Concept



# Operational Considerations for Value of DERs

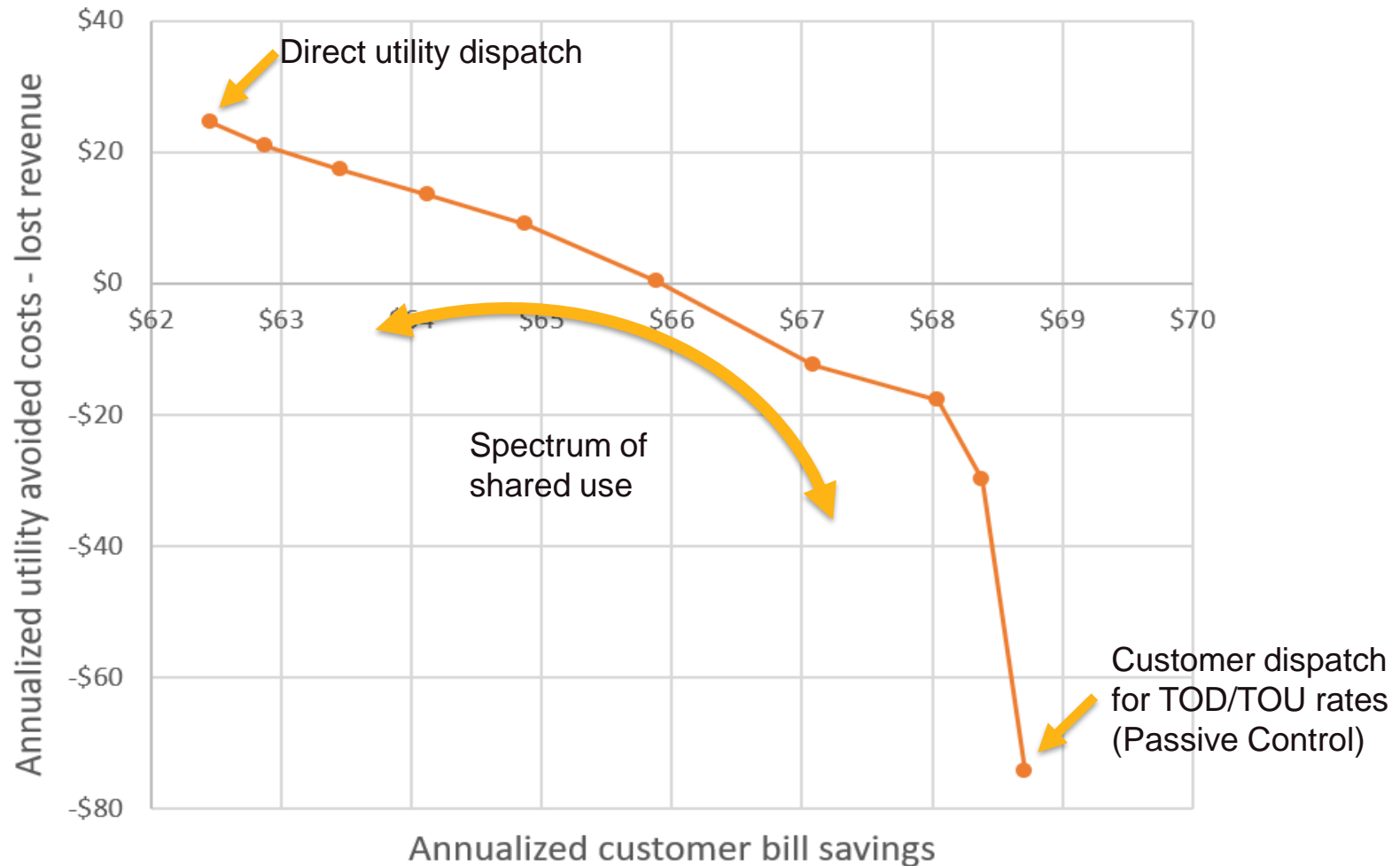
- Fixed vs dynamic DERs
  - PV and EE have a fixed, predictable shape, unaffected by pricing or signaling
  - Storage, EV, HVAC, water heating are all dynamic
- Different values for dynamic DERs



Need to consider value tradeoff with increased cost for accessing direct control

# Customer / Utility Tradeoffs with DER Control

Economic Impact of 4 kW Residential Battery with PV



# SMUD NEM 2 Value of Solar and Solar + Storage Study

- Currently nearly 30,000 solar customers (10% of SF houses) with solar, SMUD estimates \$30M per year in cross-subsidy from NEM
- Value of Solar & Storage study underway to review benefits and costs of generation, T/D, environmental and societal impacts of BTM solar and storage
- Examining customer dispatched and utility dispatched valuations
- Results expected Summer 2020
- Series of community workshops to follow before rate proposals in 2021



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NET-ZERO-CARBON  
ELECTRICITY BY 2040

## Electrification



\$1.7B



880k EVs

## Renewables



\$3.9B



290 MW  
Rooftop PV

## Reliable Power



\$800M



Transmission  
Batteries  
Hydro  
and Gas

Keep the lights on

## Maximize Community Benefits



Affordable Rates  
Local Energy  
DAC Benefits  
Local Air Quality



## Lower GHG Emissions



SMUD  
70% Below 1990  
Sacramento  
64% Below 1990



405k All Electric  
Smart Homes



# Primary Value of DERs for SMUD in Accelerating Carbon Reduction

- Expect electrification investments to substantially exceed grid upgrades (dependent on incorporating DER controls)
- SMUD adopted Carbon Metric for Efficiency / Electrification programs in 2020
- Tool developed in 2019 with E3 to evaluate hourly carbon benefits of EE, EB, EV, PV, will be adding storage, load shifting

Technology	Lifetime Carbon Savings (2020 install)	Cost per tonne to other SMUD Customers
Rooftop Solar (5kW)	12.2	\$ 905
HP Water Heating	11	\$ 180
HP Space Heating	22.8	\$ 112
AC 16 SEER	3.3	\$ 212
Electric Vehicle	32	\$ 44

Thank you.

