DOCKETED

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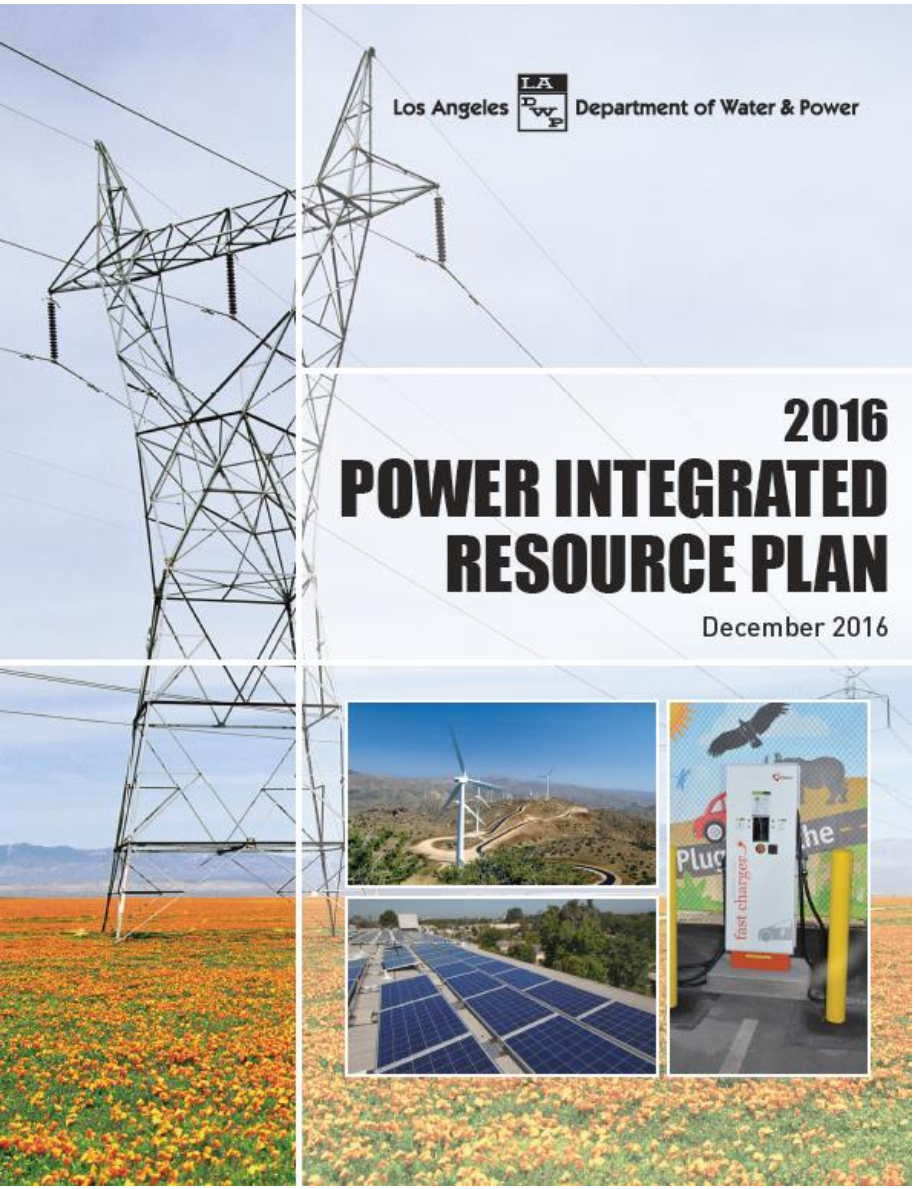
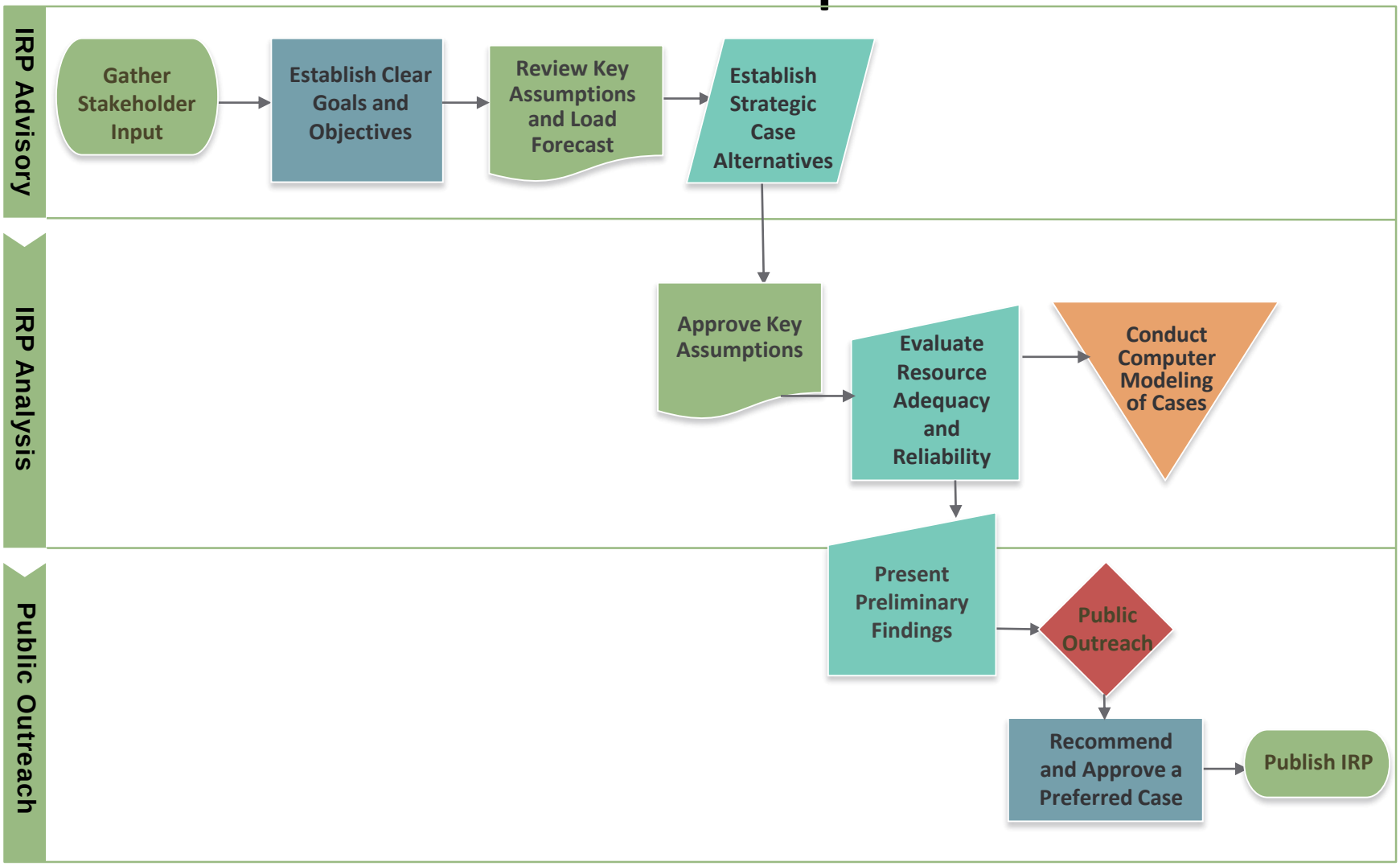
Putting Customers First



IEPR Commissioner Workshop
Draft Guidelines for POU Integrated Resource Plans
May 25, 2017

LADWP's IRP Development Process



Major IRP Elements

Reduce GHG Emissions by 40% Statewide by 2030

33% RPS by 2020 and 55% RPS by 2030

Achieve Doubling of Energy Efficiency Savings by 2030

Energy Project Investments – Storage, DER, OTC

Power System Reliability Program Investments

Transportation Electrification

2016 IRP Case Scenarios

Coal Cases

1. Intermountain Power Plant (IPP) 2027* (base)
2. IPP 2025*

Renewable (RPS), Local Solar, Energy Storage and Electrification (EV) Cases

4. 50% RPS, Low Local Solar, Low Storage, Low EV*
5. 50% RPS, Low Local Solar, Low Storage, High EV
6. 50% RPS, High Local Solar, Low Storage, High EV
7. 50% RPS, High Local Solar, High Storage, High EV
8. 65% RPS, High Local Solar, High Storage, High EV

8LLS. 65% RPS, Low Local Solar, High Storage, High EV

8MLS. 65% RPS, Med Local Solar, High Storage, High EV

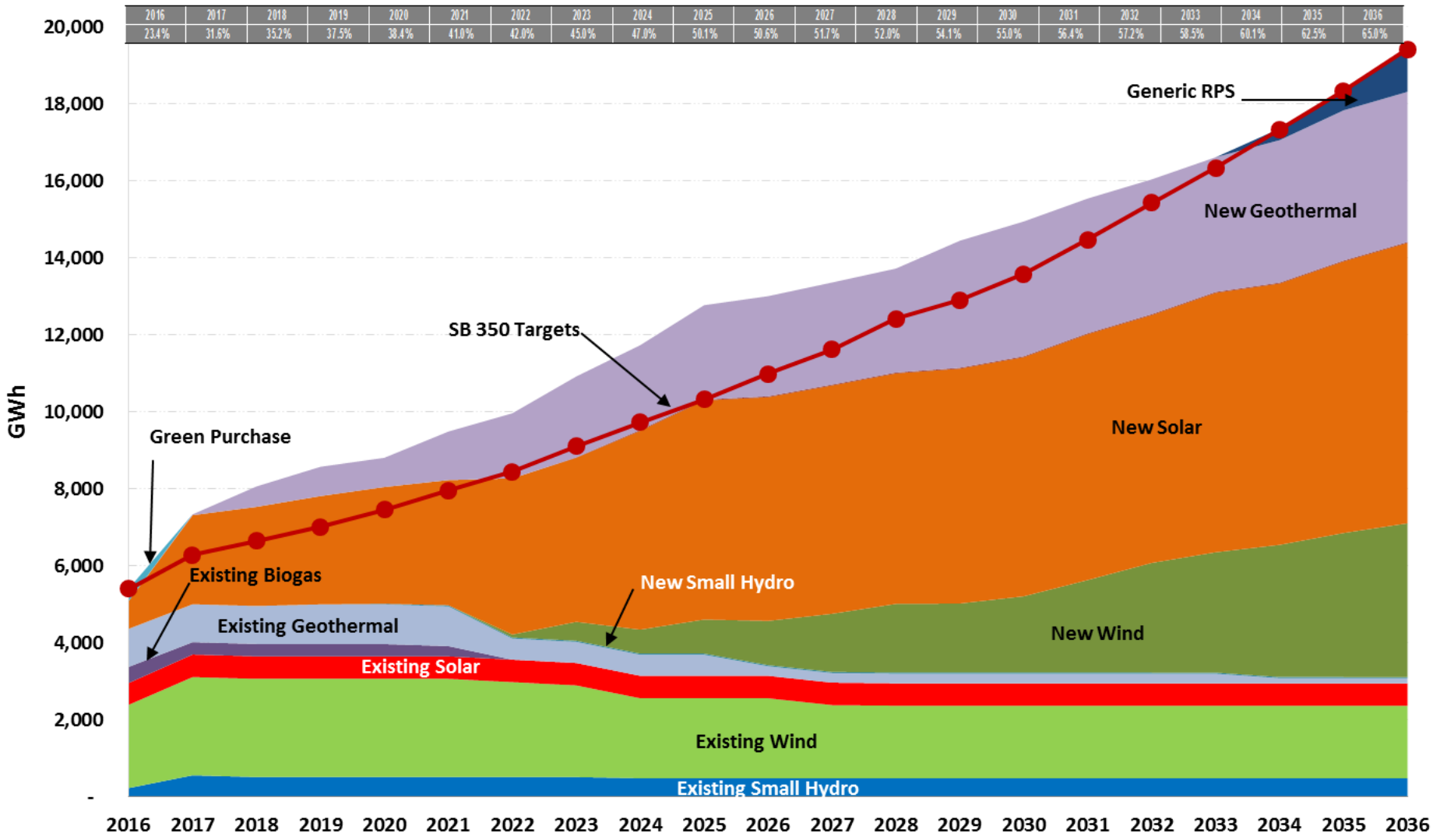
8SF. 65% Solar Focus RPS, High Local Solar, High Storage, High EV

(high local solar and storage in accordance to LA Sustainability pLAn goals)

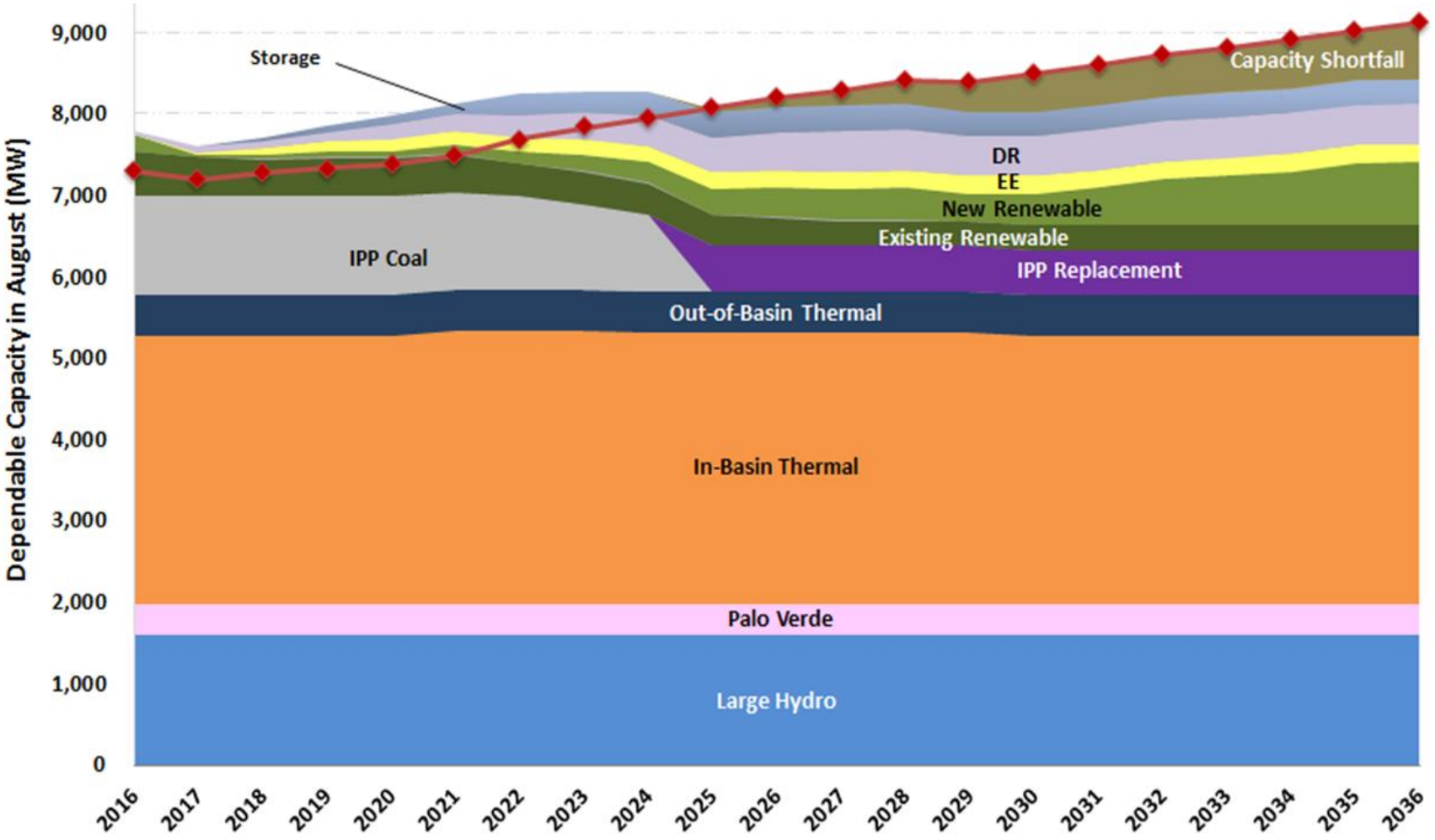
Recommended Case

**Expected, Low, and High Fuel Cost Sensitivity Analysis was performed*

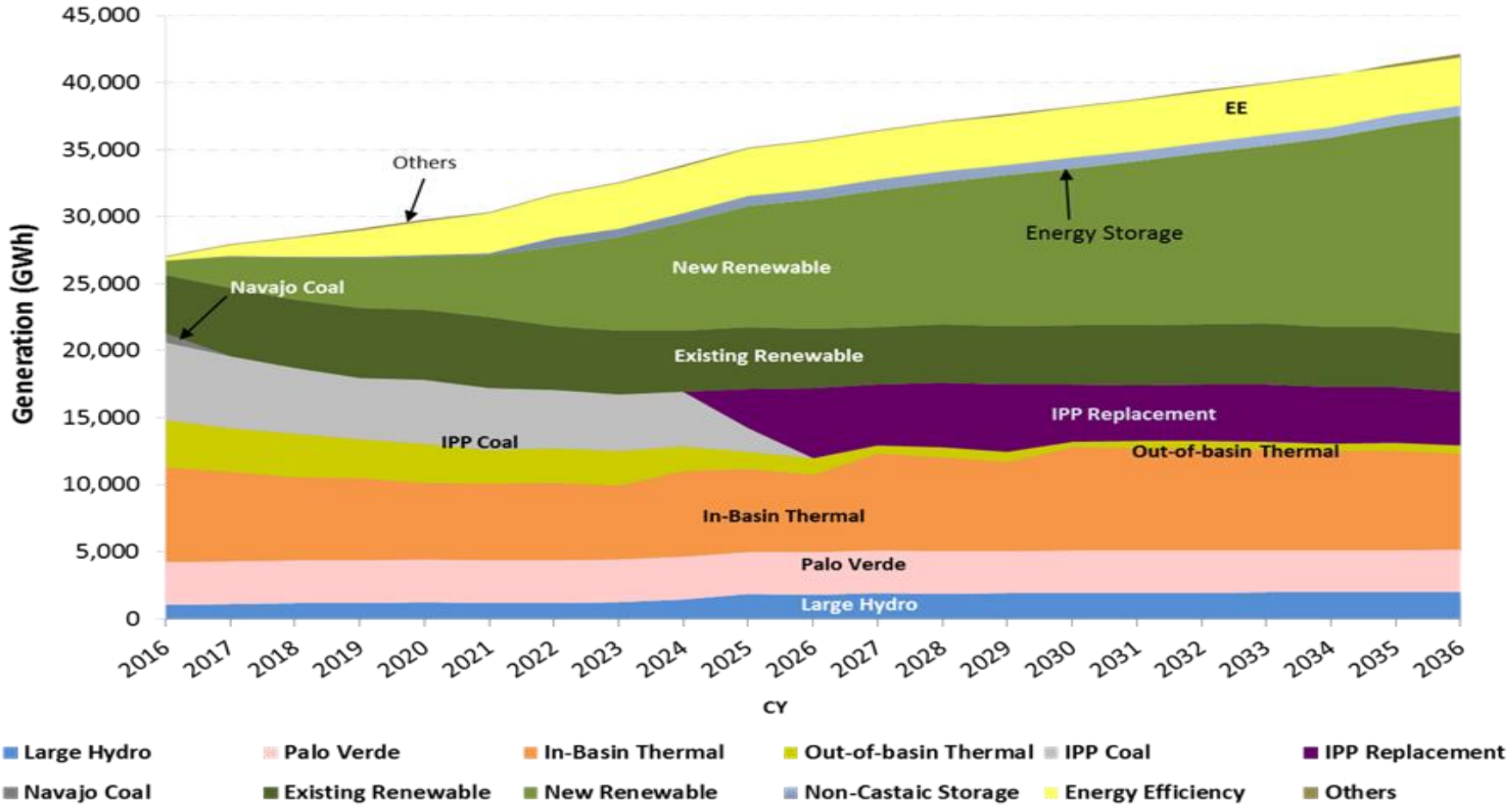
Renewables - 55% RPS by 2030



Capacity / Resource Adequacy



Energy Balance



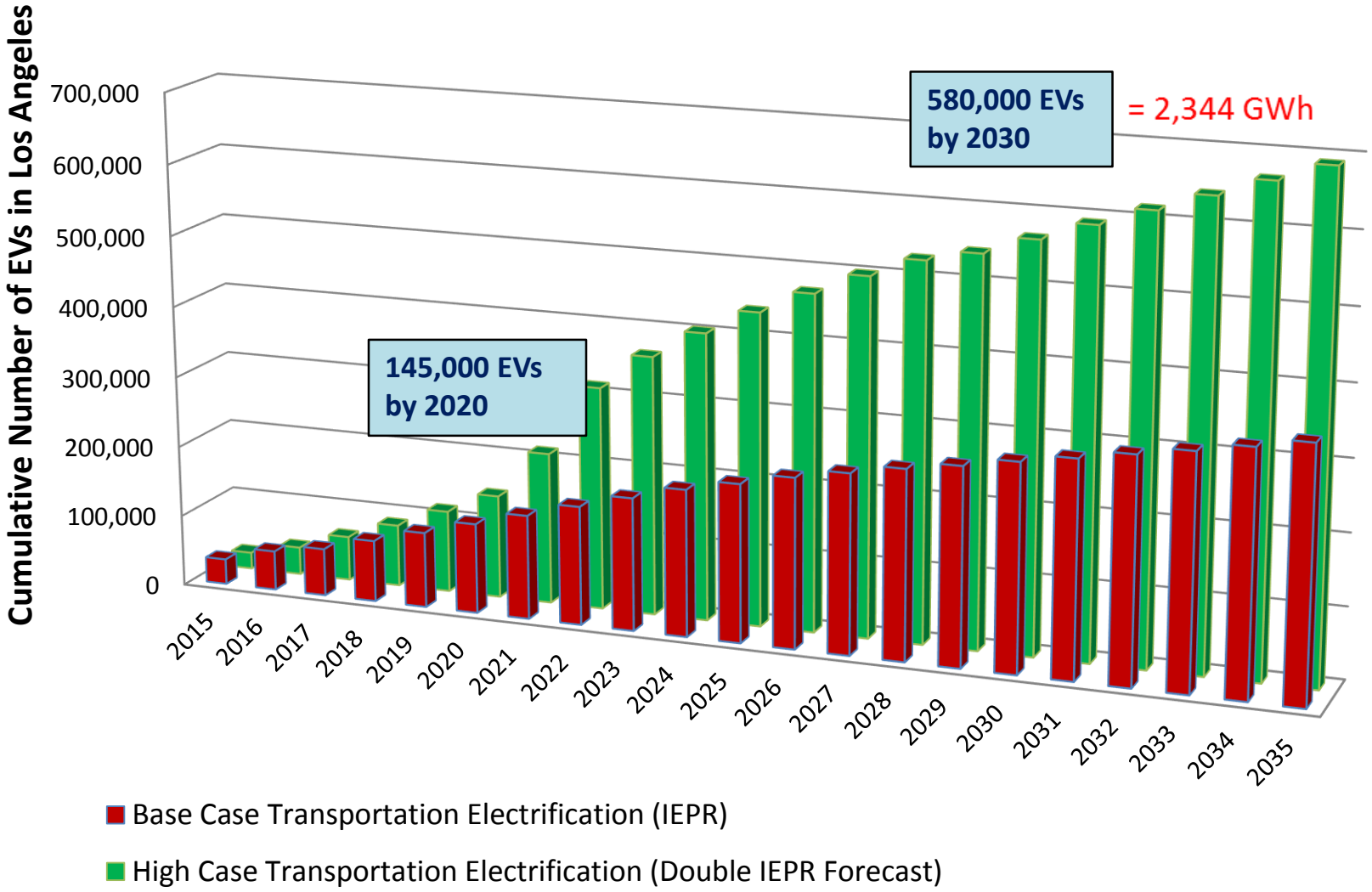
Resource Assumptions

Resource Type	Levelized Cost ($/MWh)[1]	Capacity Factor	Peak Load Dependable Capacity (3 to 5 PM)	Net Load Dependable Capacity[2] (7 to 9 PM)
Solar Photovoltaic – PPA	$67	28% - 35%	27% - 38%	0 - 2%
Solar Photovoltaic – LA Solar	$176	19% - 23%	27%	3% - 5%
Solar Feed-in-Tariff	$175	20%	27%	3% - 5%
Wind	$106	24% - 33%	10%	0%
Wind Firmed and Shaped	$106 to $122	24% - 33%	45% - 100%	45% - 100%
Geothermal	$81	91% - 95%	90%	90%
New Combined Cycle Gas	$61-70	47-52%	96%	96%
New Simple Cycle Gas	$400-500	3-5%	96%	96%
Castaic Improvement	$53	25%	100%	100%
Valley Thermal	$31	28%	100%	99%
Battery	$554	5%	43-61%	21 to 100%
CAES	$56	44%	92%	92%

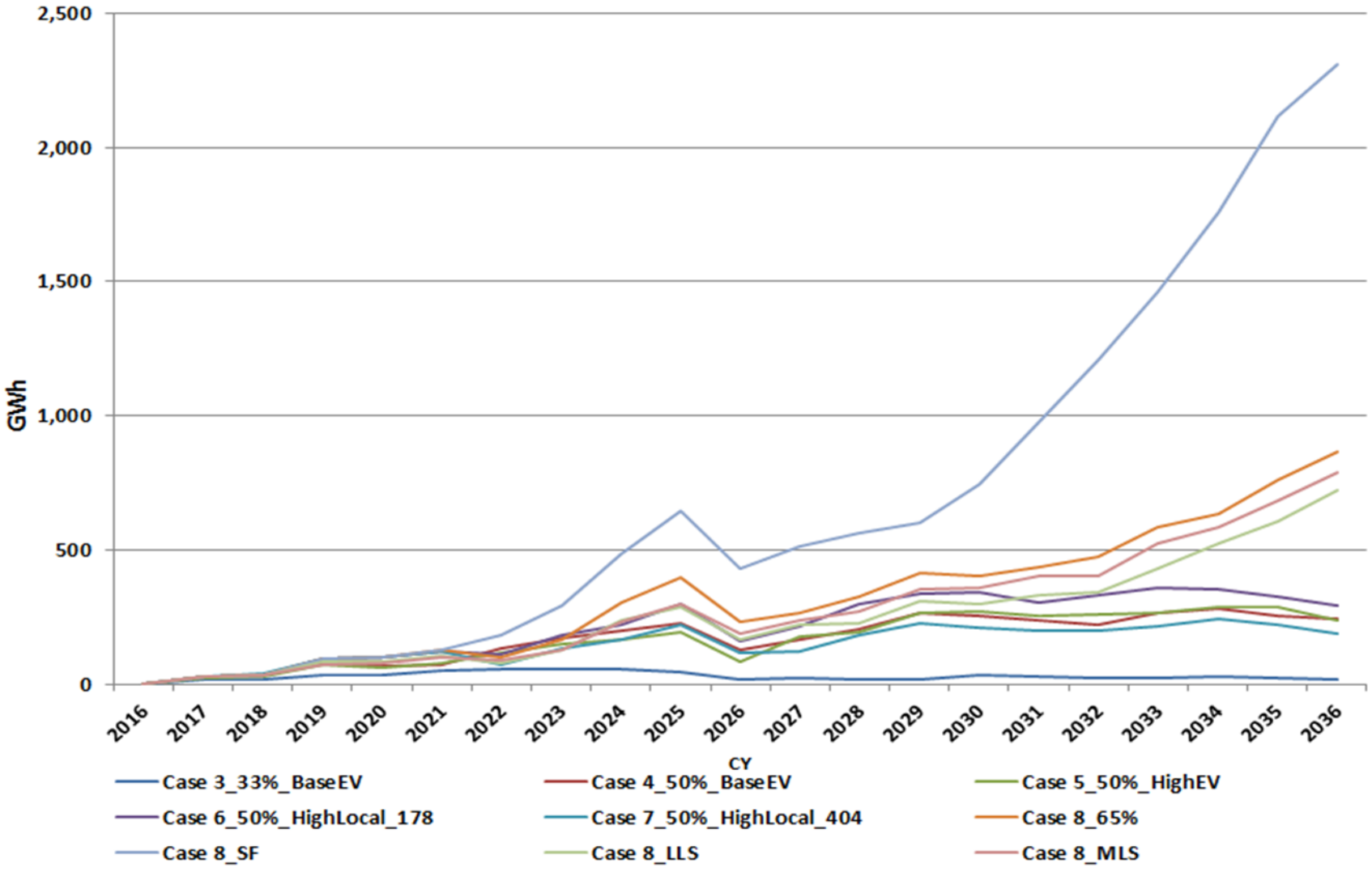
[1]Net Present Value (annual costs, 2016-2036) / NPV of Energy Produced

[2]Net Load represents the hour when the net energy for load minus variable energy resources is maximum

Electric Vehicle (EV) Charging Forecast



Overgen Forecasts w/ Energy Storage



Transmission Upgrades

- Increased capacity from 450 to 2,200 MW
- Renewable interconnection requests of 3,773 MW from wind and solar developers
- New Haskell Canyon Switching Station (SS)
- New double-circuit 230 kV transmission line from Barren Ridge SS to the new Haskell Canyon SS.
- New 230-kV circuit on existing structures from the new Haskell Canyon SS to the Castaic Power Plant.
- Reconductoring of existing 230 kV transmission line from Barren Ridge to the existing Rinaldi Receiving Station
- Expand the existing Barren Ridge SS

DER Integration Study

- Leverage DER program efforts and resources
- Achieve optimal DER deployment
- Achieve a common objective

Energy Storage Plan for 50% RPS

GENERATION

Gas Fired + Thermal Energy

Location: Valley Generating Station

Capacity: 60 MW or greater

Key Applications:
- Increase CT output during hot weather 10%-20%
- Peak Shifting
- Ramping regulation capacity
- May eliminate need for added capacity

Schedule
- Completion by December 2017

TRANSMISSION

Battery Energy Storage System

Location: Beacon & Springbok Area Solar

Capacity: 50 MW or greater

Key Applications:
- Regulation Service (ramping up and down)
- Solar Power Output Leveling
- Peak Shaving

Schedule
- Completion by September 2020

DISTRIBUTION

Battery Energy Storage System

Location: Distributing and Receiving Stations

Capacity: 4 MW or greater

Key Applications:
- Peak Shaving
- Distributed PV Solar Integration
- Deferring Distribution Infrastructure Upgrades

Schedule
- Completion by March 2019 for DS and September 2020 for RS

CUSTOMER

Battery, Thermal Energy Storage

Location: Customers

Capacity: 40 MW

Key Applications:
- Permanent Load Shifting
- Dispatchable Peak Shifting
- Deferring Distribution Infrastructure Upgrades
- Demand Response
- Energy Efficiency

Schedule
- Completion by July 2020

JFB ES

Battery Energy Storage System

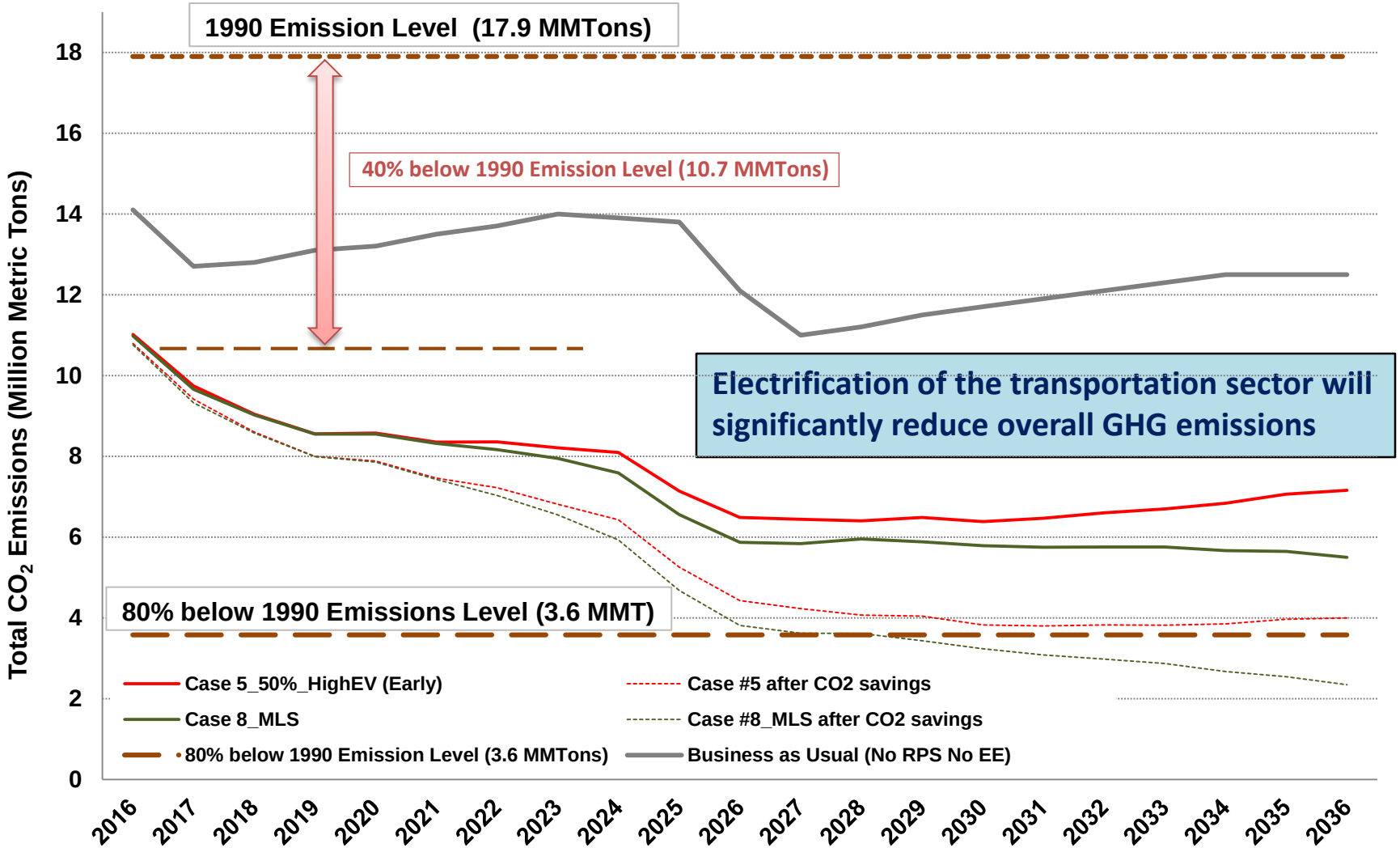
Location: John Ferraro Building Parking lots

Capacity:300KW/1MWh

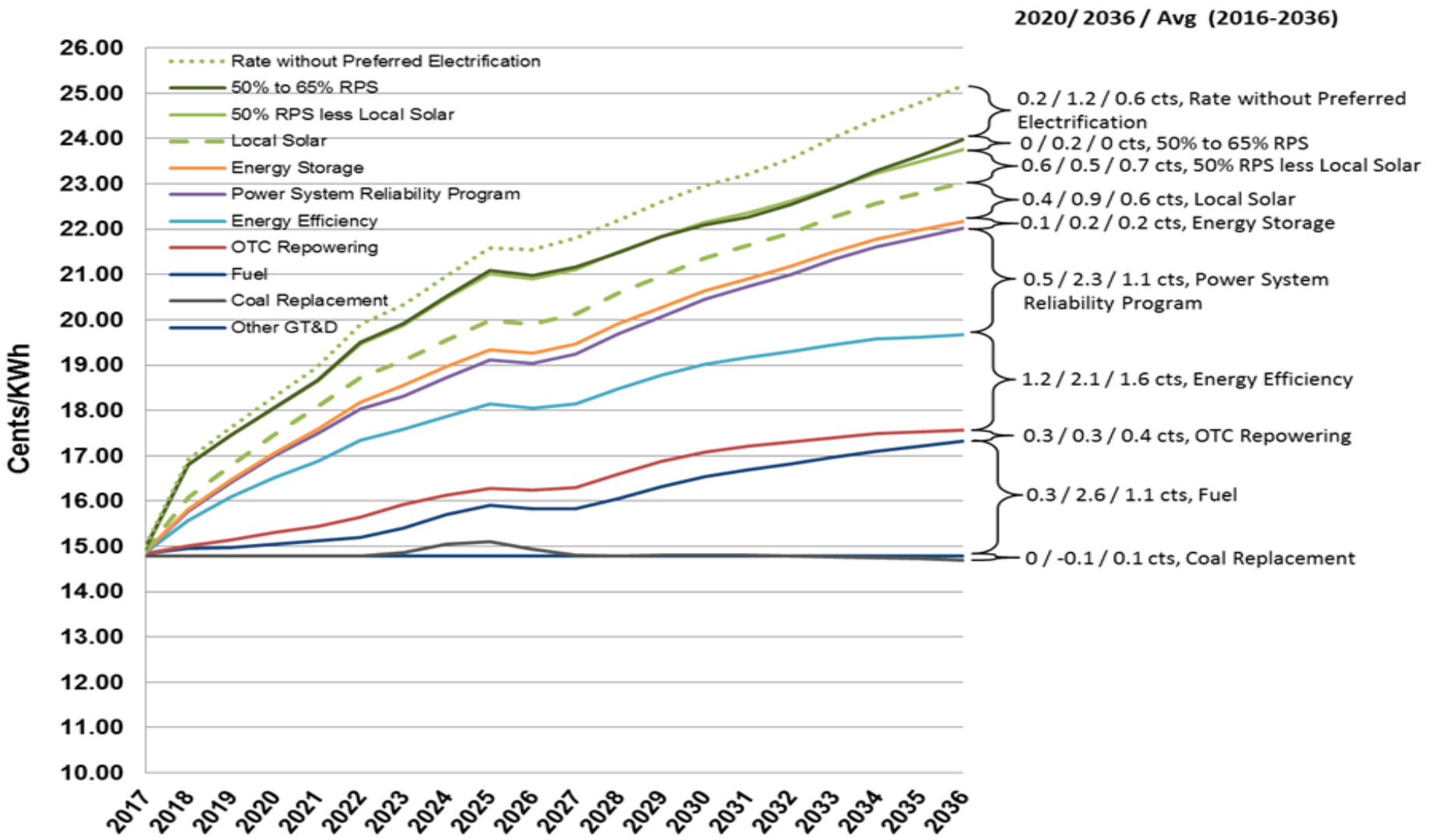
Key Applications:
- Demand Response
- Dispatchable Peak Shifting
- Energy Management System
- Research and Development

Schedule
- Completion by June 2016

GHG Emissions: 50% vs 65% RPS



Rate Forecast



Questions?