LADWP's Efforts on Integrating DSM and DER as a Reliable Resource Alternative

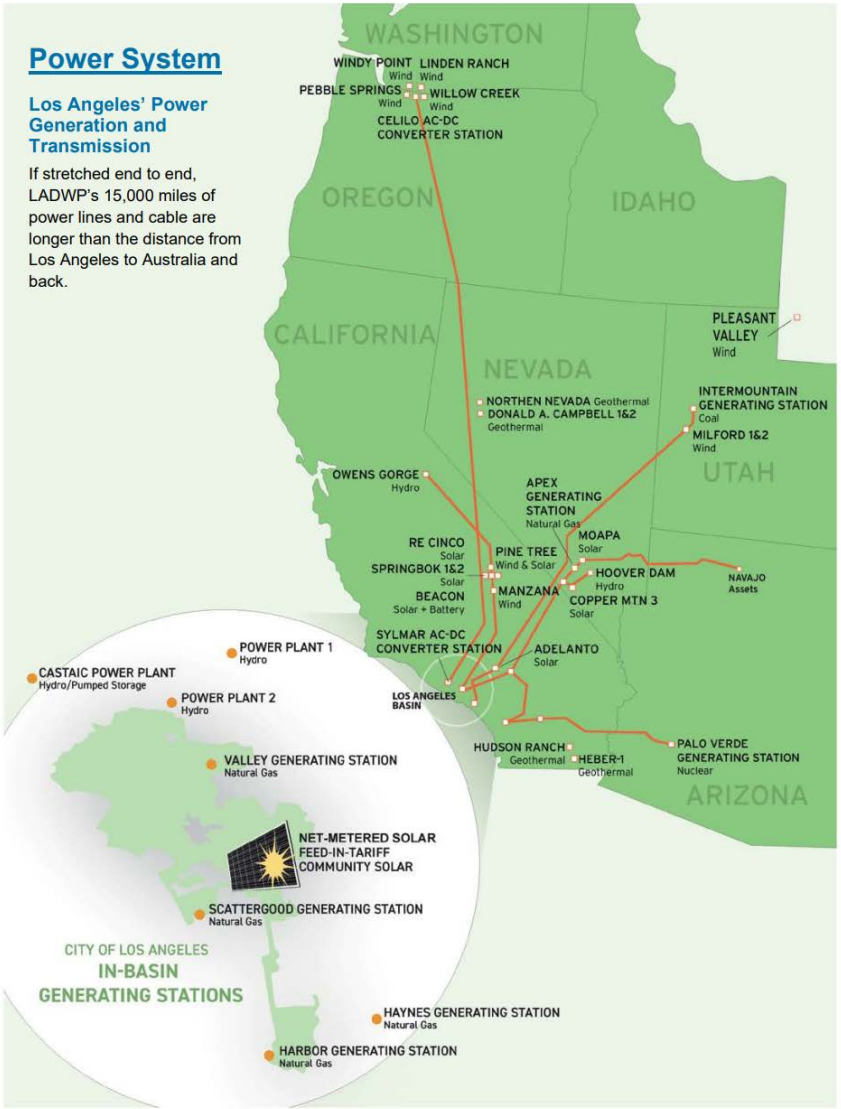
Presented at the 2019 ACEEE National Conference on Energy Efficiency as a Resource

Presenter: Armen G. Saiyan, P.E.

www.ladwp.com

About LADWP Power System

- Largest Vertically Integrated Municipally Owned Utility in the Nation
- 1.5M power customers – serving 4M residents
- Service territory covers 465 square miles
- 7880 MW of capacity
- 6502 MW peak demand



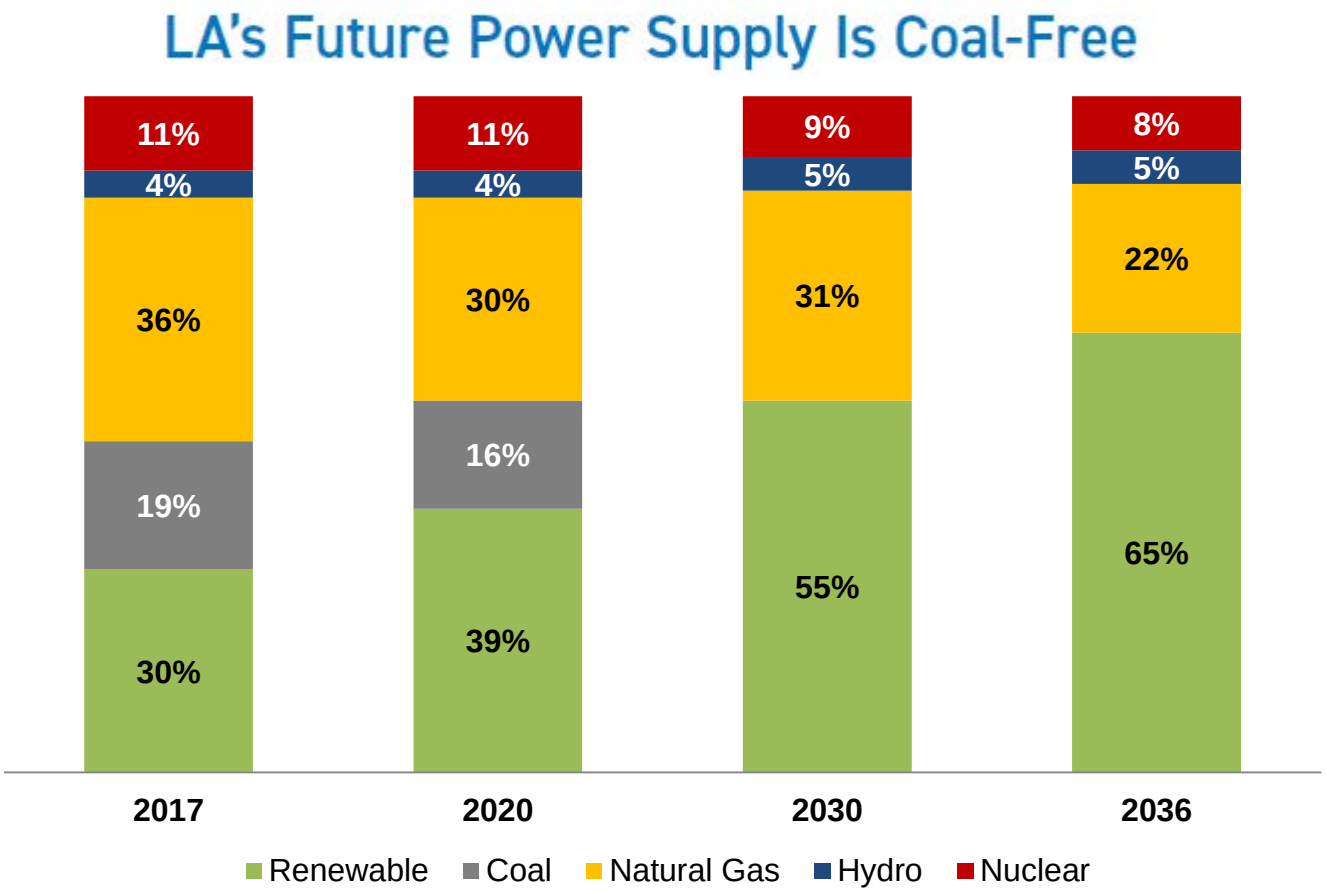
Power Supply Transition

LADWP is transitioning to a clean energy supply for Los Angeles through major investments in:

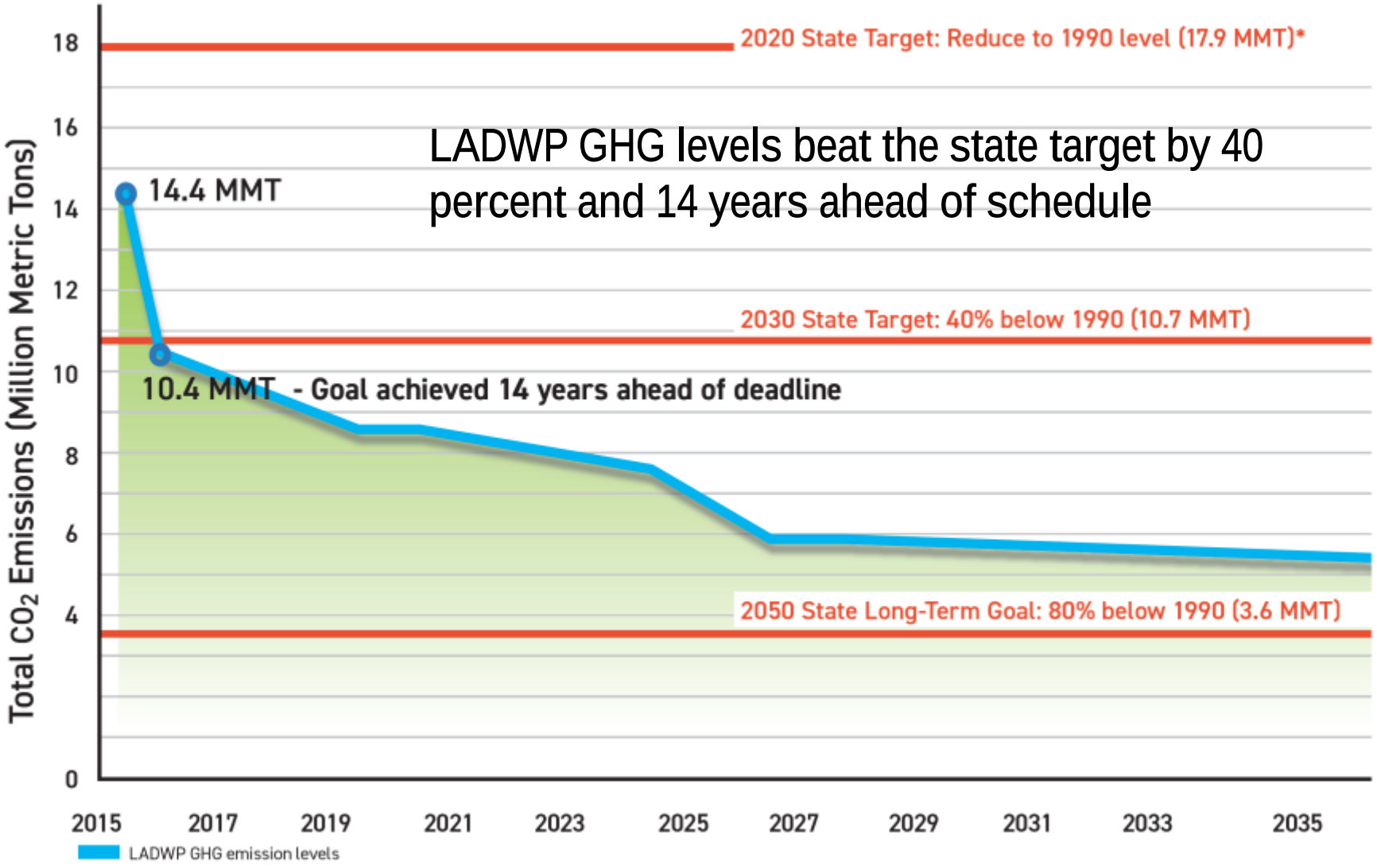
- Power Reliability
- Coal Transition
- Renewable Energy
- Energy Efficiency
- Electric Transportation
- Energy Storage
- Distributed Energy Resources (DER)

Clean Energy Successes

Achieved 30% Renewables in 2017—up from 6% in 2006



Clean Energy Successes

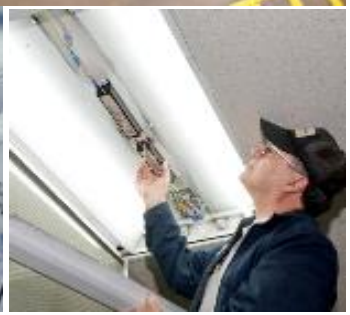


*LADWP emissions have been below the 1990 level since 2002 (16.4 MMT), 18 years ahead of 2020 state target.
In 2025, LADWP will have reduced CO_2 emissions by 9.8 million metric tons, compared to the 1990 baseline level, equivalent to removing 2.1 million cars from the highway.

Clean Energy Successes in 2017-18

- Reduced GHG emissions to 47% below 1990 level
- 30% renewables for CY 2017
- 1,100 MW of large-scale solar
- >321 MW customer local solar
  (No. 1 Solar City in U.S. in 2017)
- 1,318 MW wind and geothermal power
- Commissioned Beacon 250 MW solar + 20MW lithium battery
- Moved forward with eliminating coal by 2025
- 1,400+ EV chargers installed in L.A.
- Launching new Community Solar, Jan 2019

Short Term Clean Energy Transition Goals



- Invest in power grid reliability
  - $800 million/year (Power System Reliability Plan)
- Eliminate coal by 2025
- Achieve 33% RPS by 2020 (State RPS)
- Increase long-term RPS goals by 5% (70% by 2036);
- Achieve 900 MW local solar by 2025
- Achieve 15% energy efficiency by 2020; another 15% by 2027
- Implement 404 MW of energy storage by 2025
- Accelerate EV expansion (10,000 chargers in L.A.)

Transition to 100% Clean Energy Accelerated

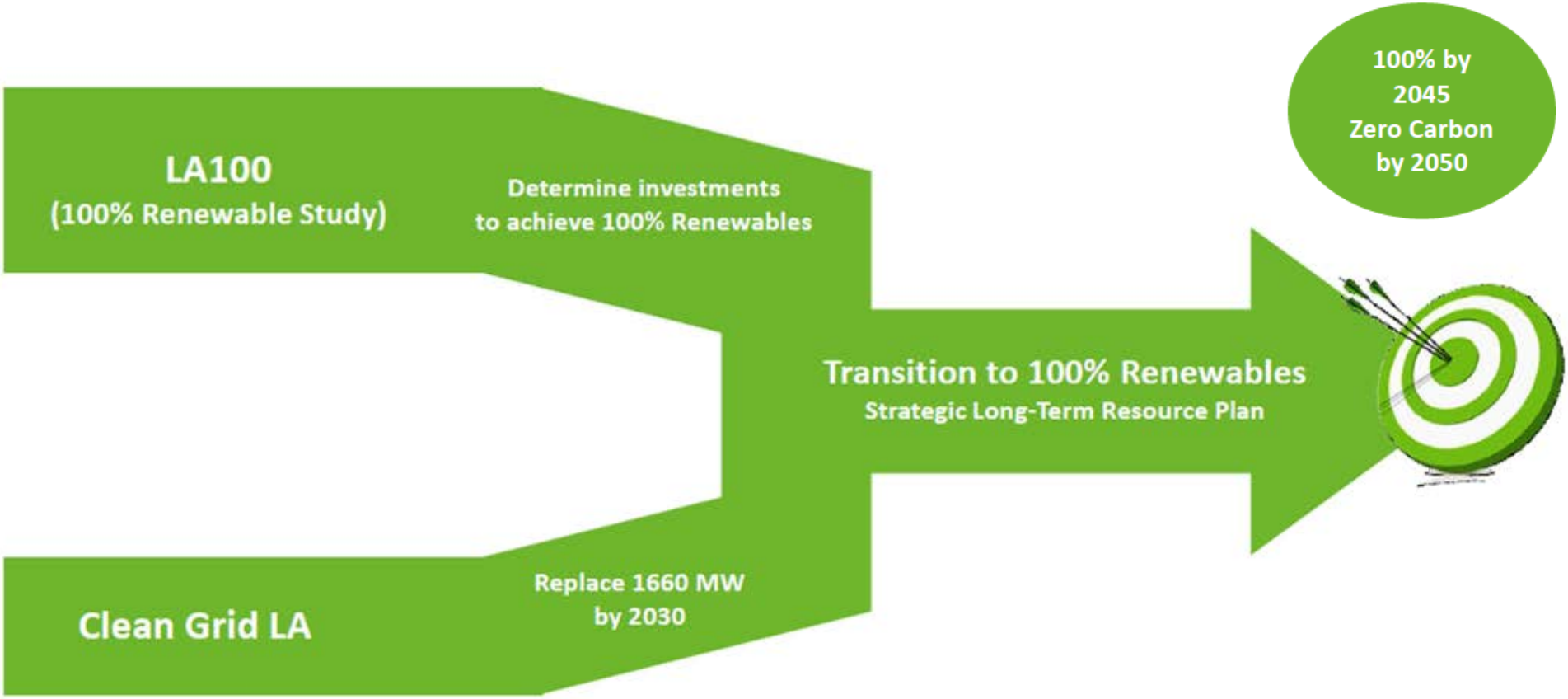
February 2019: Announced decision to not repower ocean-cooled thermal units at Scattergood, Haynes & Harbor plants.

~1660MW of in-basin power generation must be replaced/offset by 2030

In addition to fully decarbonizing the Electric Sector, the pLAn also includes aggressive goals for Net Zero Carbon in the Transportation and Building Sectors by 2050.

GREEN NEW DEAL
PLAN
ENVIRONMENT ECONOMY EQUITY

Long Term Future of Clean Energy



Clean Grid LA Resources

Renewables

In-basin & Out-of-basin **Solar**

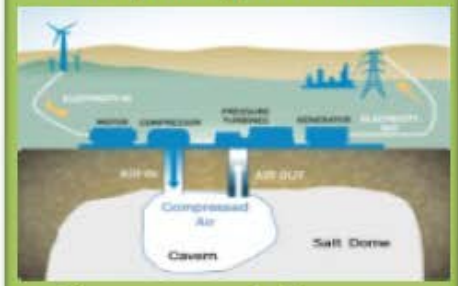
Wind

Geothermal

Energy Storage

Battery energy storage

Pumped hydroelectric



Compressed air energy storage

Distributed Energy Resources

Energy efficiency

Demand response & Electric vehicles

Rooftop solar

Microgrids

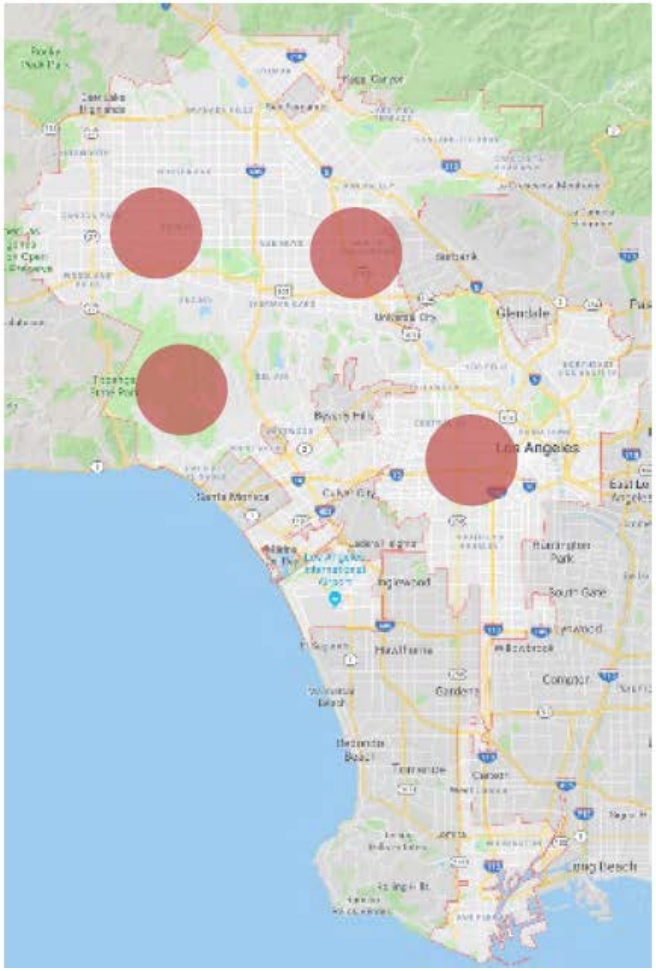
Transmission

Increased capacity on external transmission

In-basin transmission system upgrades

Distributed Energy Resource Strategy

Identifying Constraints In the Distribution System



2018	Hours																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
August 1	2365	2151	1985	1798	1774	1698	1648	1713	2027	2345	2766	2864	2883	3032	3076	3257	3187	3045	3105	2768	3015	2827	2738	2583
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3	2237	2014	1900	1818	1747	1713	1641	1677	2050	2323	2677	2971	3183	3296	3357	3482	3393	3415	3153	2829	2919	2766	2659	2467
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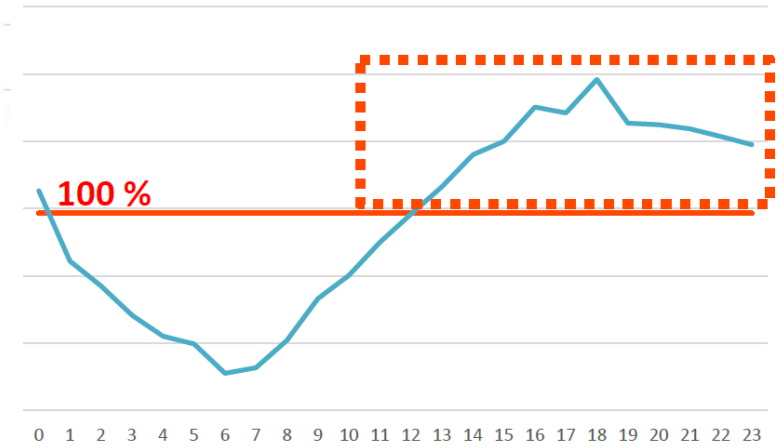
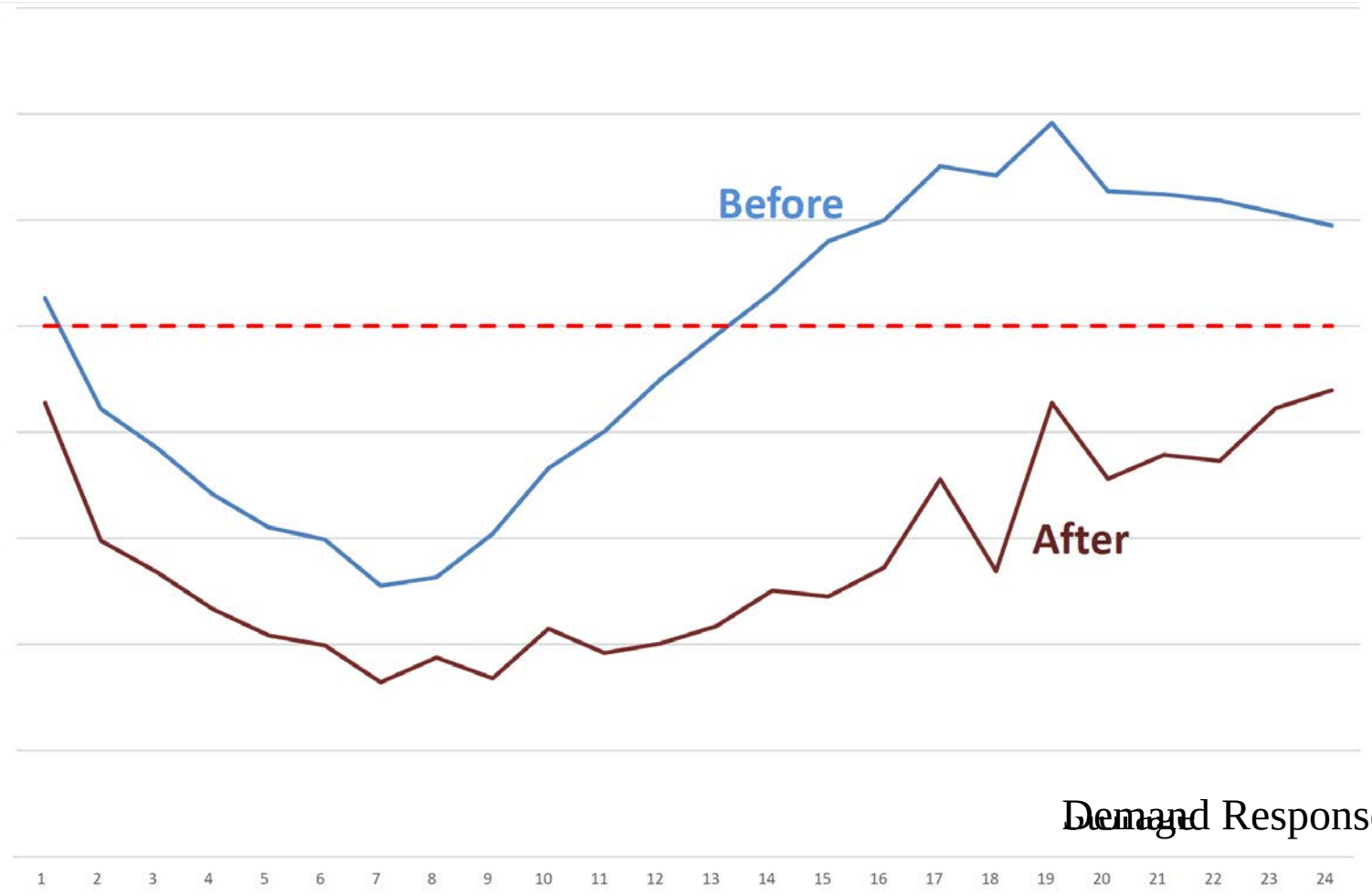
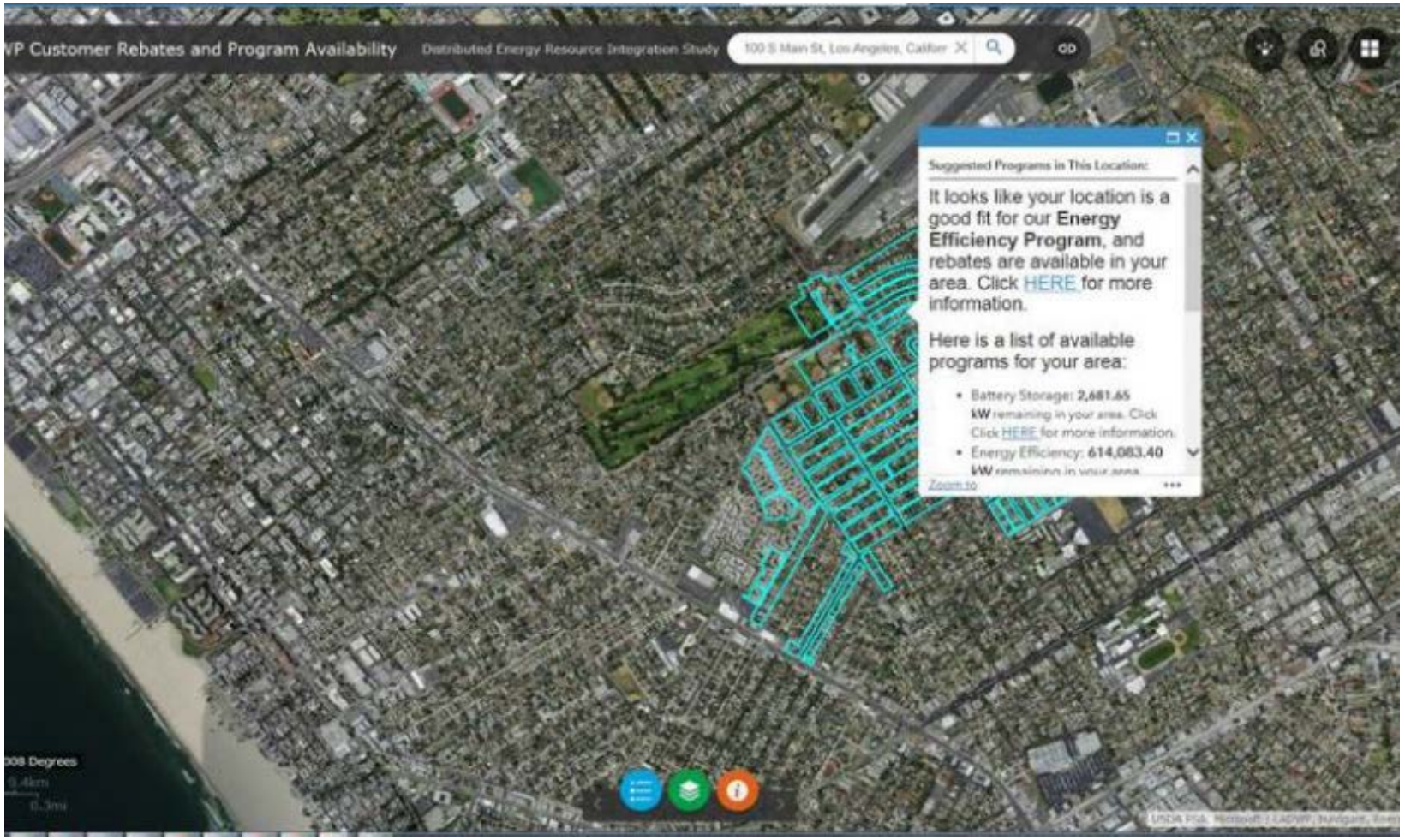


Illustrative DER Strategy and Expected Grid Impact



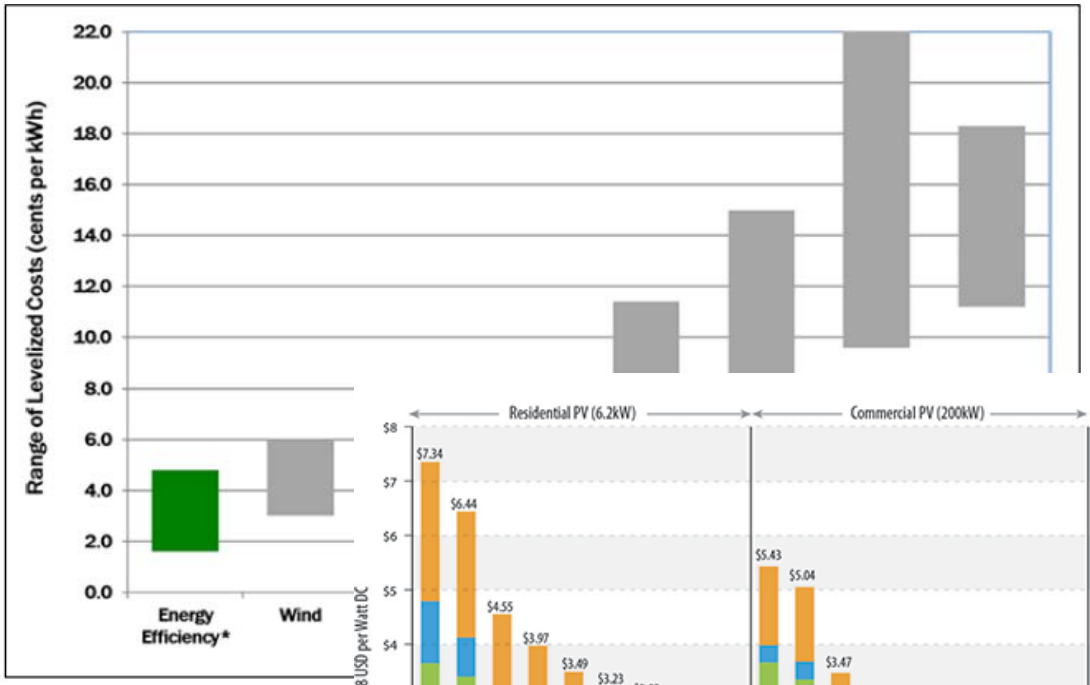
Potential Future Platform to display DER potentials geographically



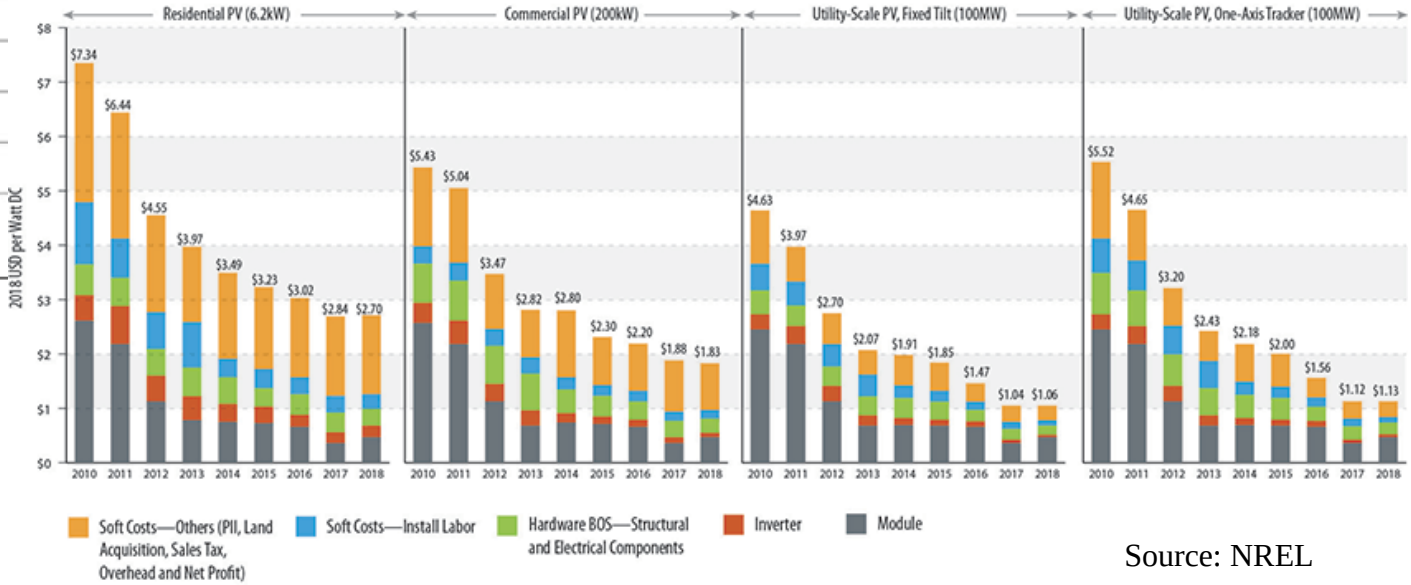
DER Program Challenges and Opportunities

- Development and Deployment of Customer facing programs take time
- Equity challenges with locational-based programs
- LADWP DER processes and expertise is still in development
- Possible environmental/permitting barriers with Battery Storage
- Diversity of DER options is both a strength and a weakness:
  - Each have a unique expected grid impact
  - Creates competition for resources
  - What is the optimal mix of investment in each option?

Cost Comparison of Resources



Source: ACEEE



Source: NREL

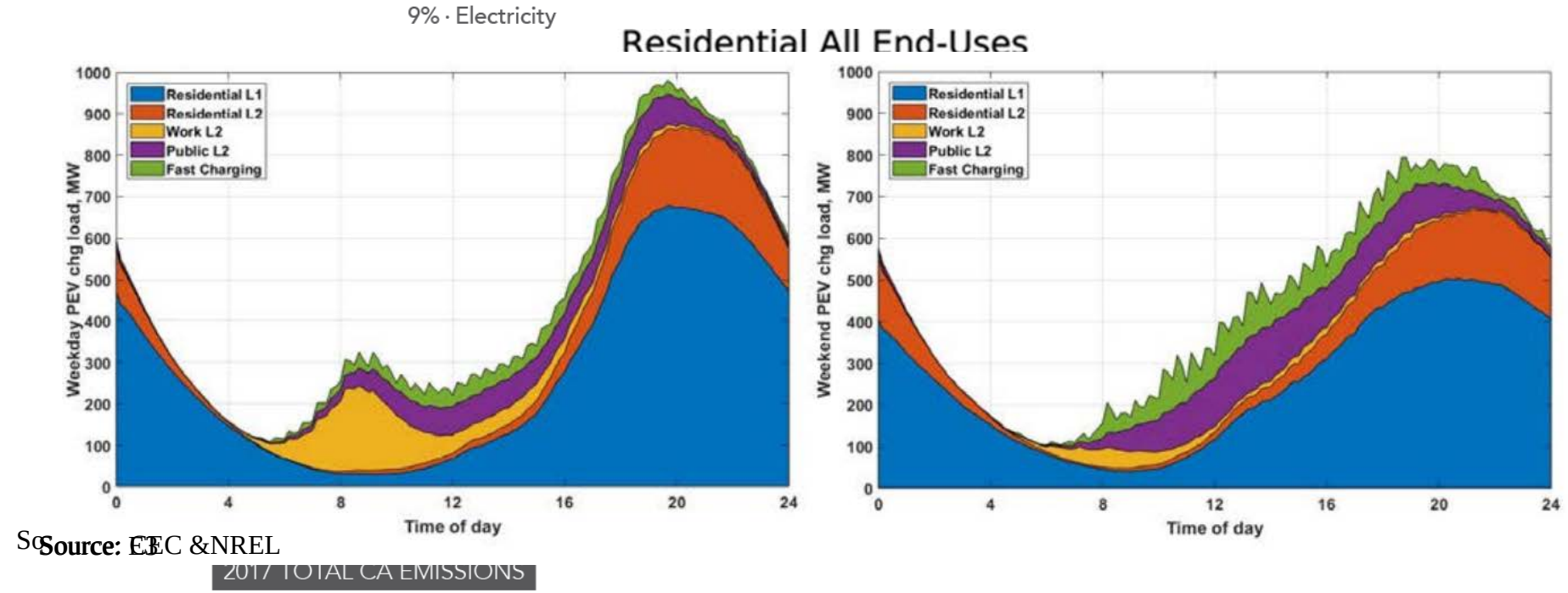
Role of EE in Supporting the Grid

- LADWP's Power System has undertaken an extensive Distributed Energy Resource Integration Study (DERIS) – Maximize grid reliability at minimum cost

- Five main categories of DERs
  - Energy Efficiency
  - Demand Response
  - Distributed Solar PV
  - Electric Vehicle Chargers
  - Distributed Battery Storage

- Integration of DERs is key to reliably accommodating higher and higher levels of renewables on the grid

Energy Efficiency's role in a Decarbonization World



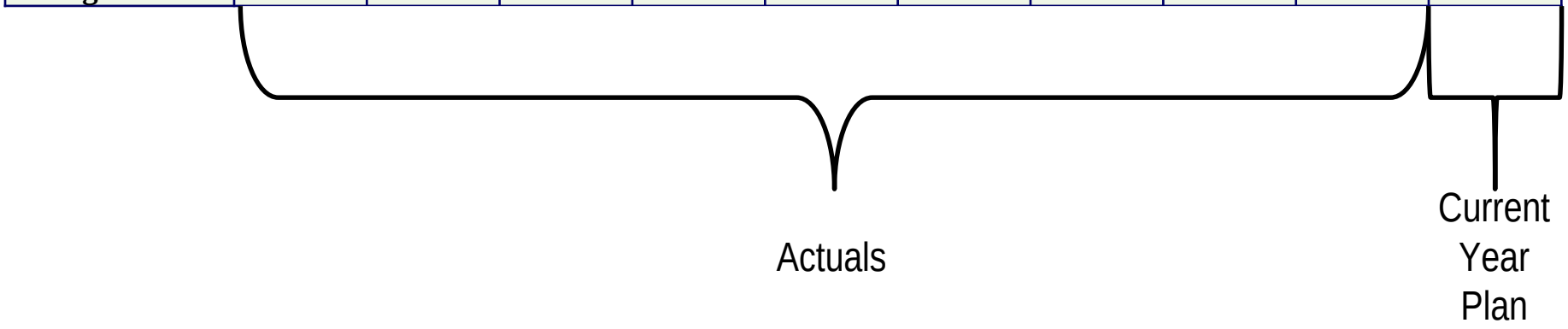
Source: CEC &NREL

Load growth due to electrification makes EE foundational to achieving future RPS and reliability goals: EE makes everything else smaller

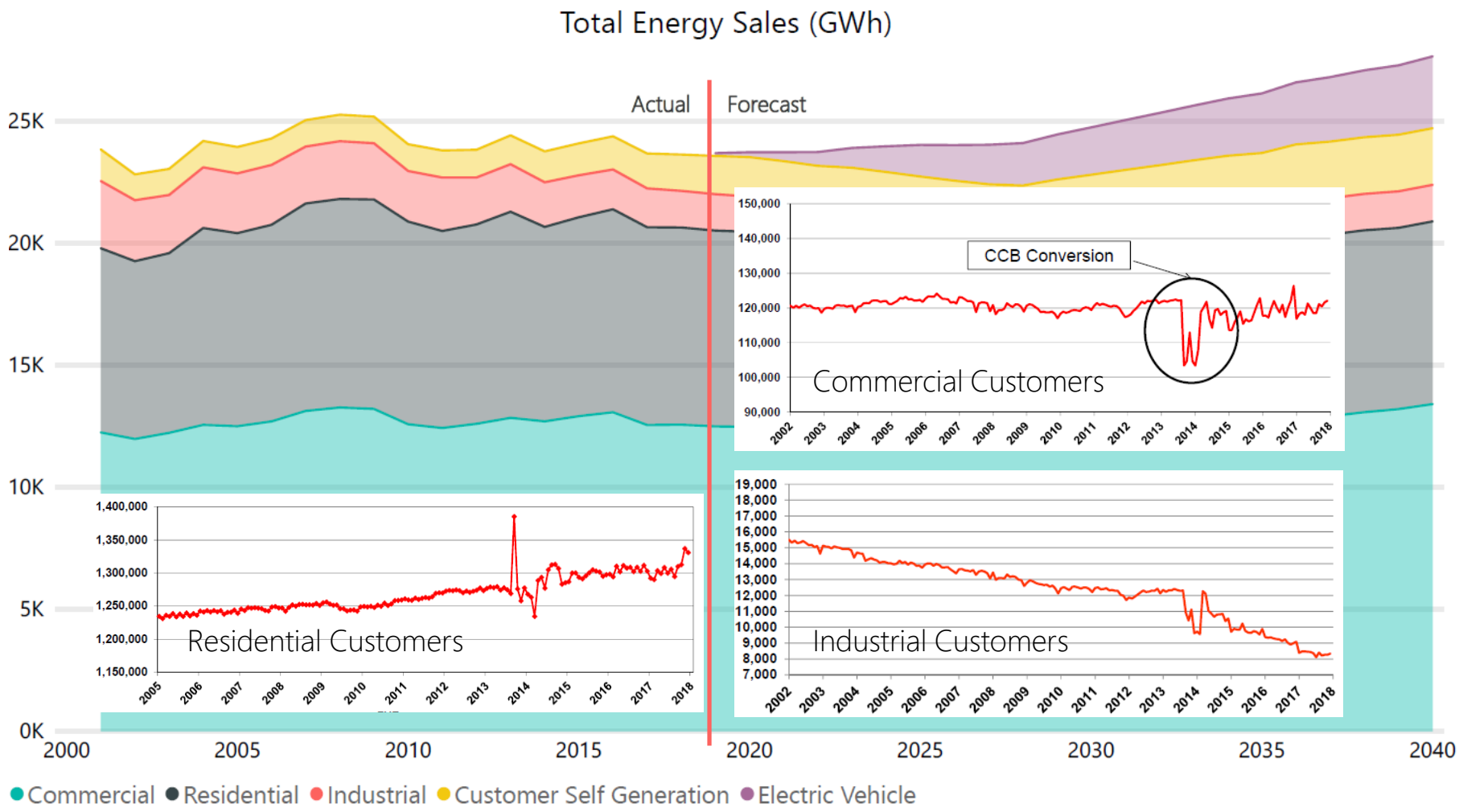
Energy Efficiency:
A Sustained Effort to Achieve 15% by 2020

Annual EE Investment and Goals: 2010 – 2020

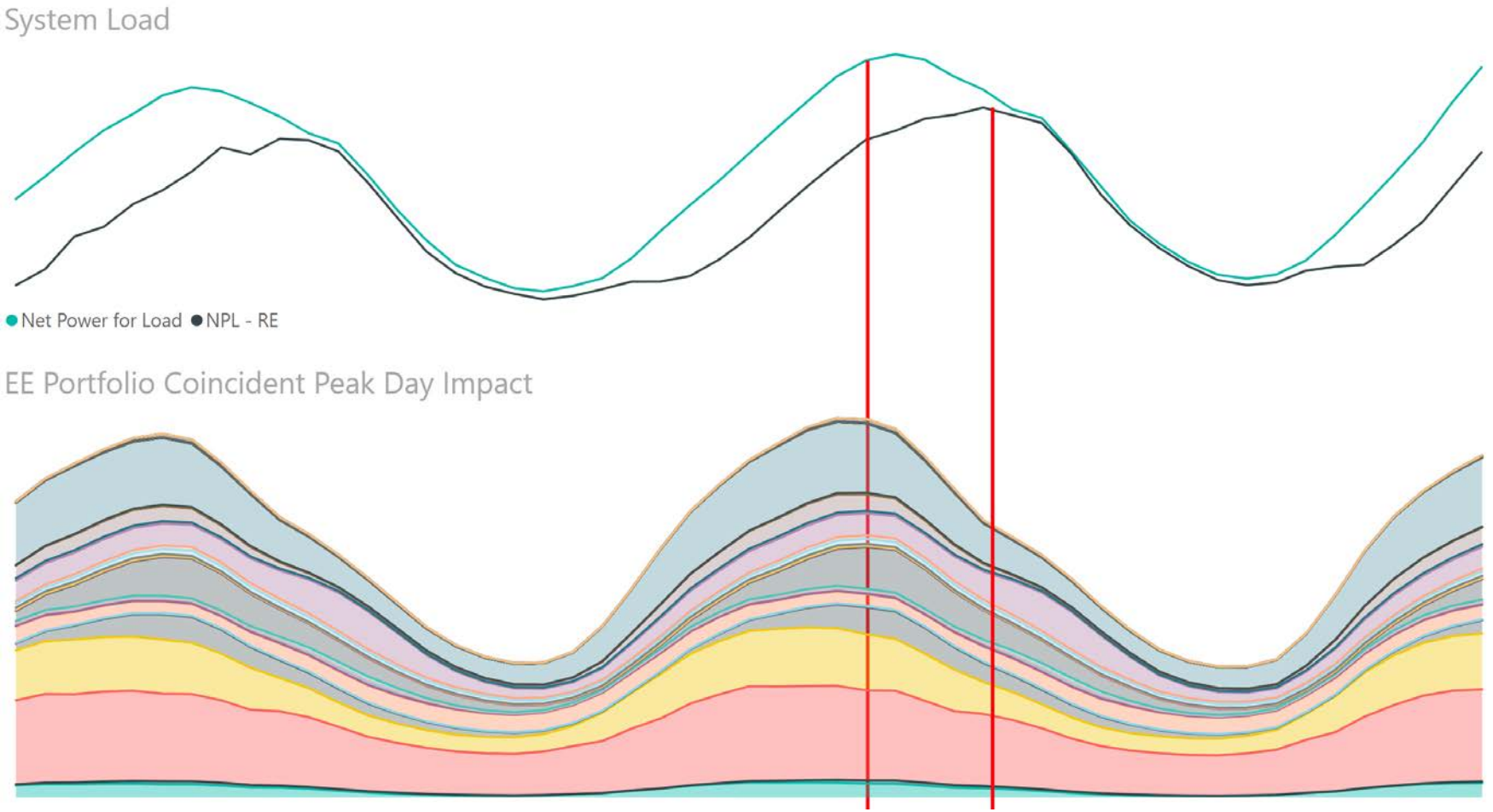
Fiscal Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Budget (millions)	$49.5	$37.3	$50.0	$78.0	$79.0	$73.0	$133.0	$178.0 (+$20)	$180.0 (+$20)	$163.0 (+$20)
GWh Savings	265	228	319	337	343	412	480	412	476	359
Portfolio Savings Cum'l	1.1%	2.1%	3.4%	5%	6.5%	8.2%	10.4%	12%	13.7%	15.1%



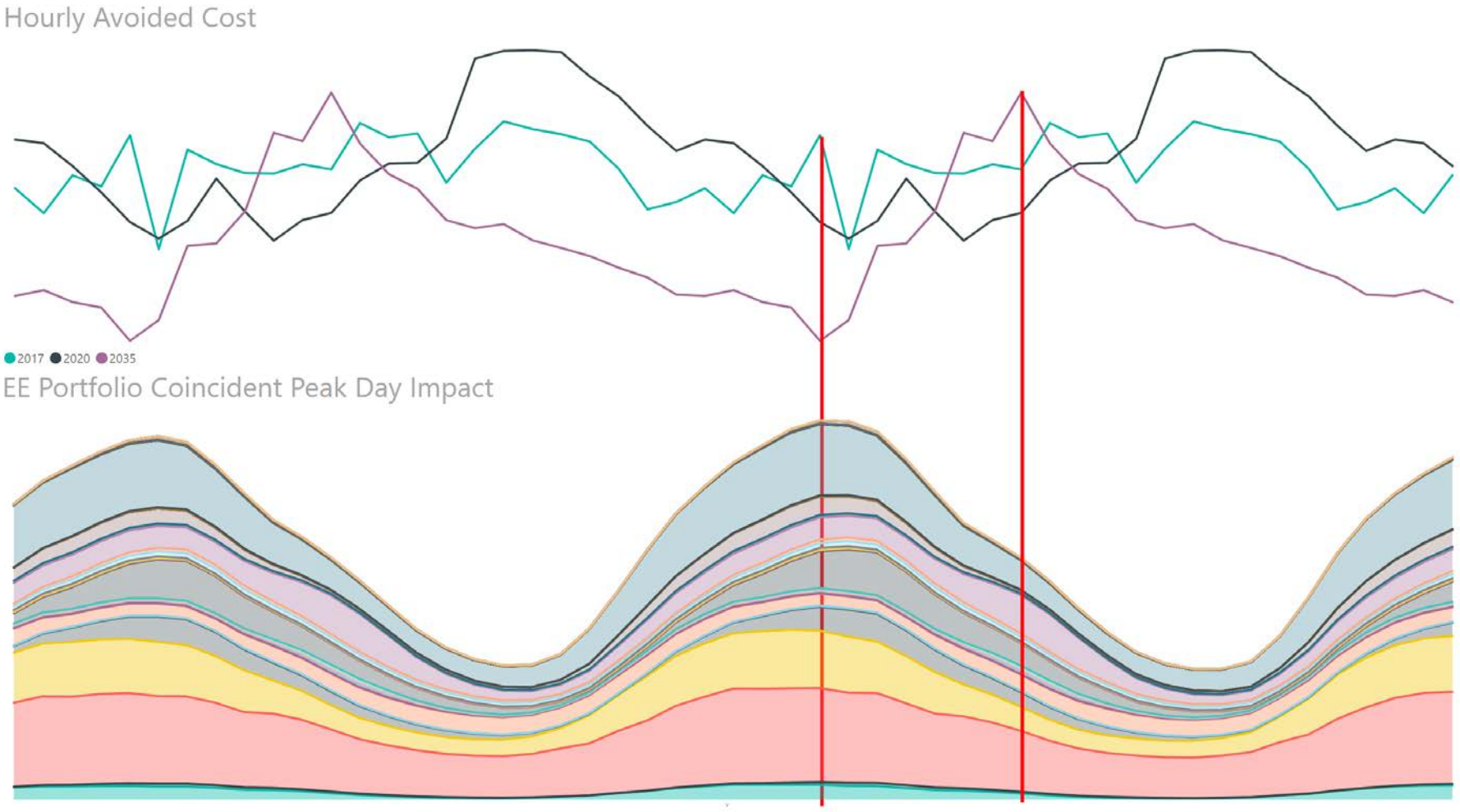
Success in EE efforts



New challenges for EE – Hourly Grid Impacts

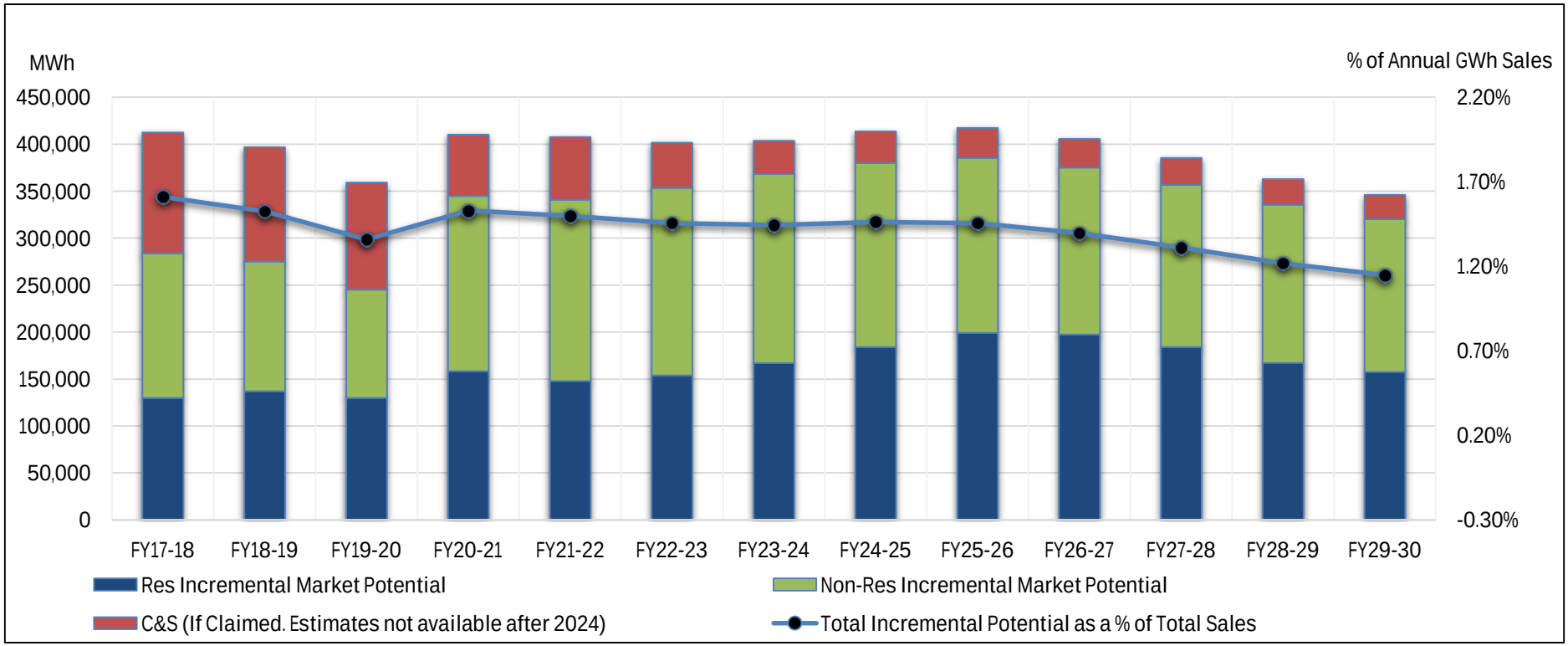


New Challenges for EE – Hourly Avoided Costs



Onward goals to 2027

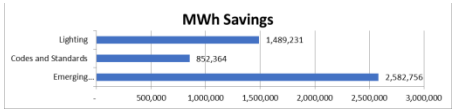
- 2017-2027 targets developed from 2017 EE Potential Study

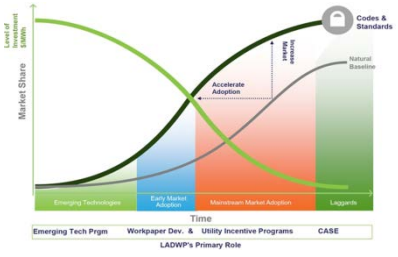


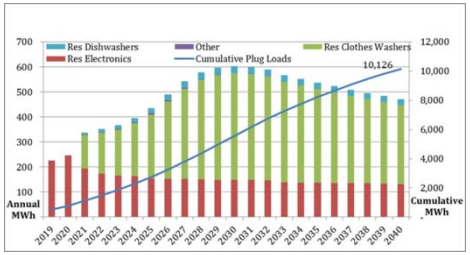
Energy Potential Studies
Power System Planning Coordination

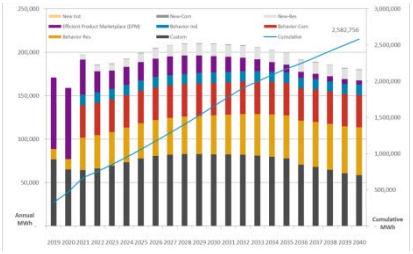
Potential Studies

- Conduct technical, economic and achievable potential studies for identifying all DSM (Energy Efficiency, Building Electrification, Distributed Energy Resource) opportunities.
  - Provide business intelligence for use in program design activities.
  - Present and defend portfolio plans with internal and external stakeholders (OPA, IRP, NRDC, Sierra Club, etc..).
  - Use NREL IDSM planning tool, ESP and eTRM for program planning & design.





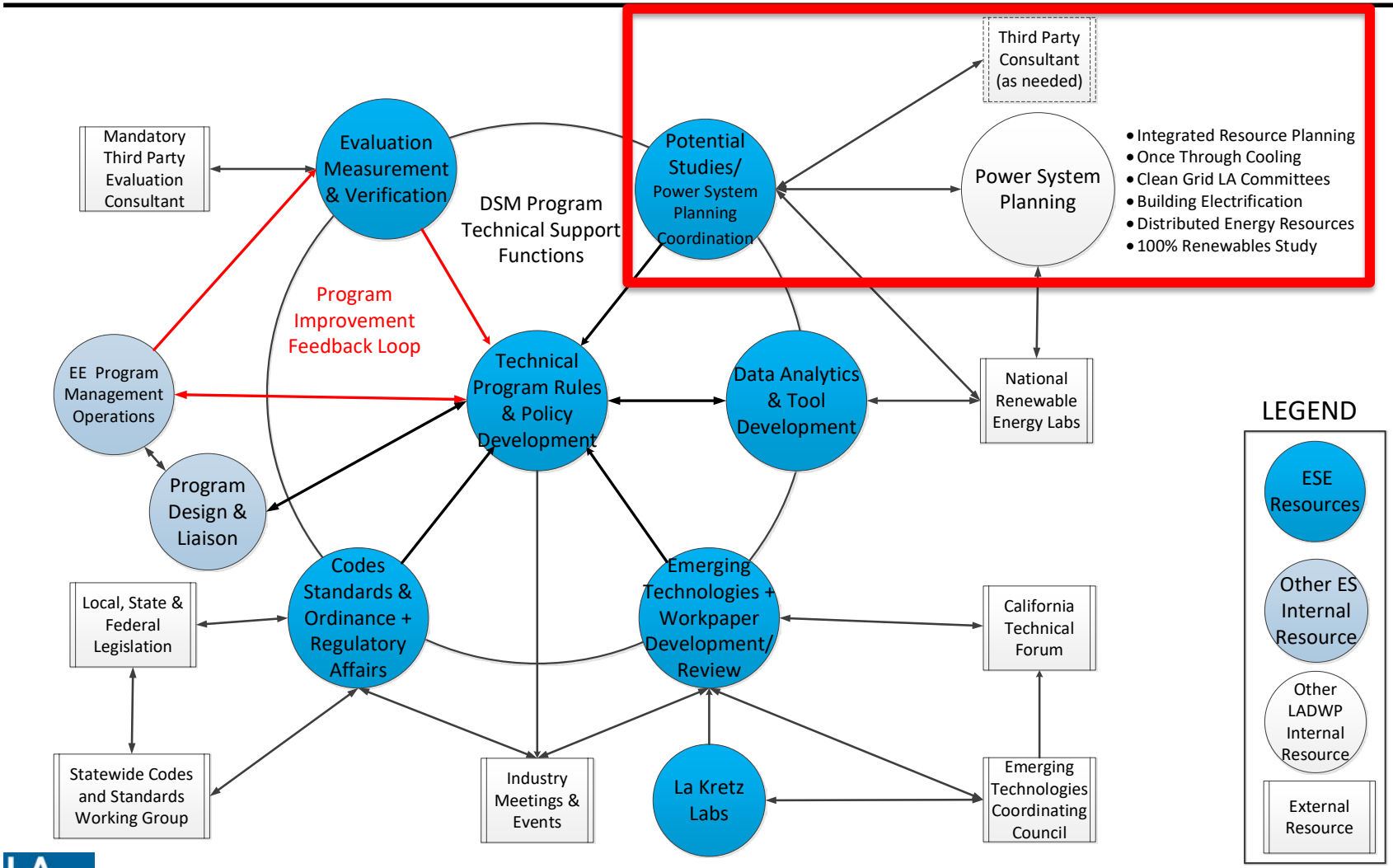




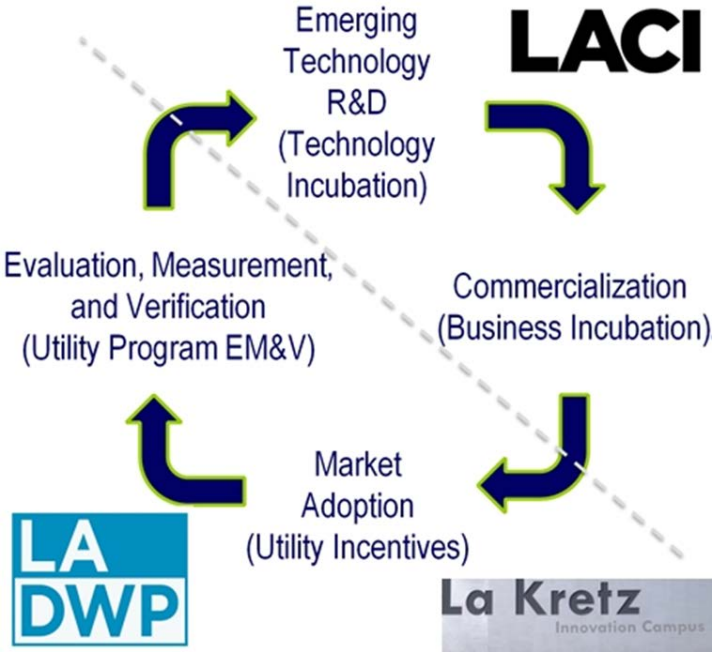
Power System Planning Coordination

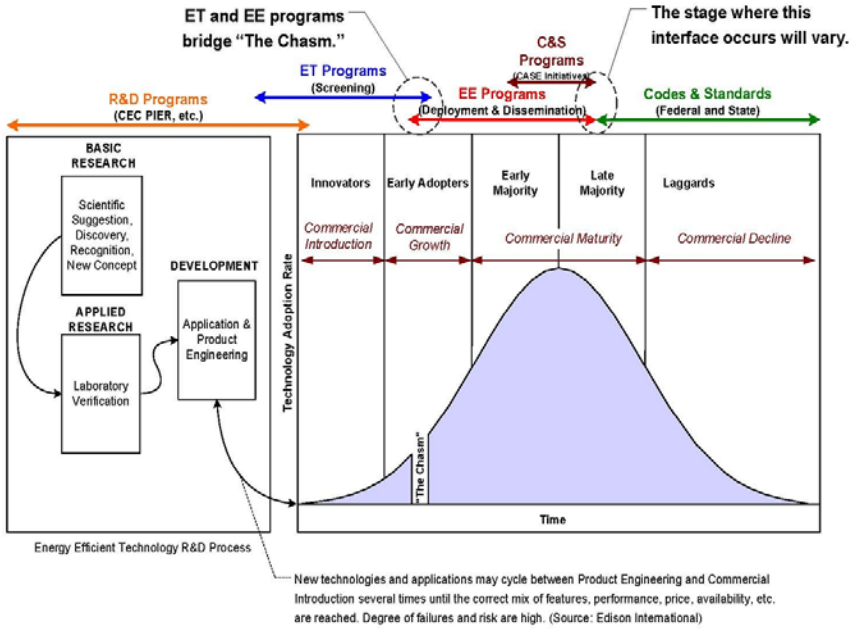
- Integrated Resource Planning / Strategic Long Term Resource Plan
- Clean Grid LA
- Distributed Energy Resources
- Distribution Planning
- 100% Renewables Study (LA100)
- Electrification Planning

DSM Support Functions & Nexus of Industry Relations and LADWP Strategic Initiatives



How can EE activities help proliferate DER opportunities

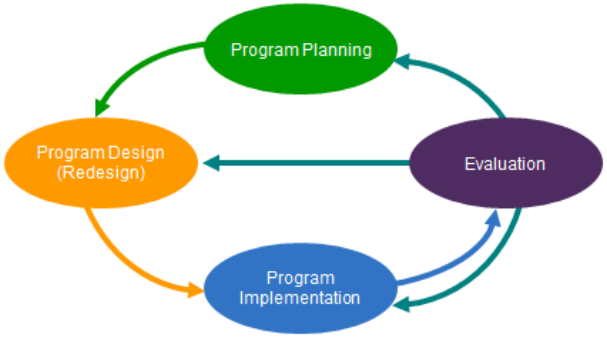


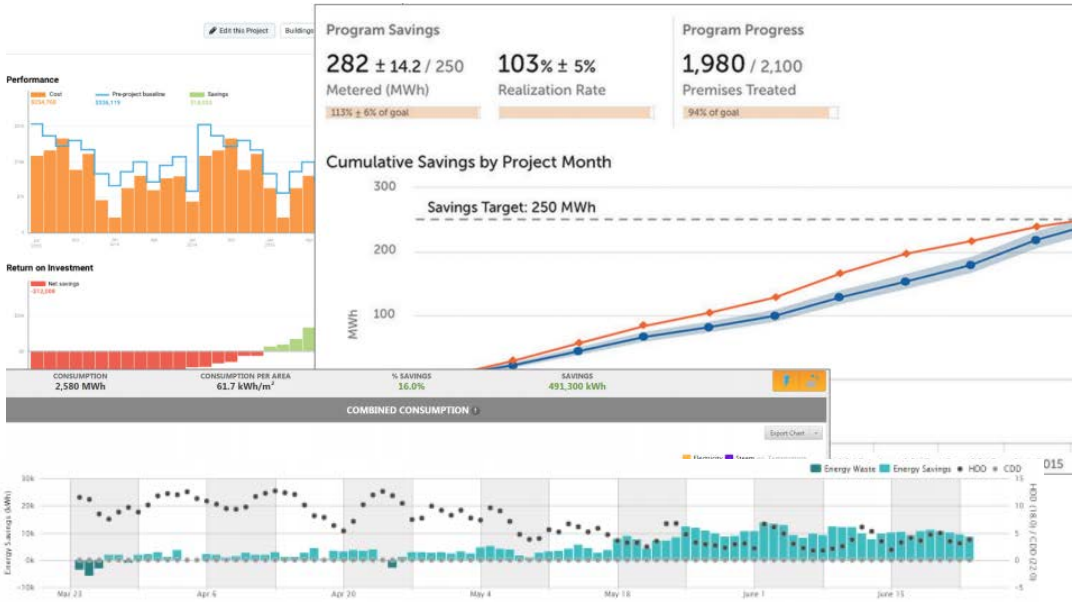


- Emerging Technologies Assessment
- Workpaper Development/ Technical Standardization
- Evaluation Measurement & Verification (EM&V)

Evaluation Measurement & Verification (EM&V)

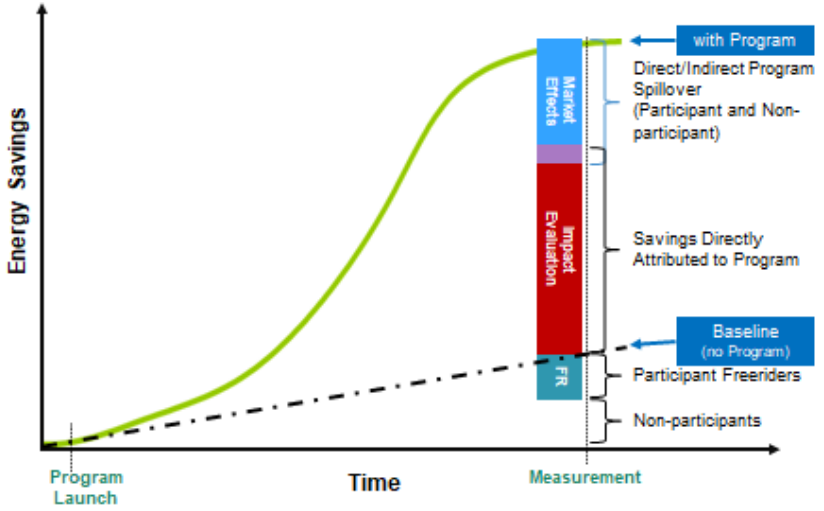
- Core Scope
  - Impact Evaluations
    - Confidence for resource planning
  - Process Evaluations
    - Customer Experience
  - Recommendations for Program improvements





- Elective Scope
  - Evaluation of Market Transformation
  - Research market changes
  - Quantify market effect savings above and beyond directly accounted program portfolio savings.

Assess effectiveness in program market transformation.



Emerging Technologies

- Coordinate with Emerging Technologies Coordinating Council (ETCC) and National Renewable Energy Labs (NREL)
- Evaluate new technologies (i.e. Smart Appliances/equipment, plug loads)
- Use of La Kretz and NREL Labs for testing of select measures.
- Prioritize and coordinate with LACI for products developed at LKIC
- Provide cleantech companies insights on product deficiencies, barriers and customer program policies.
- Promote products within customer programs that have technical merit and are market ready.
- Coordinate with other LADWP divisions for other applicable technologies in specific use cases.
  - Smartgrid (Micro/Nanogrid)
  - Smart Appliances
  - Desalination
  - On-site Water Treatment
  - Energy Storage
  - Advanced Meters and Leak Detection Systems

ET CC EMERGING TECHNOLOGIES COORDINATING COUNCIL

LACI FOR ENTREPRENEURS BY ENTREPRENEURS

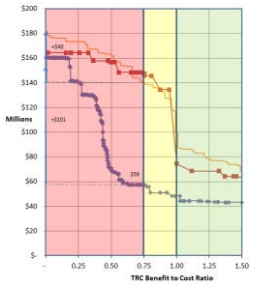
Workpaper Development/ Technical Standardization

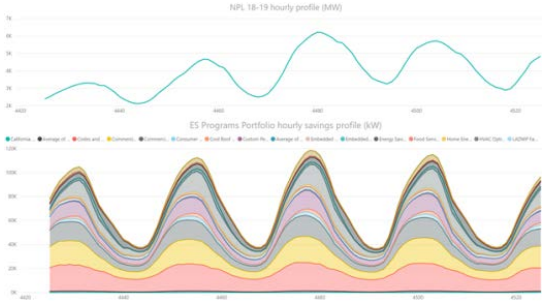
- Coordinate with Emerging Technologies group to determine if a technology is ready for inclusion within programs portfolio.
- Coordinate with California Technical Forum (CalTF) on statewide standardization and new measure developments
- Incorporate DER measures in the new Electronic Technical Reference Manual (eTRM) system , the new statewide repository for standardized measures.
- Develop and or Review new DSM/DER measure workpapers for use in statewide, Scale into Mass Market and upstream programs.

Data Analytics and Tool Development

Data Analytics

- Conduct big data analytics and support program development functions in providing actionable intelligence for studies, evaluations, audits and other applications.
- Develop customizable reports and dashboards for various business use cases from broad and complex data sets.





Tool Development

- Assess and develop tools for various use cases to accelerate program process streamlining and automation.
- Develop and maintain DSM data systems to maintain transparent, verifiable, trackable, measureable and attributable claims.
- Interface with other third party data systems
  - eTRM (CalTF)
  - ESP Portfolios (POU SB1037 & SB350 claims system)
  - NREL tools etc…

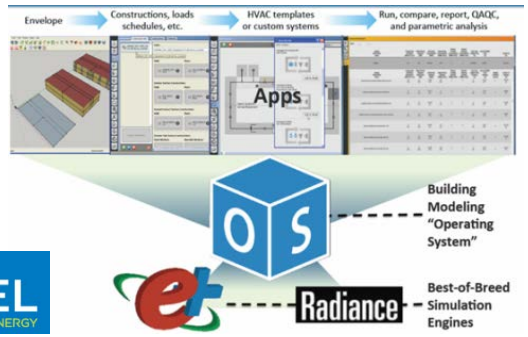
ESPPortfolios

CMUA

NCPA NORTHERN CALIFORNIA POWER AGENCY

SCPPA SOUTHERN CALIFORNIA PUBLIC POWER AUTHORITY

ESP®



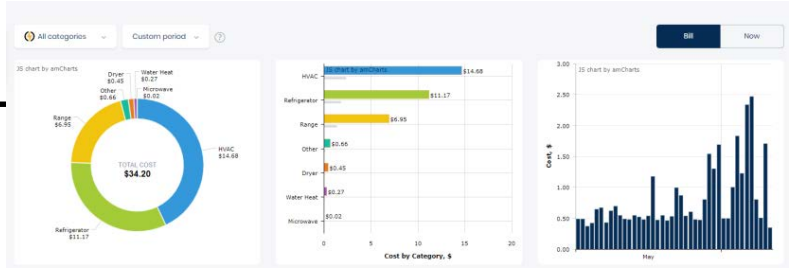
LA DWP www.ladwp.com

NREL Transforming ENERGY

Customer Engagement Lab (CEL) + Sustainable Living Lab (SLL) Demonstration Space

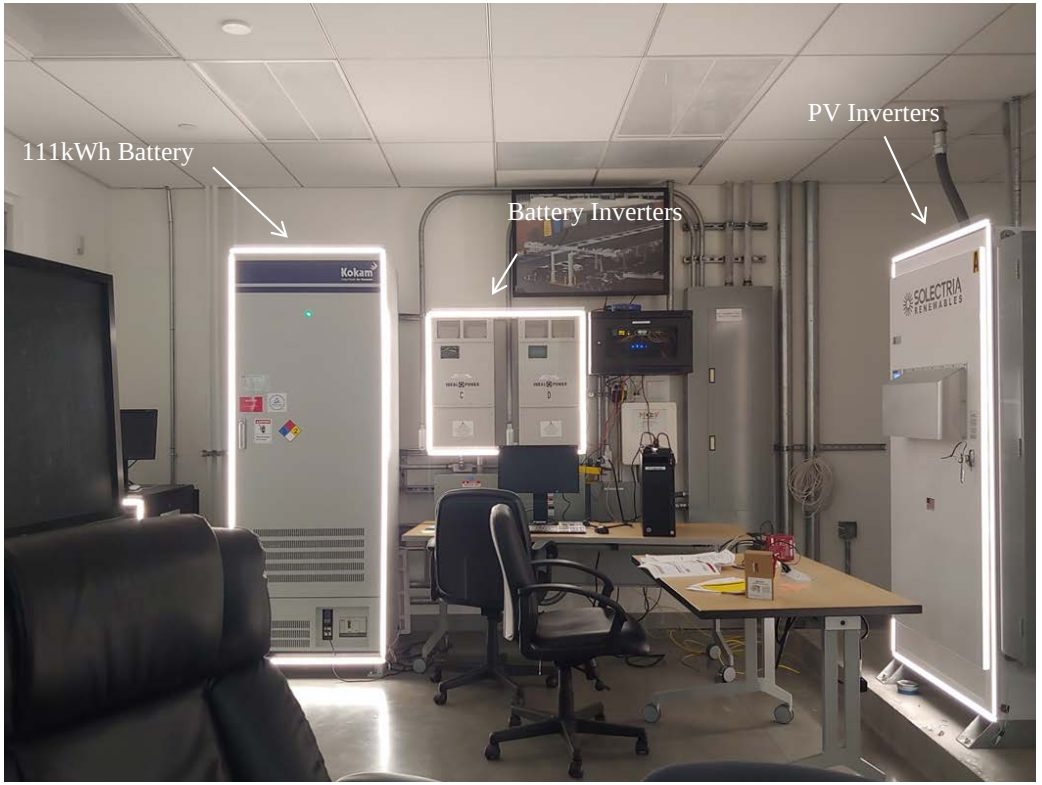
- The CEL/SLL spaces feature interactive educational displays to engage and educate all segments of LADWP customer portfolio.
- The Efficiency Solutions Engineering (ESE) Group was intimately involved in the review and approval of the display content. The ESE Group is considered the Subject Matter Expert (SME) for most of the displays, and is involved in future updates to the content.

Case Study (Smart) Home



- This dual purpose room at LKIC both demonstrates customers and allows Engineering staff to test various smart appliances and control devices. These devices offer convenience and efficiency features that LADWP customers may purchase now and in the future.
- This provides valuable insight on new avenues for demand response, and ways for customers to manage their energy & water consumption. Engineering staff look for opportunities to incorporate these products in LADWP customer programs.
- Staff also study how interaction with technology changes customer experience and behaviors in consuming energy & water.

Microgrid



- The microgrid controller balances the building demand with the energy output from the PV array and controls energy flows to and from the battery storage system.
- Knowledge gained by programming the Microgrid will assist LADWP's Power System in their goals to greatly increase system resiliency and reliability as customers adopt Distributed Energy Resources in their facilities.

Next Steps for LADWP DSM/DER Resource Planning

- Reassess avoidable costs with considerations for local Distribution and Transmission upgrade deferrals where applicable.
  - Align with 100% Renewables future.
  - Assess potential to defer more costly conventional utility scale efforts.
- Coordinate on potential studies to provide apples to apples comparison of alternatives and optimize mix of DERs including EE measures for deployment.

Questions?

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