LA100

The Los Angeles 100% Renewable Energy Study

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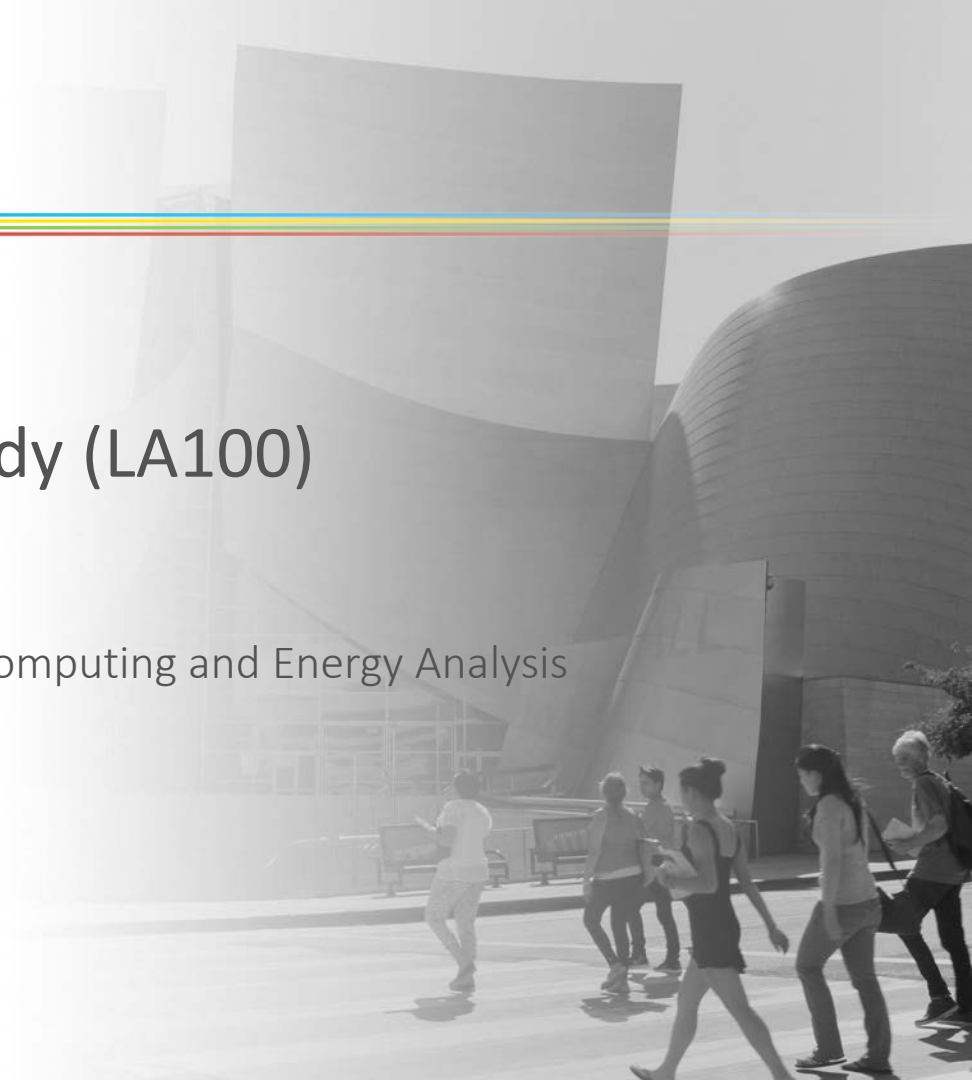


LA DWP Los Angeles Department of Water & Power | NREL Transforming ENERGY




LA100

The Los Angeles 100% Renewable Energy Study

Detailed, high resolution analysis evaluating a range of future scenarios to equip LA decisionmakers to understand:

- What are the **pathways and costs to achieve a 100% renewable electricity supply** while electrifying key end uses and maintaining the current high degree of reliability?
- What is the **impact on the environment**?
- How might the **economy** and **rates** respond to such a change?

What Is Unique About LA100?

LADWP must balance electricity supply and demand **at all times**

First-of-its-kind, ultrahigh resolution modeling

Objective, transparent, stakeholder-based analysis of pathways to 100% RE

LA100 does **not** present recommendations or suggest policies

Scenarios Based on LA Advisory Group Priorities

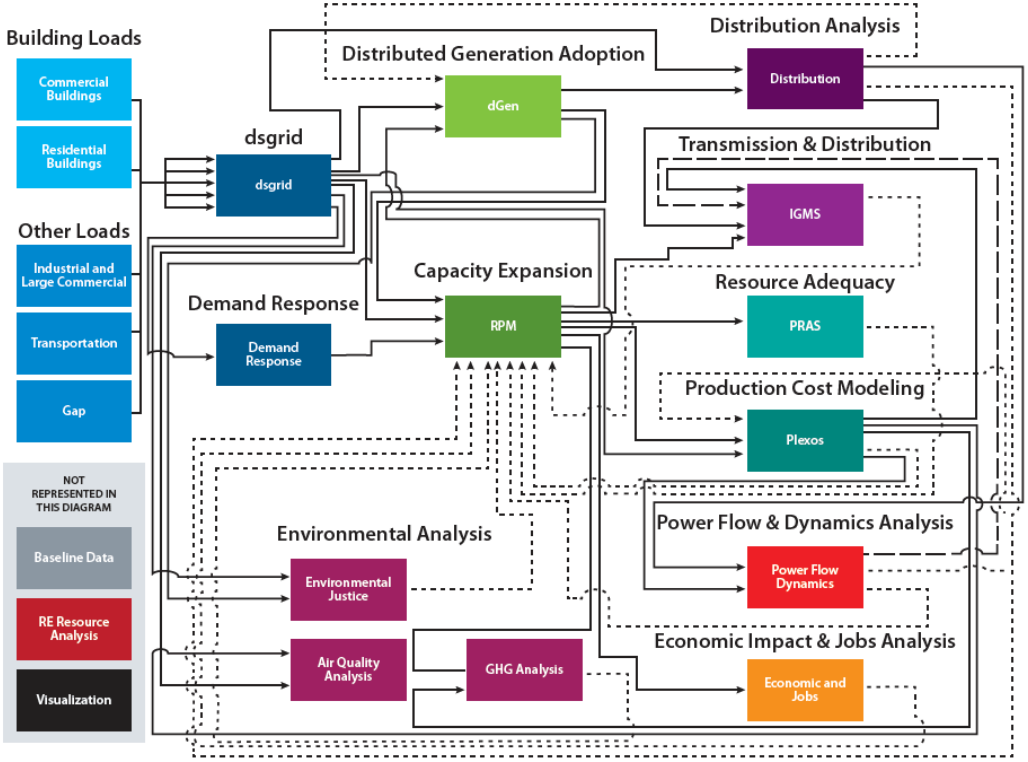
		LA100 Scenarios								
		Moderate Load Electrification				High Load Electrification (Load Modernization)				High Load Stress
		SB100	LA-Leads, Emissions Free (No Biofuels)	Transmission Renaissance	High Distributed Energy Future	SB100	LA-Leads, Emissions Free (No Biofuels)	Transmission Renaissance	High Distributed Energy Future	SB100
	RE Target in 2030 with RECs	60%	100%	100%	100%	60%	100%	100%	100%	60%
	Compliance Year for 100% RE	2045	2035	2045	2045	2045	2035	2045	2045	2045
Technologies that do not vary in eligibility across scenarios	Solid Biomass	N	N	N	N	N	N	N	N	N
	Fuel Cells	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Hydro - Existing	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Hydro - New	N	N	N	N	N	N	N	N	N
	Hydro - Upgrades	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Nuclear - New	N	N	N	N	N	N	N	N	N
	Wind, Solar, Geothermal	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Storage	Y	Y	Y	Y	Y	Y	Y	Y	Y
Technologies that do vary	Biofuel Combustion	Y	No	Y	Y	Y	No	Y	Y	Y
	RE-derived Fuel Combustion (e.g., hydrogen)	Y	No	Y	Y	Y	No	Y	Y	Y
	Natural Gas	Y	No	No	No	Y	No	No	No	Y
	Nuclear - Existing	Y	Y	No	No	Y	Y	No	No	Y
Repowering OTC	Haynes, Scattergood, Harbor	N	N	N	N	N	N	N	N	N
RECS	Financial Mechanisms (RECS/Allowances)	Yes	N	N	N	Yes	N	N	N	Yes
DG	Distributed Adoption	Moderate	High	Moderate	High	Moderate	High	Moderate	High	Moderate
Load	Energy Efficiency	Moderate	Moderate	Moderate	Moderate	High	High	High	High	Reference
	Demand Response	Moderate	Moderate	Moderate	Moderate	High	High	High	High	Reference
	Electrification	Moderate	Moderate	Moderate	Moderate	High	High	High	High	High
Transmission	New or Upgraded Transmission Allowed?	Only Along Existing or Planned Corridors	Only Along Existing or Planned Corridors	New Corridors Allowed	No New Transmission	Only Along Existing or Planned Corridors	Only Along Existing or Planned Corridors	New Corridors Allowed	No New Transmission	Only Along Existing or Planned Corridors
WECC	WECC VRE Penetration	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

Note, the study also includes a reference case (2017 IRP with minor updates). This case extends through 2036.

dGen
Modeled every property in LA (**625,291** agents), totaling **>65M** simulations

Buildings
Modeled **>7M** buildings using **3.6M** processor hours, which would take **>60 years** to finish on a laptop

dsgrid
Allocated **5** modeling teams' loads to **625,291** geographic locations, generating **>3.5M** combinations and producing **50 TB** of data; if stored in CDs, this would be taller than a **16-story building**



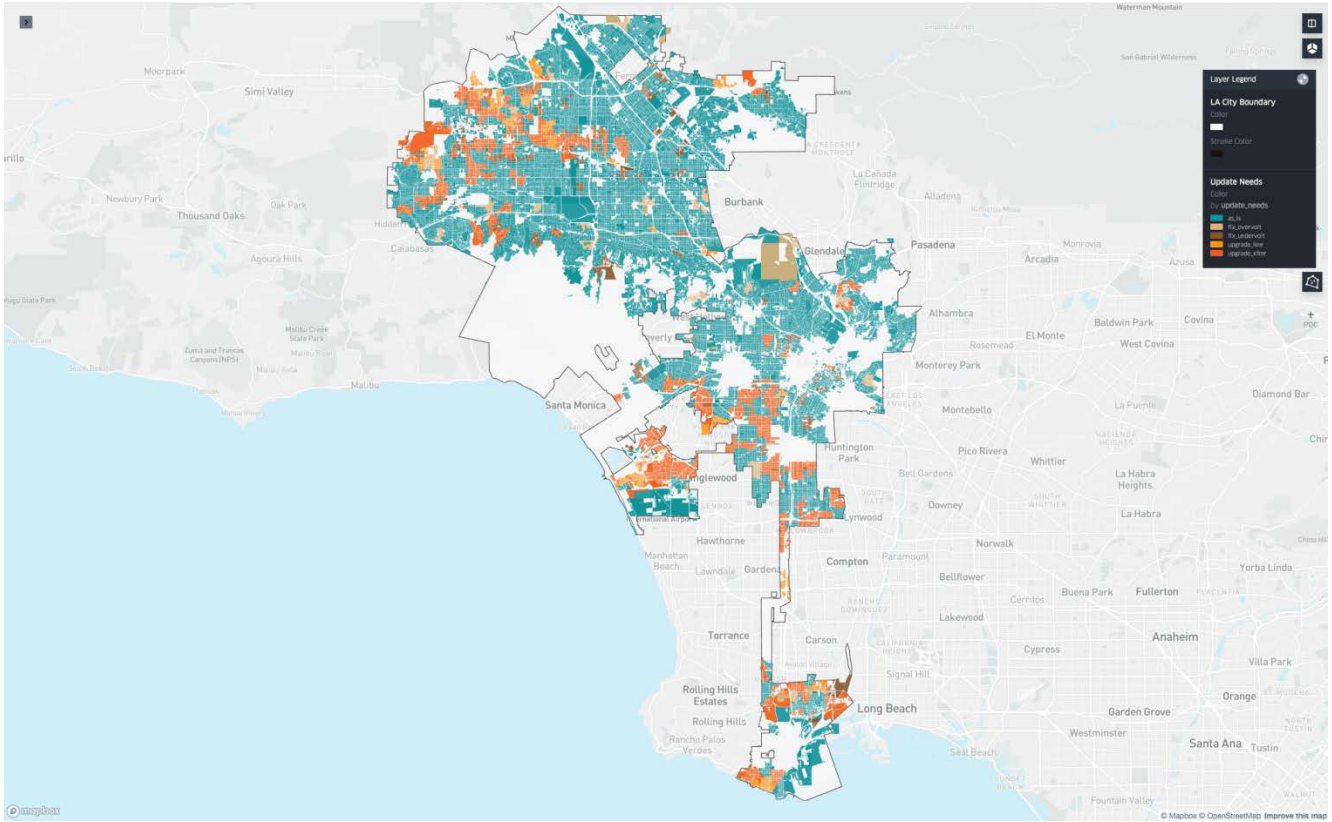
Distribution
Modeled every electric wire in LA (over **1,600** circuits) for thousands of scenarios each—totaling **>25M** detailed engineering simulations

RPM
Simulated >**8,000 years** of dispatch , which would require **2 decades** worth of computing on a laptop

Plexos
Ran **>7.6** node-years on Eagle, which is like conducting a simulation **24/7 for 7.6 years straight** on a laptop

= Approximately 100M simulations required

Example of results: Transmission Planning



Preliminary Insights

1. Multiple cost-effective pathways to get to ~90% RE
2. Last 10% will likely employ new technologies
3. Many uncertainties about the last 10%, but the broader the eligible solutions, the lower the costs
4. Cross-economy impacts require careful analysis

Closing Thoughts

- LA100 offers unprecedented **scale**, **scope**, and **detail** for energy planning

  But next analyses will be even more complex as we further integrate modeling

- High-performance computing—at the scale of a national laboratory—is **essential** to provide robust insights

- The study findings help identify characteristics of **new technologies** to meet market demand as more cities and states adopt 100% clean energy targets

Thank you!

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