



Overview of NREL's Approach to Integrating Distribution-Sited Resources in the LA100 Study

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LA100

The Los Angeles 100% Renewable Energy Study



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 are the potential benefits to **the environment and health**?



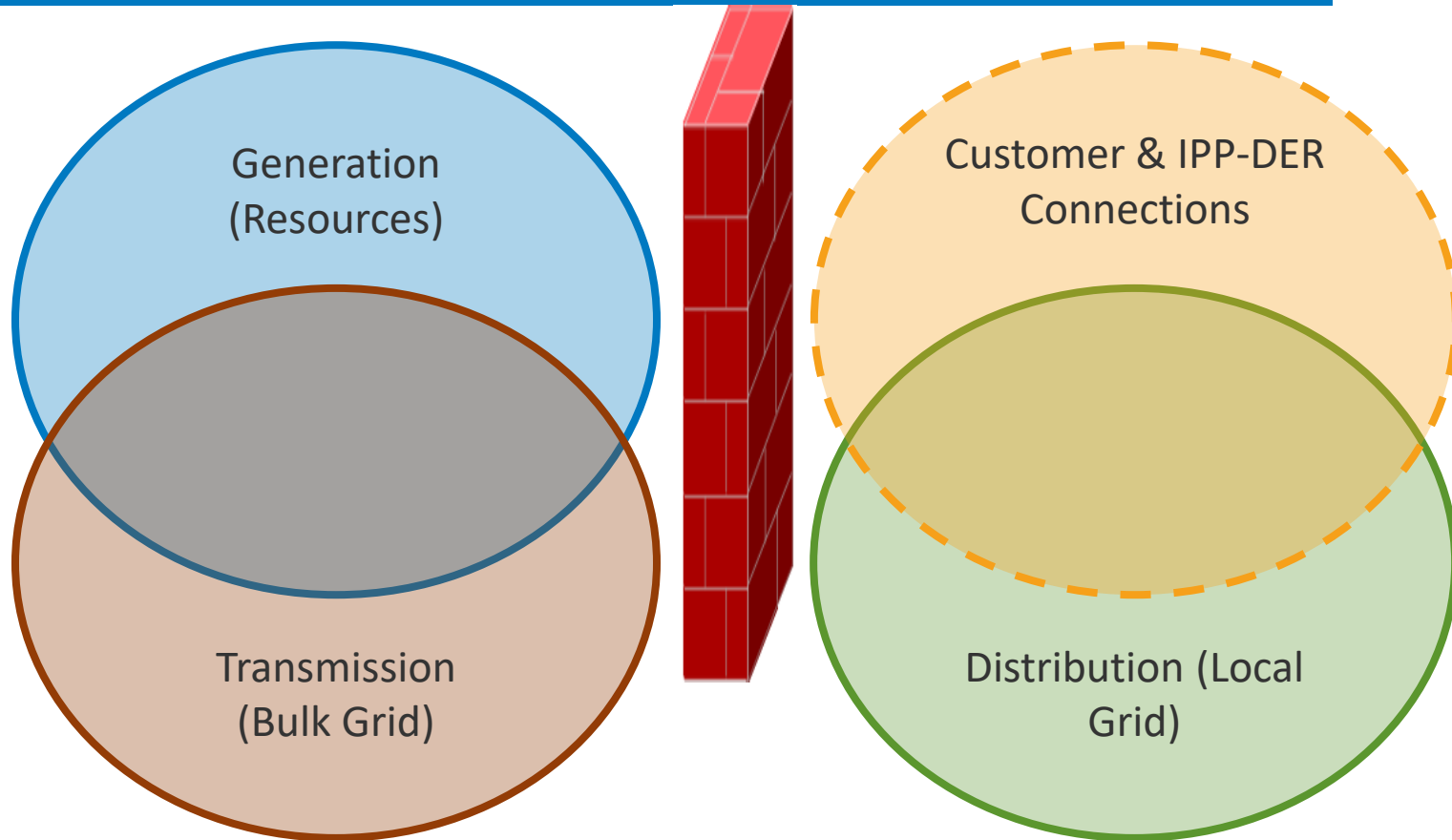
How might **local jobs** and the **economy** change?



How can communities shape these changes to prioritize **environmental justice**?



Try to Break The T-D wall? Isn't This Needed to do the "I" Part of IRP?

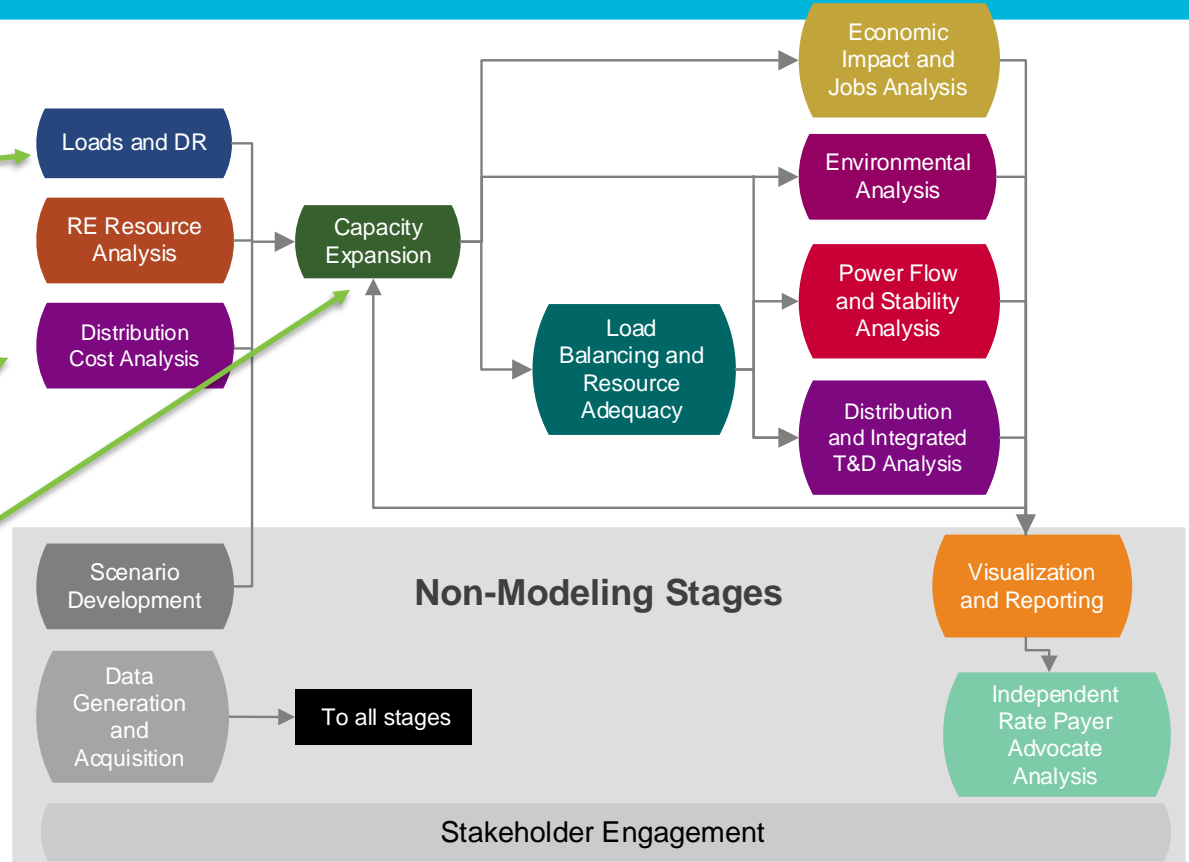


Steps of the LA 100% Renewable Energy Study – Highlighting the “D” Parts...

Estimate load growth and demand profiles, including potential for load flexibility

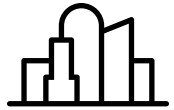
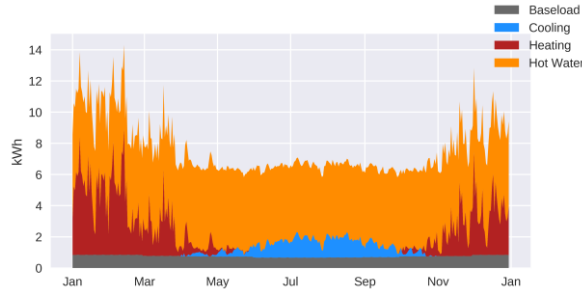
Estimate distribution system hosting capacity and upgrade costs

Include DERs in Capacity Expansion

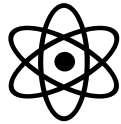


Lots of Load modeling

Buildings



Building stock characteristics database

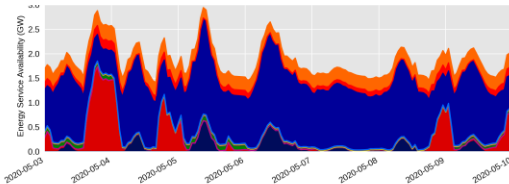


Physics-based computer modeling



High-performance computing

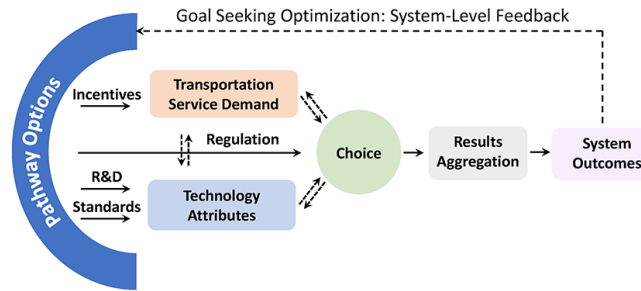
Demand Flexibility



Transportation



TEMPO

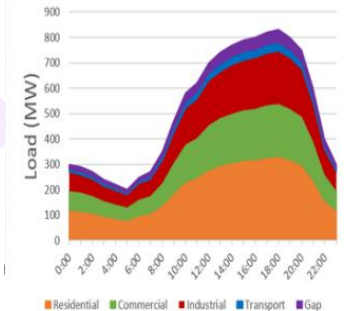


Industrial:

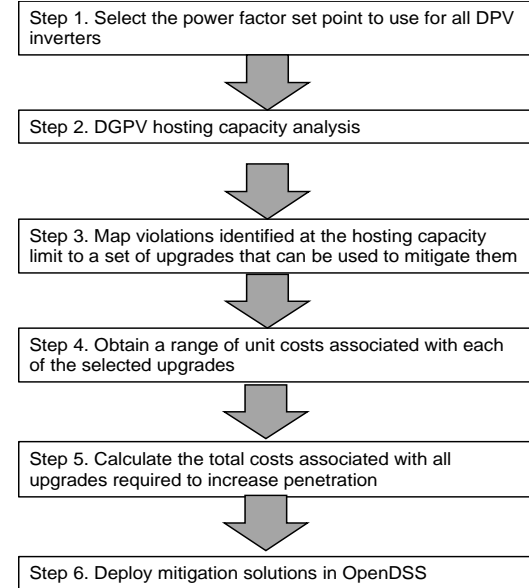
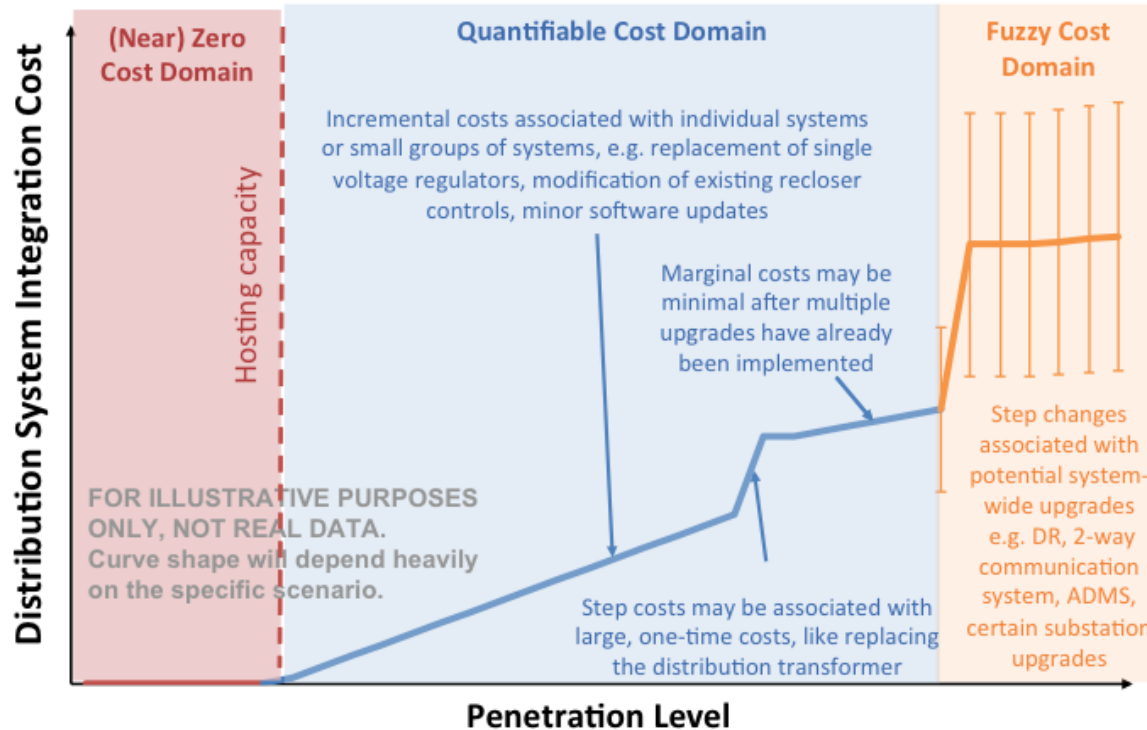
- Key individual facilities
- AMI data
- Water loads

Other/Gap loads:

- Match Data



Distribution System Cost Analysis

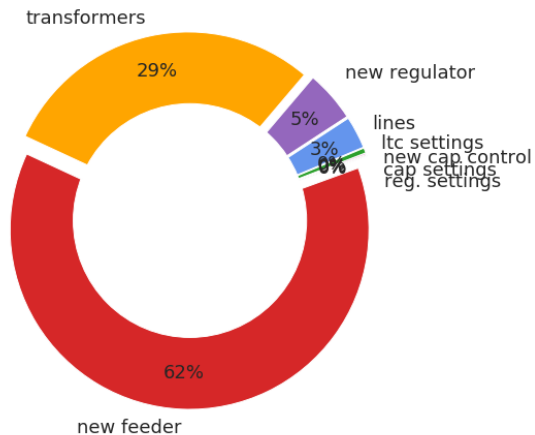


DISCO

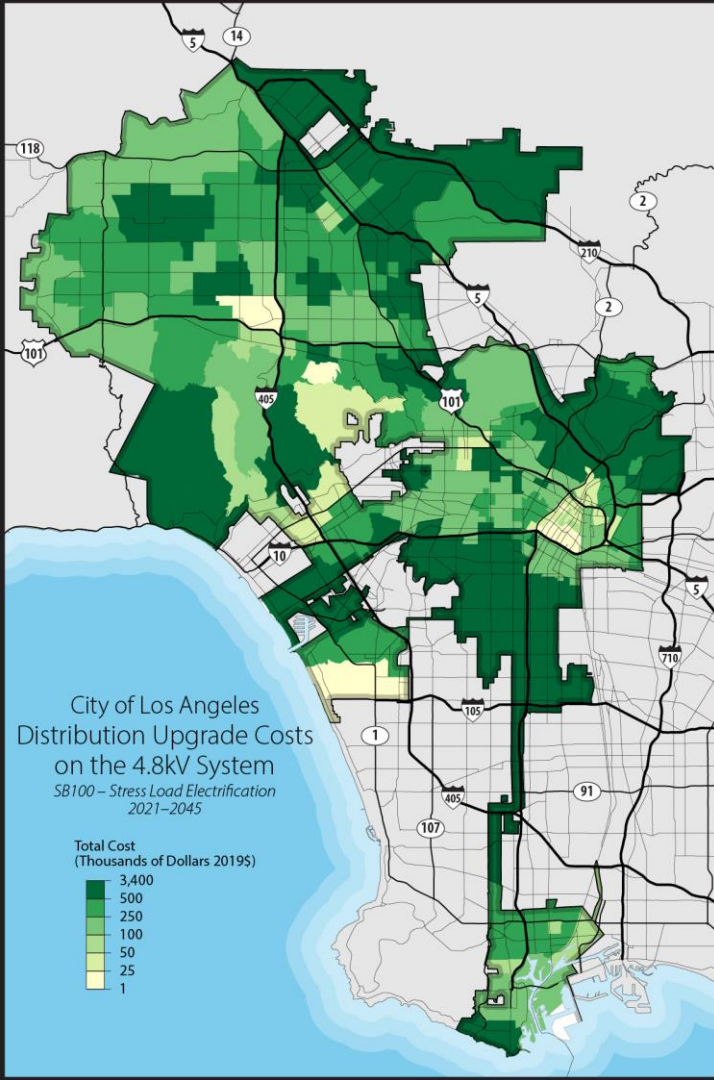
Distribution grid Integration Solution Cost

What type of distribution upgrades are needed and where?

4.8kV Upgrade Cost Breakdown By Type (2021-2045)

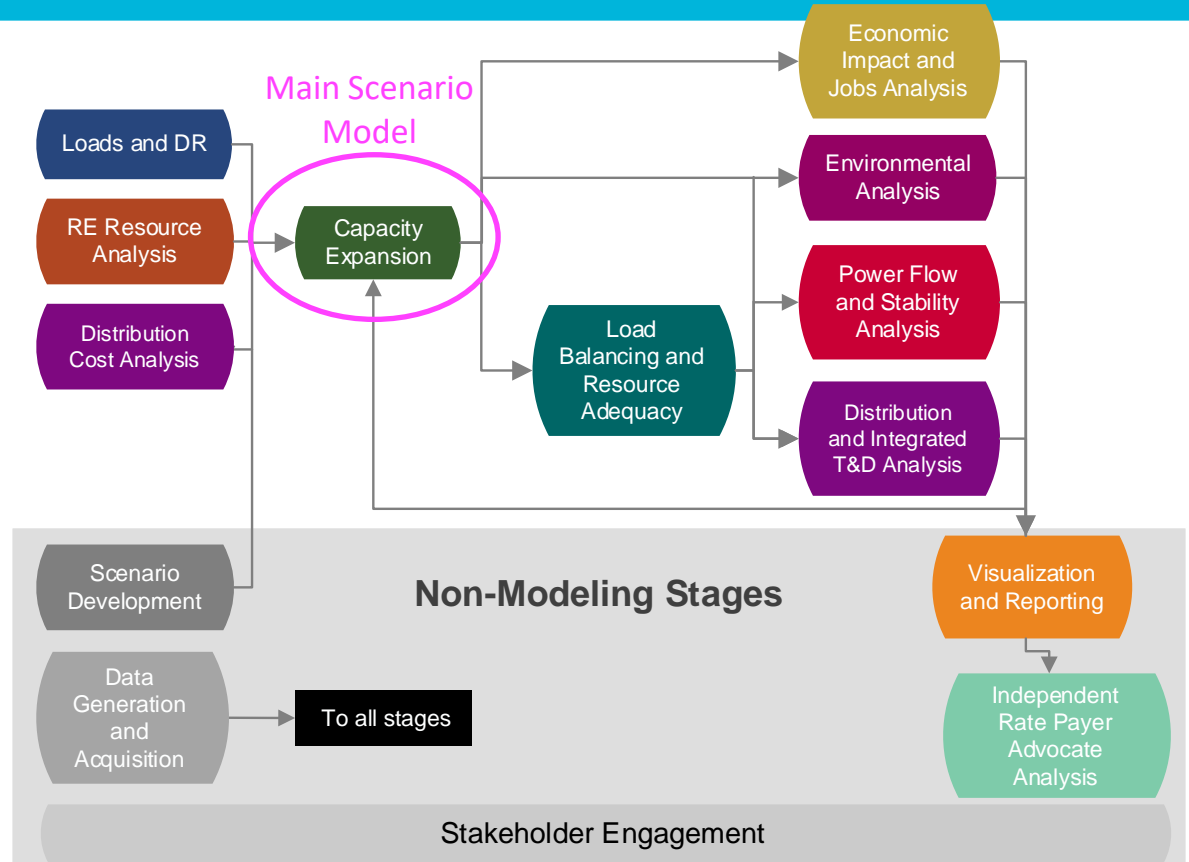


Across all scenarios



Steps of the LA 100% Renewable Energy Study

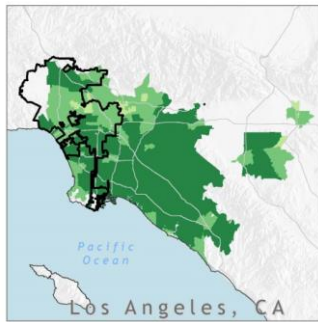
Develop optimal expansion plan and distributed resource adoption scenario



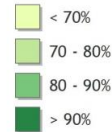
Distributed Technology Diffusion (dGen)

NREL CEMs do not estimate DG adoption.
A separate model (dGen) is used.

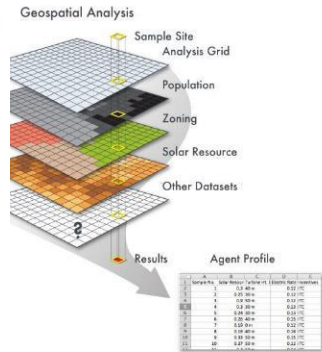
- Forecasts customer adoption of distributed generation technologies (solar, storage, wind, geothermal) for residential, commercial, and industrial entities, given assumptions about future electricity costs, technology cost and performance, policy and regulation, and customer behavior
- High geographic resolution enables state, utility, or city-specific analysis with overlay of multiple spatial layers



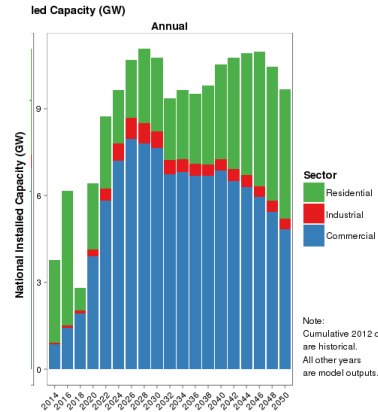
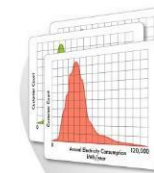
Percent of small buildings that are suitable



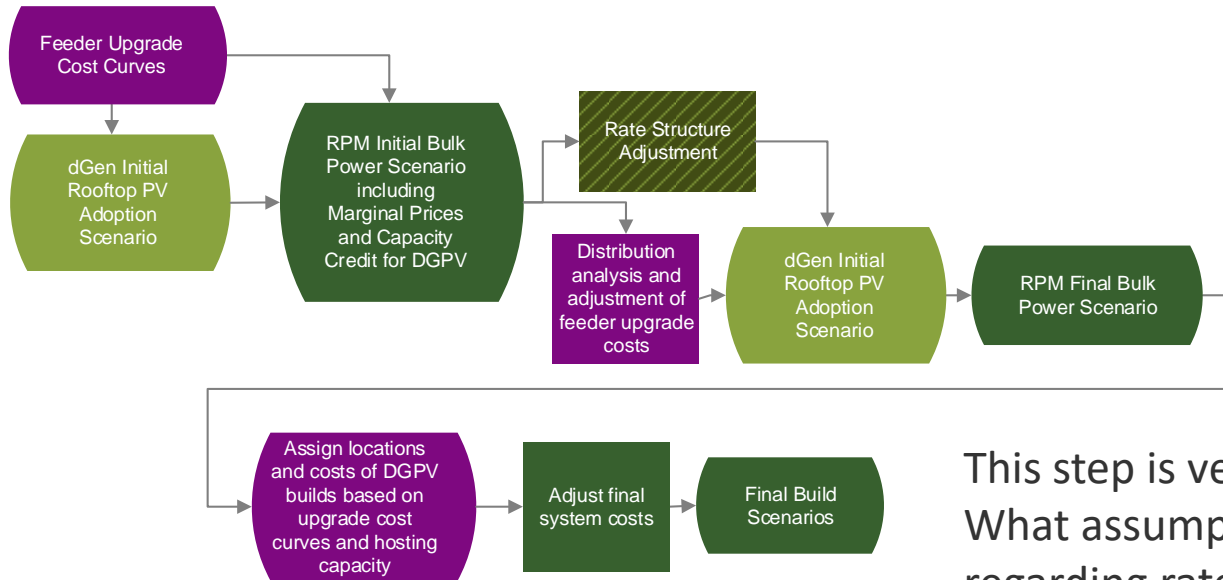
City Boundary



National Data Trends



CEM(RPM)/dGen Linkage

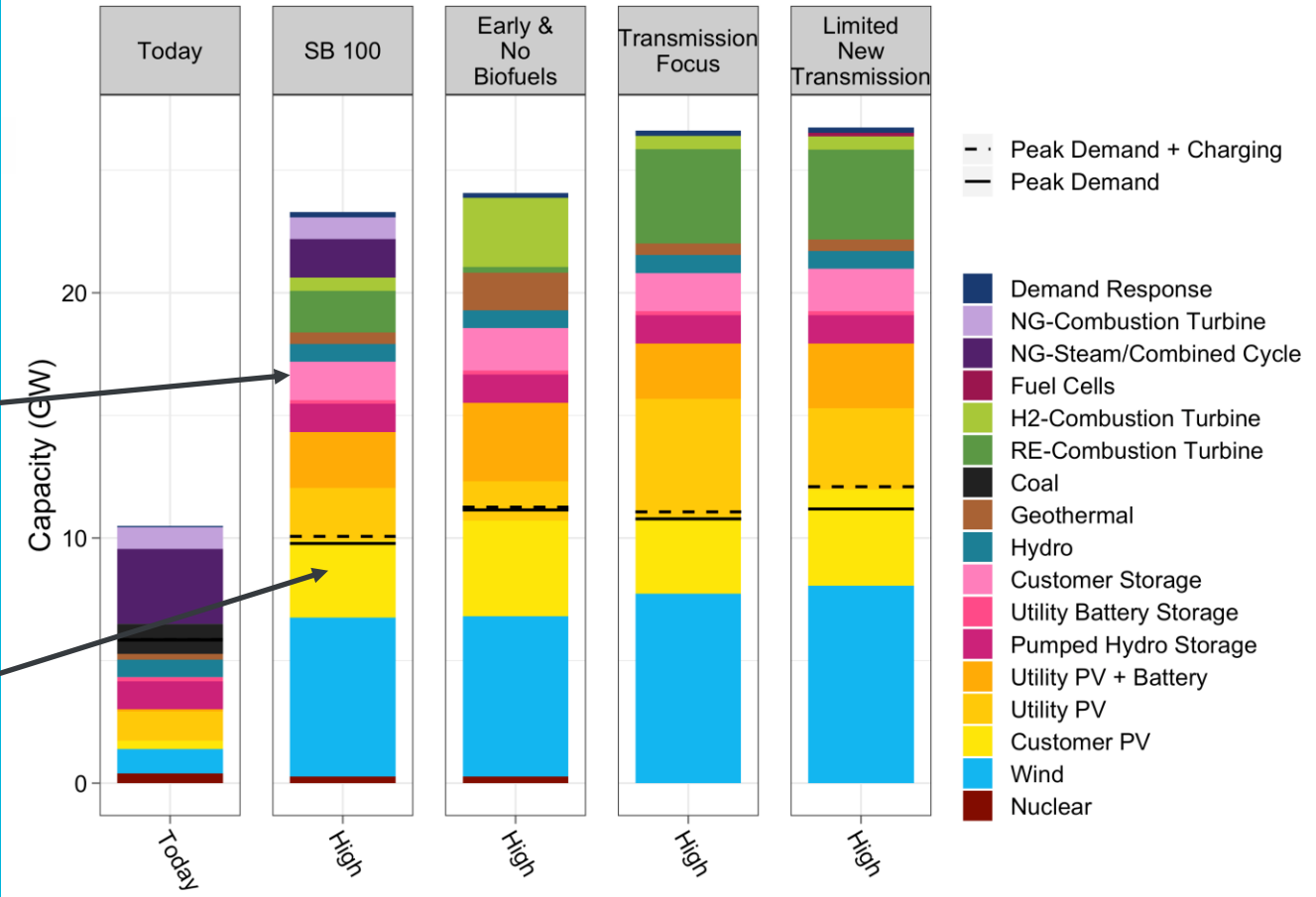


This step is very difficult
What assumption are you going to make regarding rate structures?
How are you going to treat distributed storage?

Results - Capacity Mix

Customer sited PV

Customer sited PV



Capacity Mix in 2045 — High Load Scenarios, Compared to 2020

My Personal Opinion/Conclusions

The “I” part of IRP is very difficult.

Its worth doing.

We (collectively) still have work to do to get us to a truly cost-optimal mixes of resources...



Questions?

www.nrel.gov

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LA100 Scenarios

Each Scenario Evaluated Under Different Customer Demand Projections (different levels of energy efficiency, electrification, and demand response)

Moderate

High

Stress



SB100

Evaluated under **Moderate, High, and Stress** Load Electrification

- 100% clean energy by **2045**
- Only scenario with a target based on retail sales, not generation
- Only scenario that allows up to 10% of the target to be natural gas offset by renewable electricity credits
- Allows existing nuclear and upgrades to transmission



Early & No Biofuels

Evaluated under **Moderate and High** Load Electrification

- 100% clean energy by **2035**, 10 years sooner than other scenarios
- No natural gas generation or biofuels
- Allows existing nuclear and upgrades to transmission



Transmission Focus

Evaluated under **Moderate and High** Load Electrification

- 100% clean energy by **2045**
- Only scenario that builds new transmission corridors
- No natural gas or nuclear generation



Limited New Transmission

Evaluated under **Moderate and High** Load Electrification

- 100% clean energy by **2045**
- Only scenario that does not allow upgrades to transmission beyond currently planned projects
- No natural gas or nuclear generation



LA100 Equity Strategies

More at la100study.com

THE CHALLENGE:

- How can Los Angeles ensure its transition to 100% clean energy with high levels of electrification improves energy justice?

OUR SOLUTION:

- Prioritize energy justice outcomes based on community input
- Analyze clean-energy transition pathways that maximize energy justice outcomes for all communities in LA

POTENTIAL IMPACT:

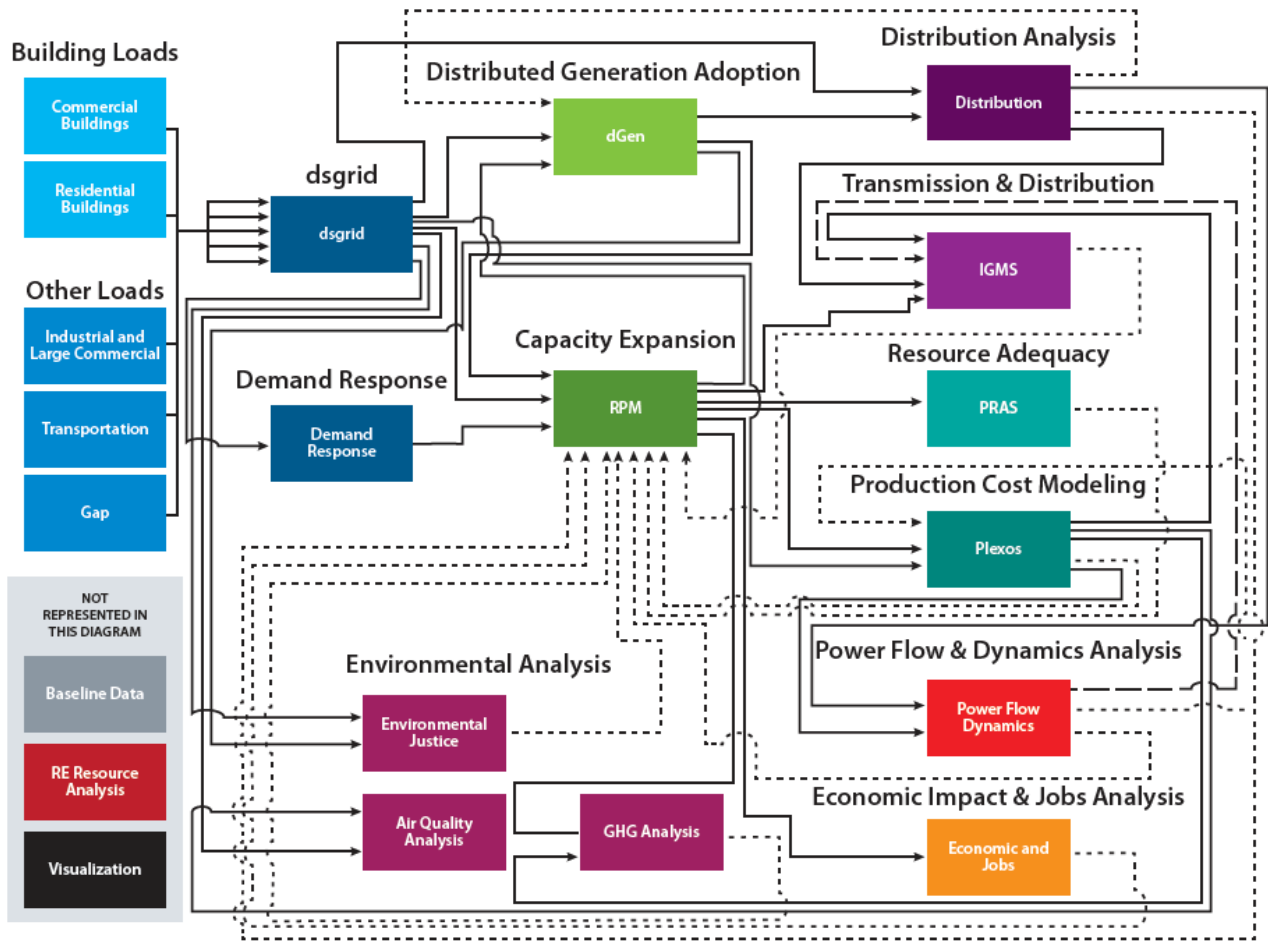
- Improved understanding of factors contributing to energy inequities
- Implementation-ready strategies to address energy justice in LA
- Replicable approaches for incorporating energy justice in future research



The Los Angeles 100% Renewable Energy Study



LA100 Data and Simulation Workflow



Over 100 million simulations