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Los Angeles Department of Water & Power

CUSTOMERS FIRST

SB100 Draft Results Workshop

Grid Planning Implications Panel

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SB100 Study Positives

- Excellent starting dialogue that will continue to evolve as we reach 100% renewable. Further collaboration between Joint Agencies, Load Serving Entities, Balancing Authorities, and other stakeholders will improve future study results.

- Study demonstrates that utilizing existing resource investments in generation and transmission along with robust planning including balancing of cost, sustainability, and reliability can result in an affordable clean energy grid for our customers.

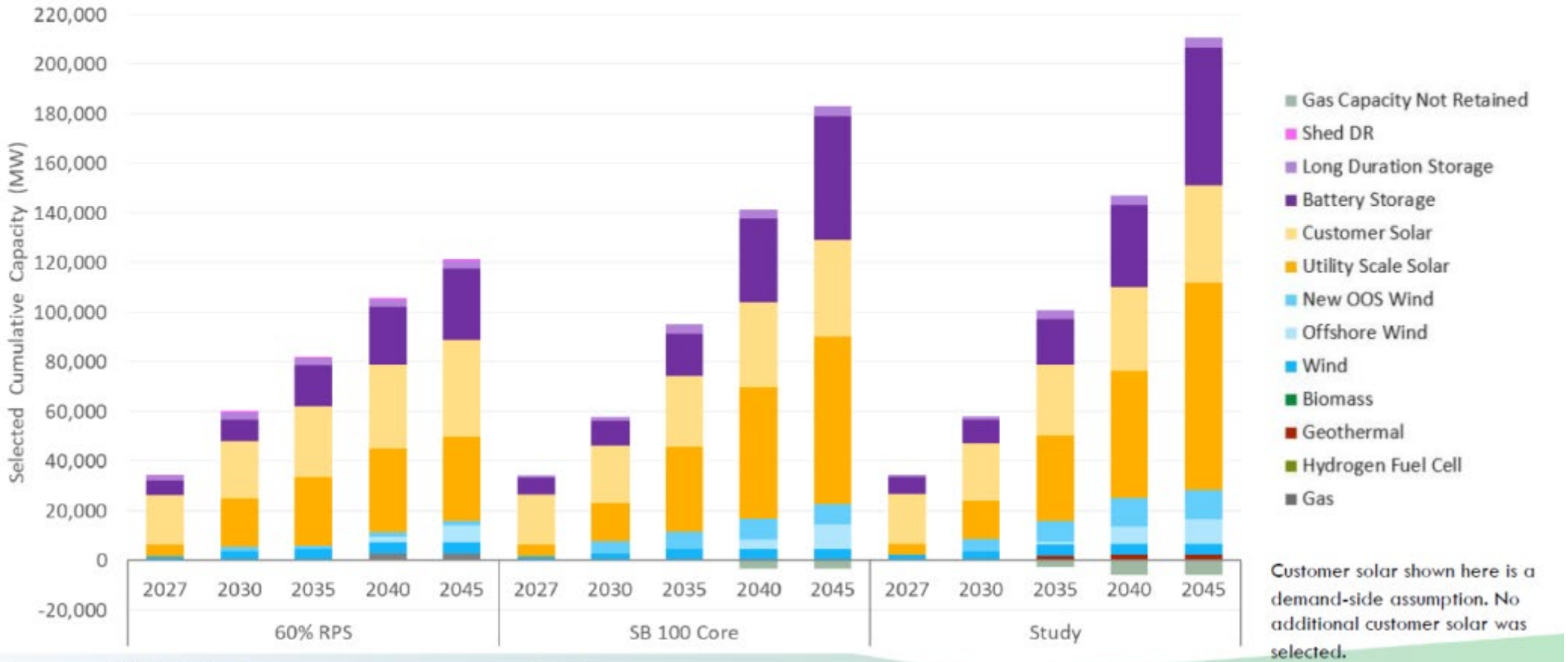
- Study clearly indicates that with increased levels of renewables consistent with SB100, gas-fired generation still serves a role predominately as a backup resource to the grid for years to come and will provide substantial cost savings, reliability, and resiliency benefits.

LADWP's Clean Grid LA Plan Elements

1. Retirement of 1,661 MW of once-through cooling in-basin gas-fired capacity by 2030 requires over 2,200 MW of 4 hour energy storage to replace the lost capacity.
2. Ten (10) Transmission Projects needed by 2030 to increase renewable import capability (100 Miles)
3. 55% RPS by 2025, 70% RPS by 2030, and 80% RPS by 2036 (over 3,000 MW planned)
   - Future Distributed Energy Resources (Local Solar, Local Energy Storage, Energy Efficiency, Demand Response, Transportation and Building Electrification)
4. IPP Renewable Hub (30% Green Hydrogen by 2025)
5. Increased use of Castaic Pumped Hydroelectric Plant for integration of renewables.

Major challenges related to constructing transmission and in-basin energy storage for reliability and resiliency

Results: Capacity Additions

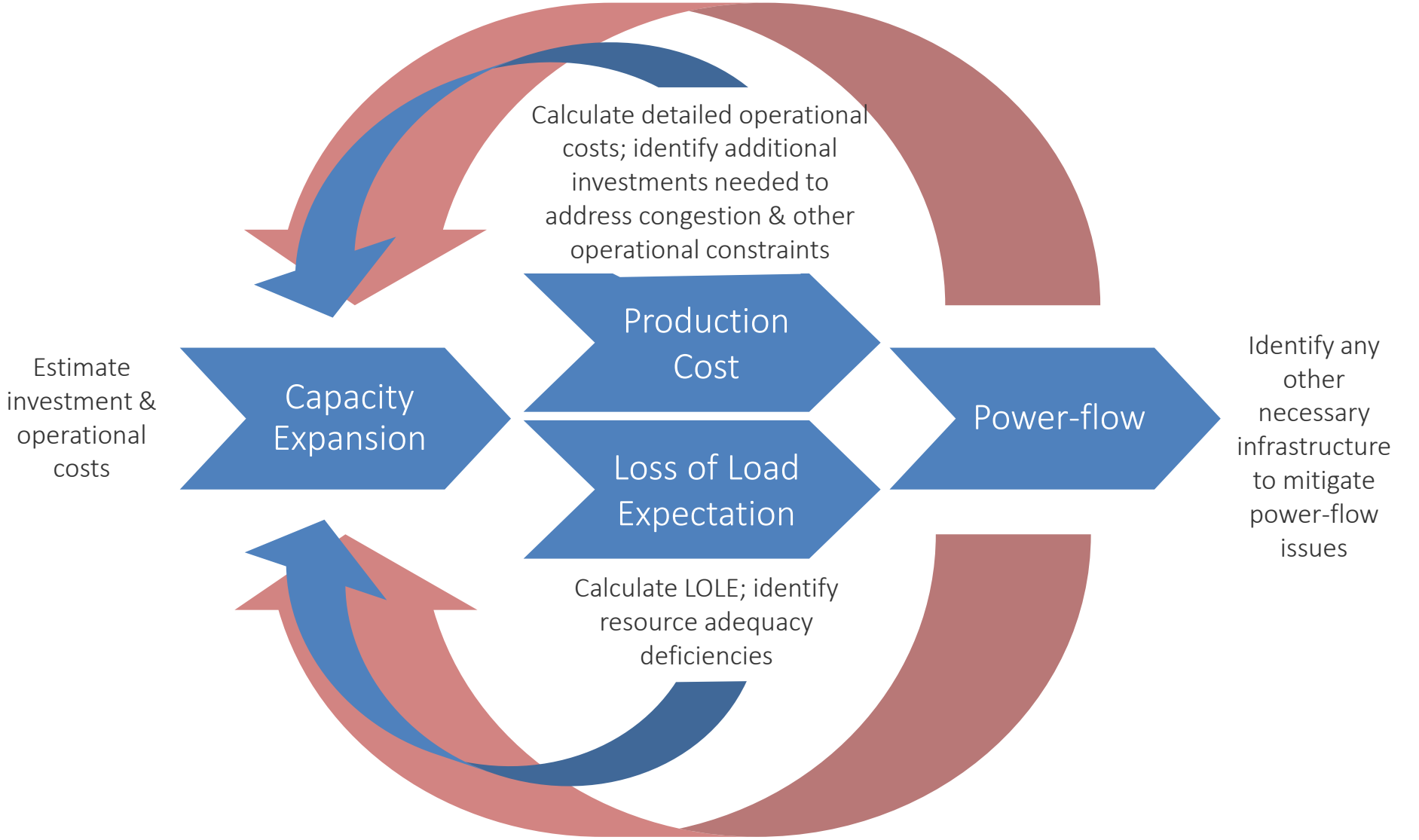


As of 2019, there is 80 GW of in-state capacity in California.

SB100 Study results depicts limited diversity in resource mixes and points to the need for additional modeling techniques and iteration of results to refine capacity expansion modeling.

LA100 Bulk Modeling Approach:

Estimate, validate, then Refine



Observations on SB100 Draft Results

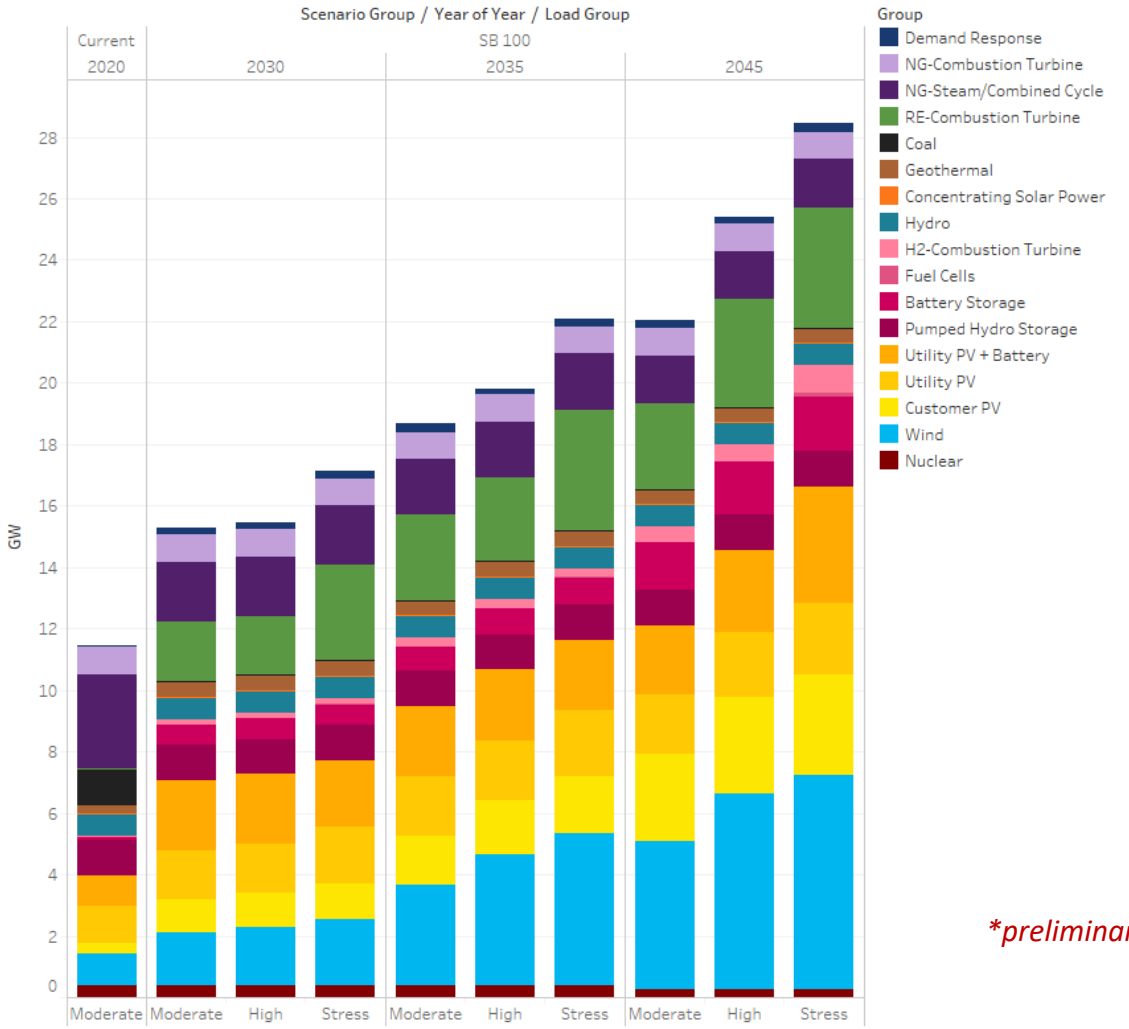
More detailed modeling will likely result in greater resource diversity

- Additional hourly production cost modeling, Loss of Load Expectation, and Power Flow studies are recommended in future SB100 study updates. Based on LADWP's experience from the LA100 study with NREL, additional modeling resulted in multiple iterations on resource inputs in the capacity expansion model and resulted in much greater diversity of resources to achieve reliability and resiliency.

LADWP LA100 Draft Results for Achieving SB100 Goals and OTC Retirements

Replacing OTC units' capacity requires significantly more renewables, energy storage, and some additional renewable combustion turbine capacity. Green Hydrogen Combustion Turbines were included in the LA100 study results.

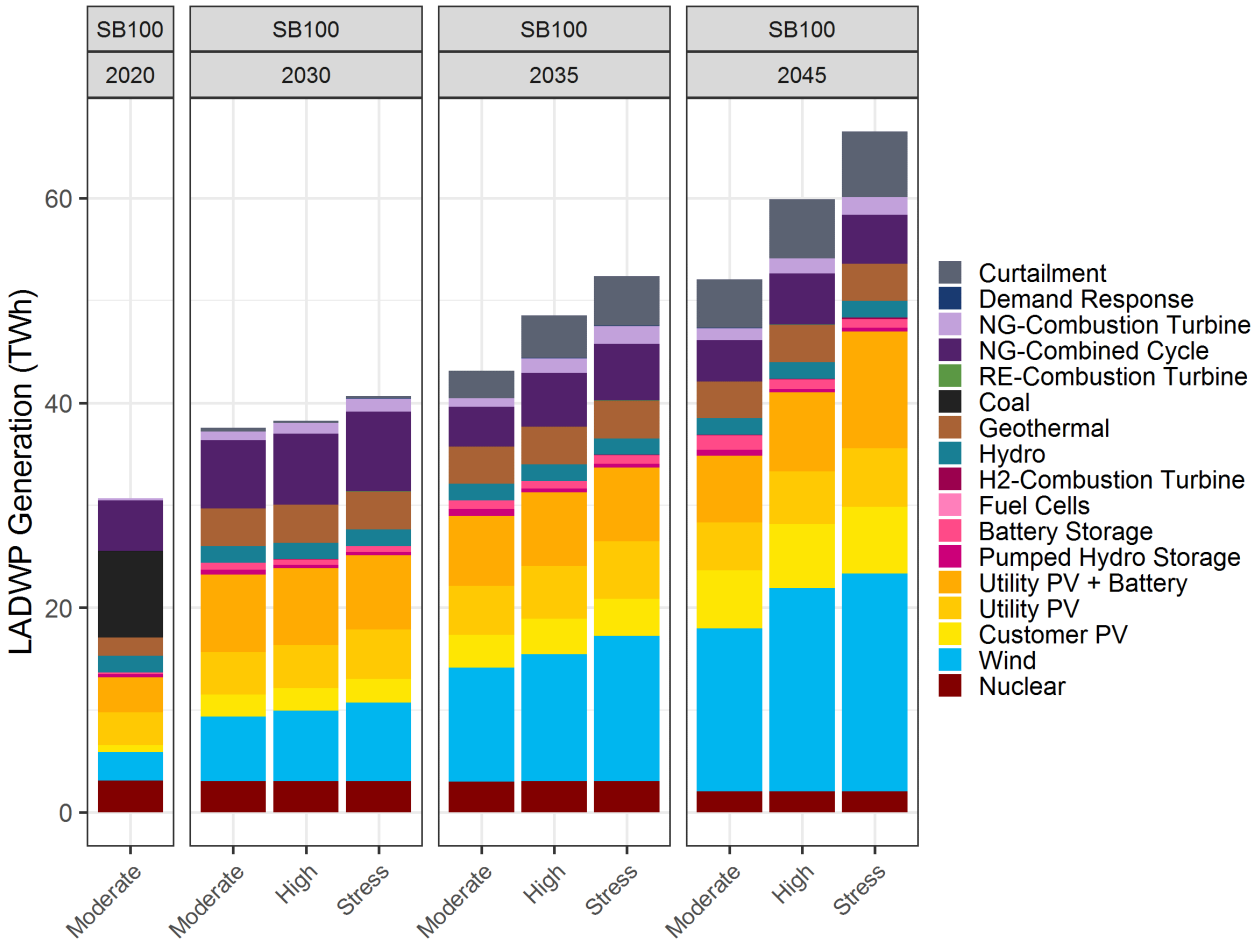
Capacity Mix



Draft Results for Discussion Only; Subject to Change

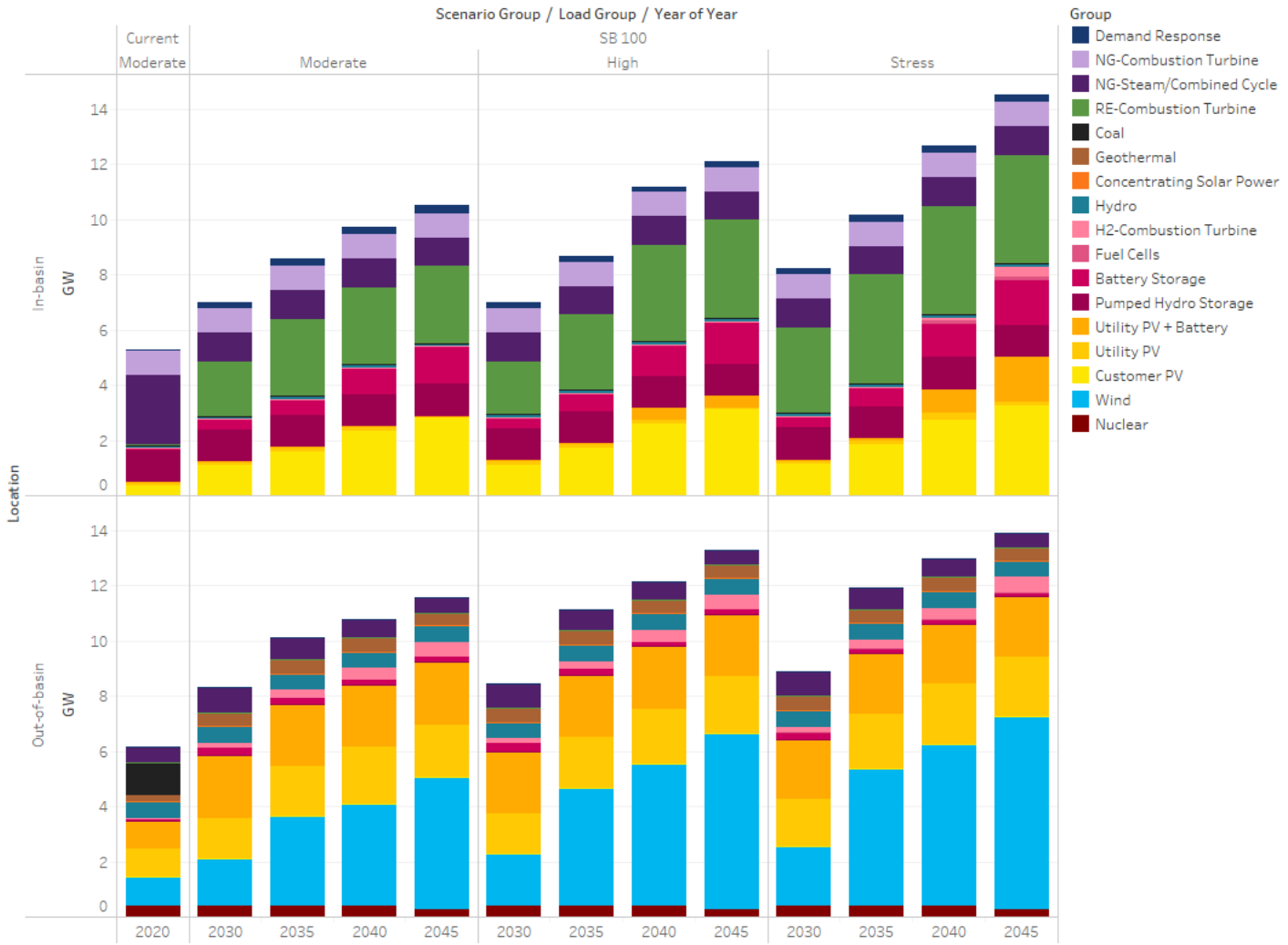
**preliminary*

Annual Generation



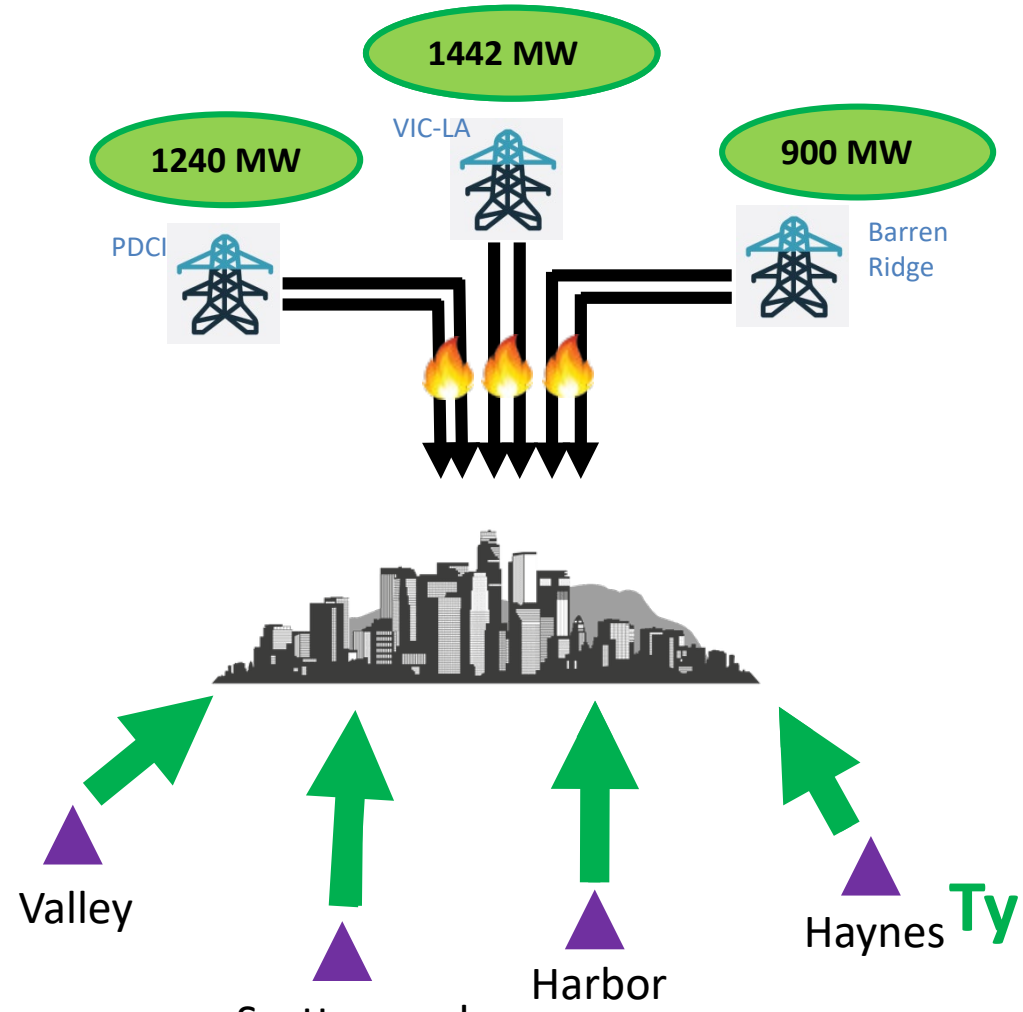
LADWP LA100 Study Capacity Deployed In- and Out- of Basin under SB100

Draft Results for Discussion Only; Subject to Change



Resource mixes are very different considering In-basin resources and local transmission constraints. Local clean dispatchable generation is essential to providing grid resiliency.

Saddle Ridge Fire – Import Capacity Lost



- Complete loss of Pacific DC Intertie
- Complete loss of south of Barren Ridge Lines (3 lines)
- 2 of 5 lines lost on the VIC-LA path

Import = 1442 MW

In-Basin Generation + (938+951) MW

Net Capacity = 3331 MW

Typical Summer Load = 5000+ MW

Future SB100 studies must address Grid Resiliency and Reliability and ensure alignment of natural gas and electric system planning

Observations on SB100 Draft Results

Load forecasts should consider moderate, high, and stress load sensitivities considering more aggressive State and Local electrification adoption targets

- CPUC IRP and CEC IEPR Demand forecasts typically are considered “moderate” cases and may not align with more aspirational State and Local transportation and electrification goals.
- LADWP assumes electric transportation represents 30% of baseline sales by 2030 in a stress case scenario vs. the more moderate 5% used in the SB100 Study.
- System Losses at 7.24% should be adjusted higher as a function of renewable development out-of-state.
- Peak demand forecast based on 1-in-2 should consider 1-in-10 which for LADWP is 11% higher.

More robust modeling needed to ensure Local Reliability/Resource Adequacy/Resiliency

- Using E3’s RECAP tool, or equivalent, is needed to analyze resource adequacy and loss of load probability. Adding stochastics with multiple weather simulations would refine results further.
- Production cost modeling is fundamental for improving dispatch, evaluating transmission constraints and identify hourly resource shortfalls

All of the above would result in refinements to resources needed to achieve SB100 goals.

Observations on SB100 Draft Results

Further vetting of modeling inputs by stakeholders needed

- Aggregating CCGT generators and peakers into 2 tiers (higher and lower efficiency units) may be oversimplifying the study in terms of cost, RA, and GHG emissions likely affecting accuracy of results.
- WECC 2028 Anchor Data Set data needs to be revisited. LADWP full repowering of OTC units assumptions is outdated and several renewable, pumped hydro, and large-hydro capacity differences were noted.
- Incremental upgrades and new transmission builds should include not only external transmission to bring the resources into the load centers, but also transmission within the load centers to maintain proper power flows.

May result in significantly more and different resources needed to achieve SB100 goals.