



The Los Angeles 100% Renewable Energy Study

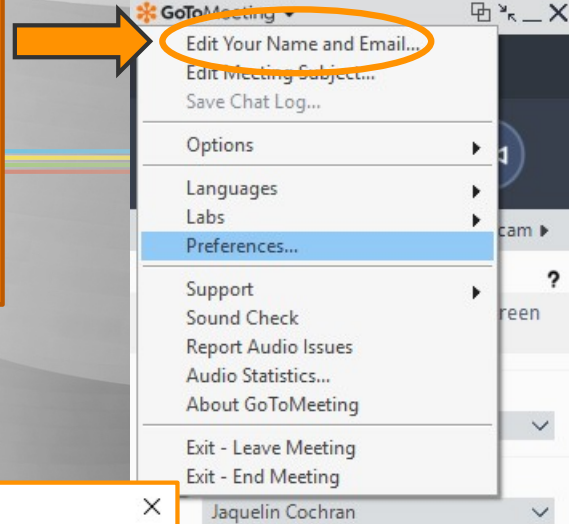
Advisory Group Meeting #14

Virtual Meeting #2
December 17, 2020





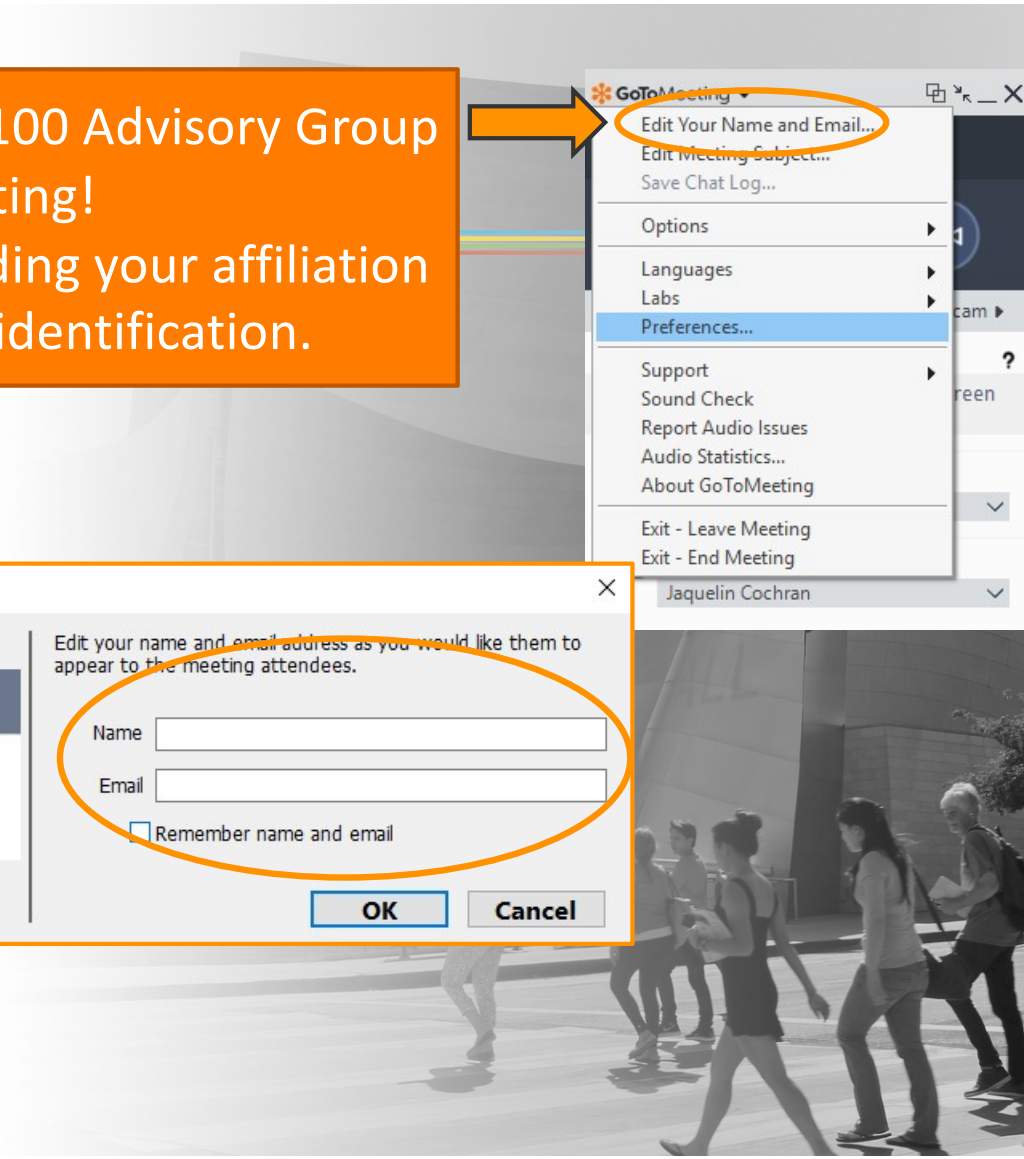
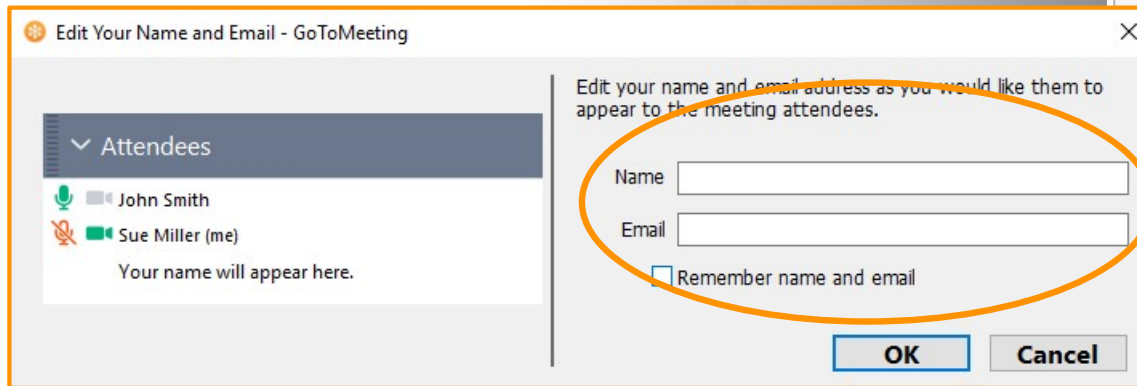
Welcome to the LA100 Advisory Group meeting!
Please consider adding your affiliation to your name identification.



Advisory Group Meeting

#14

Virtual Meeting #2
December 17, 2020



Tips for Productive Discussions



Let one person speak at a time
Keep phone/computer on mute
until ready to speak



Help ensure everyone gets
equal time to give input
Type "Hand" in Chat
Function to raise hand



Keep input concise so
others have time to
participate
Also make use of Chat
function



Actively listen to others,
seek to understand
perspectives



Offer ideas to address
questions and concerns
raised by others



Hold questions until
after presentations

Agenda

December 10

- Welcome
- Distribution Grid Analysis
- Discussion/Q&A

Today (December 17)

- Final Updates to Bulk Power Modeling
- Discussion/Q&A
- LA100 Updates
- Open Q&A on Any LA100 Topic



The Los Angeles 100% Renewable Energy Study

Final Results: LA100 Investment Pathways

Advisory Group Meeting #14, Virtual Meeting #2

Dan Steinberg & Bulk Power Team
National Renewable Energy Laboratory
December 17, 2020



AG 13 Recap: Reviewed Sensitivity Analyses and How to Keep the Lights On

Sensitivity Analyses:

- What happens when the 100% RE **definition** changes (e.g., basis on sales vs. generation, technology or REC eligibility)?
- How does the **speed** of the transition affect costs?
- What is the impact of different **load levels** (moderate vs. high vs. stress)?
- What happens if **transmission** is more or less available?
- What happens if RE **technology costs** change?

Reliability:

- How well does the power system hold up to different type of **events**?
- The pathways identified in the draft final results were highly robust to simulated outages; discussed plan to examine potential reductions in capacity investments to reduce costs

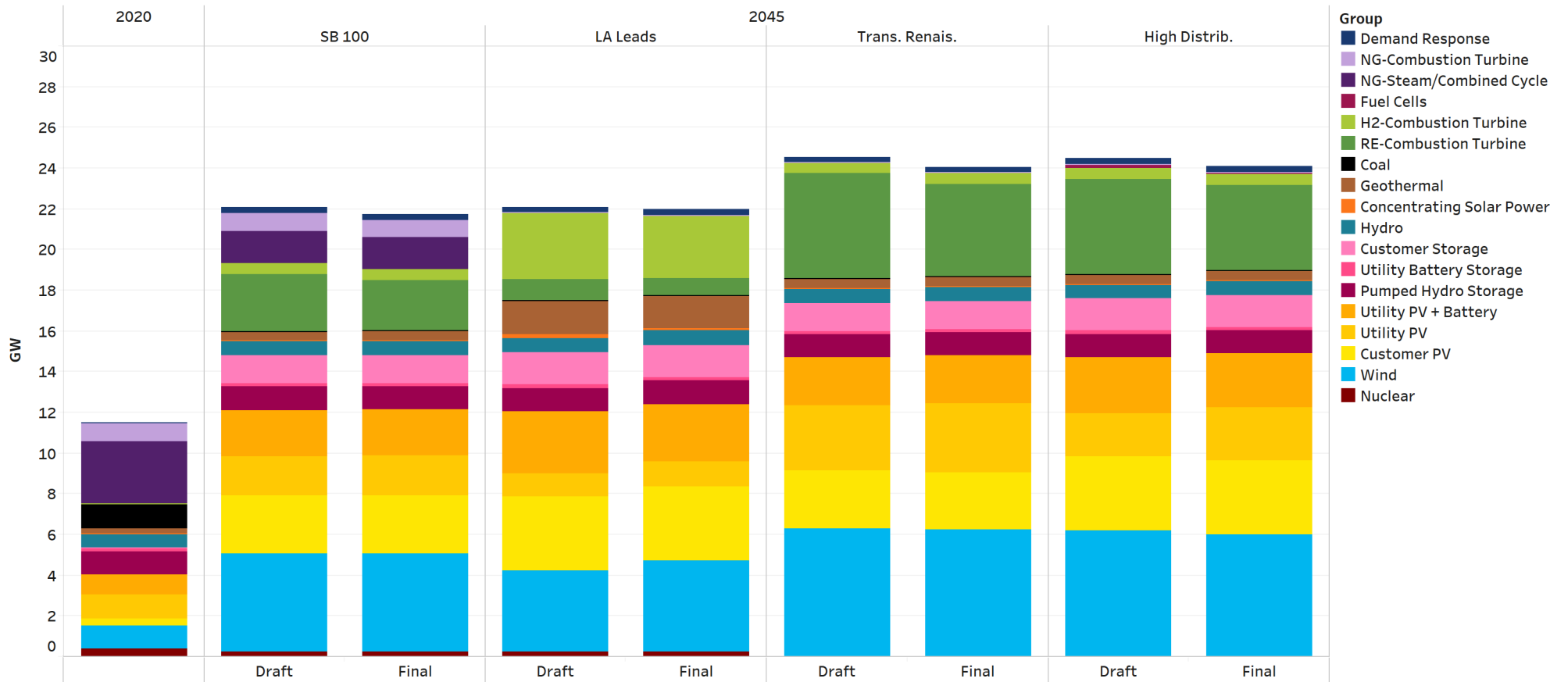
Since Then...

- Revised methods used to assess the capacity credit of renewable and storage resources at very high renewable and storage penetrations, and re-ran our analysis
- Updated pathways maintain resource adequacy and cost less; instances of unserved energy are more likely, but only in the most extreme of events

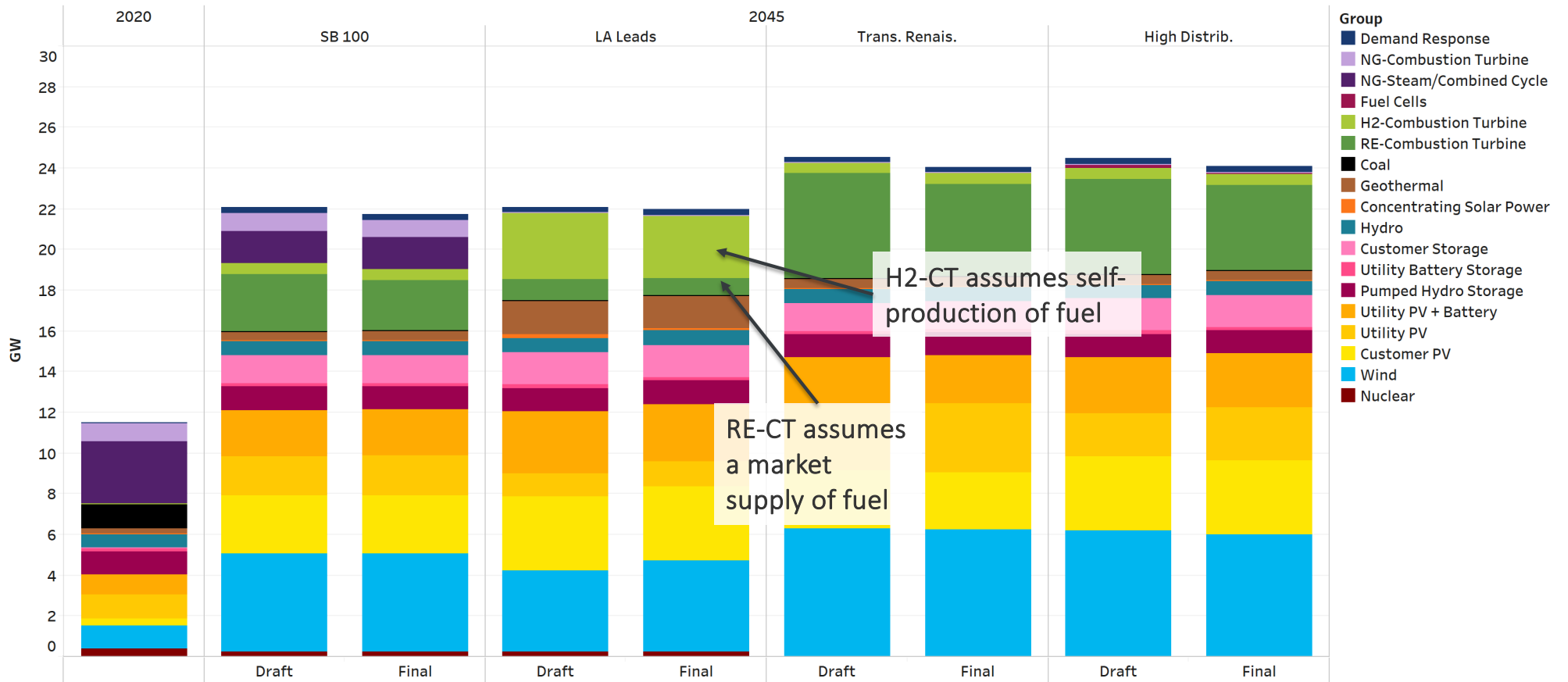
Focus of Today

- Final results for RE Investment Pathways and comparison to previous version
 - What gets built?
 - How is the target met? The generation mix
 - How much does it cost?
 - How do the results compare to the previous version?
 - How do these revised scenario buildouts hold up under extreme events?
- What have we learned?

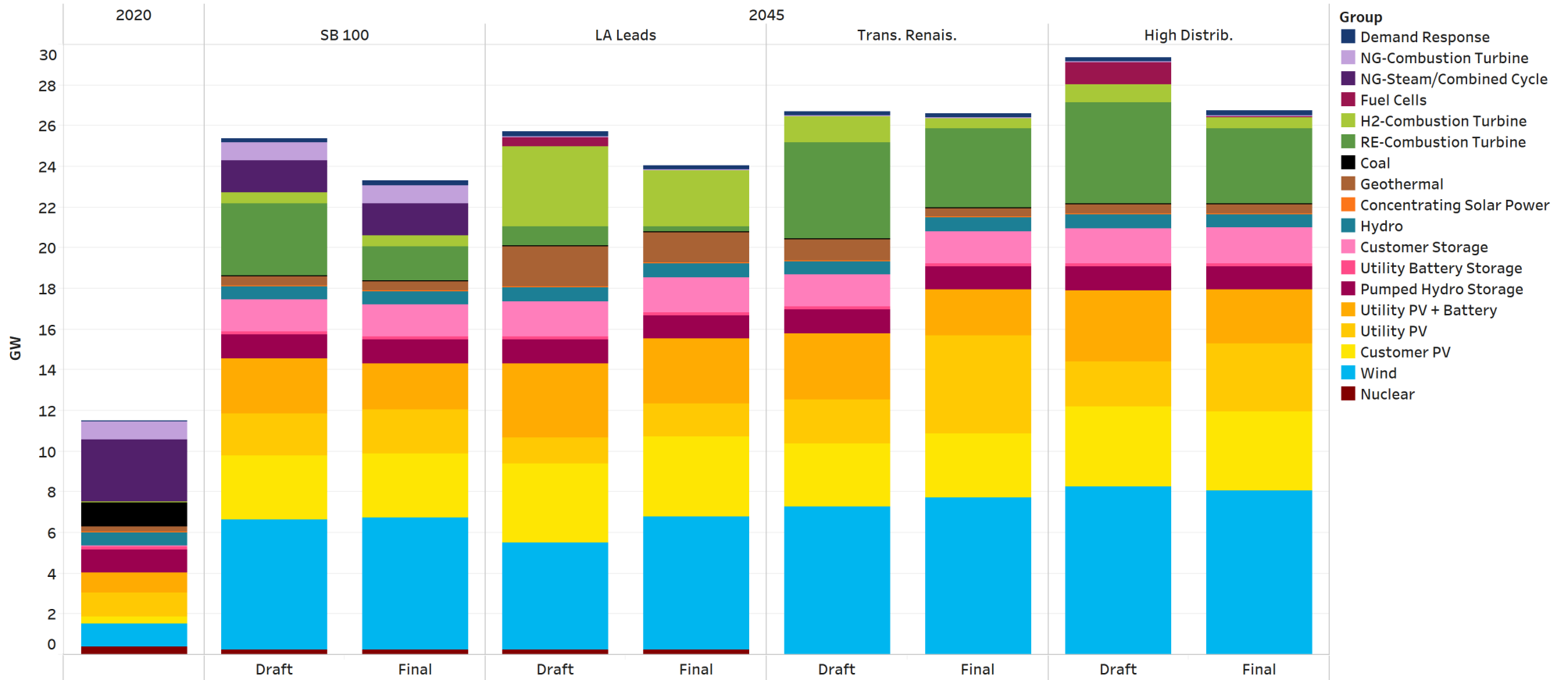
What gets built? Moderate Load, 2045



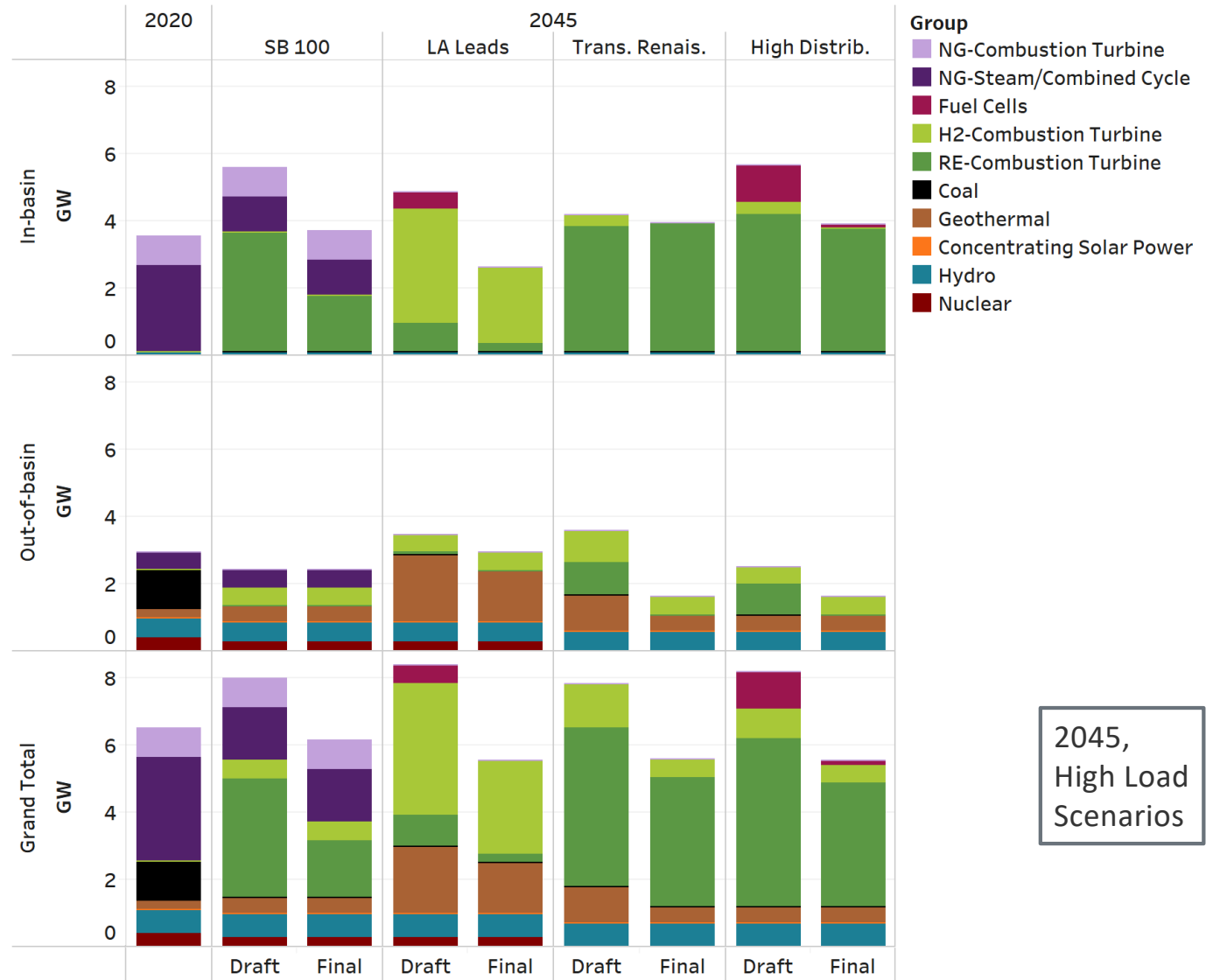
What gets built? Moderate Load, 2045



What gets built? High Load, 2045



Most significant changes are to firm capacity assets



2045, High Load Scenarios

Questions?

Up Next:

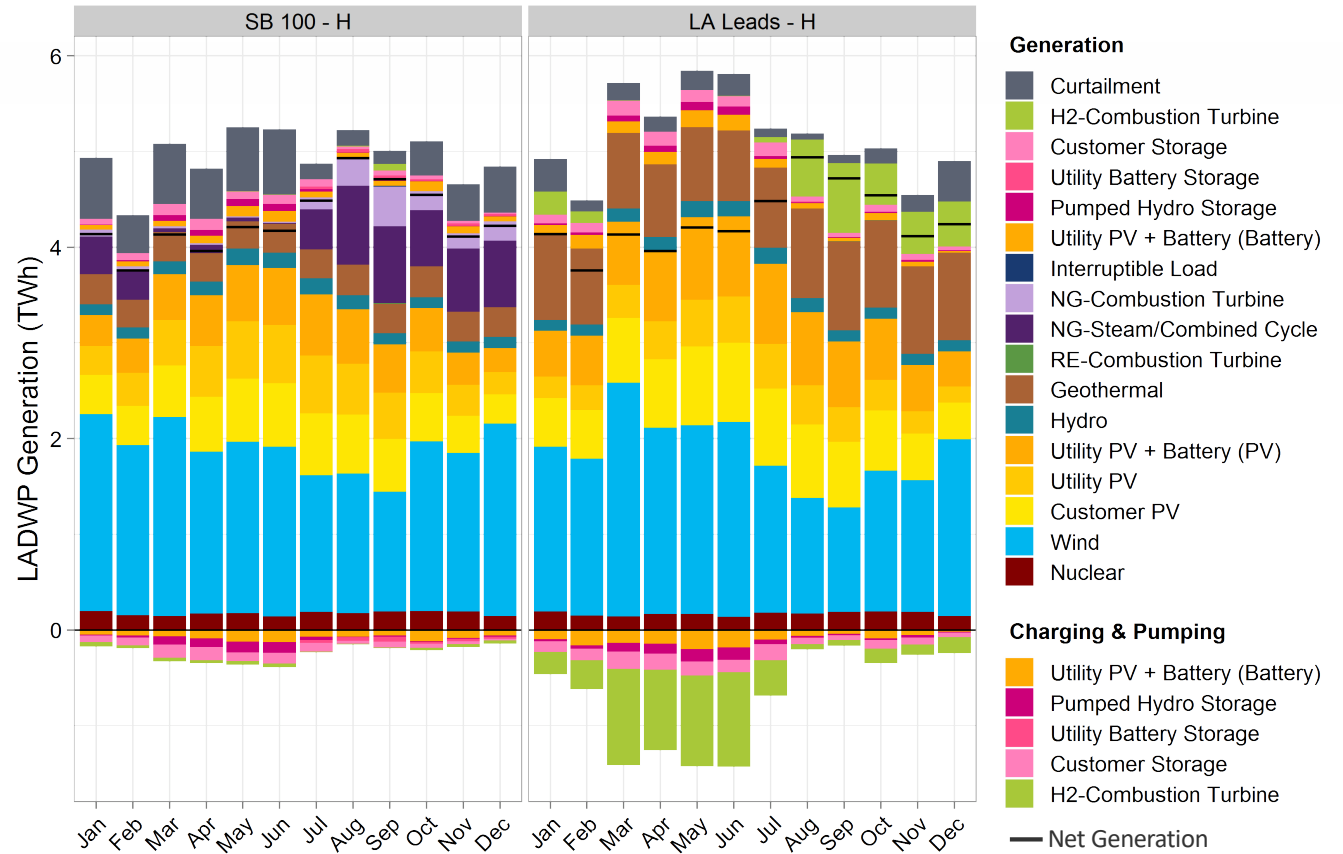
Generation

Costs

Reliability

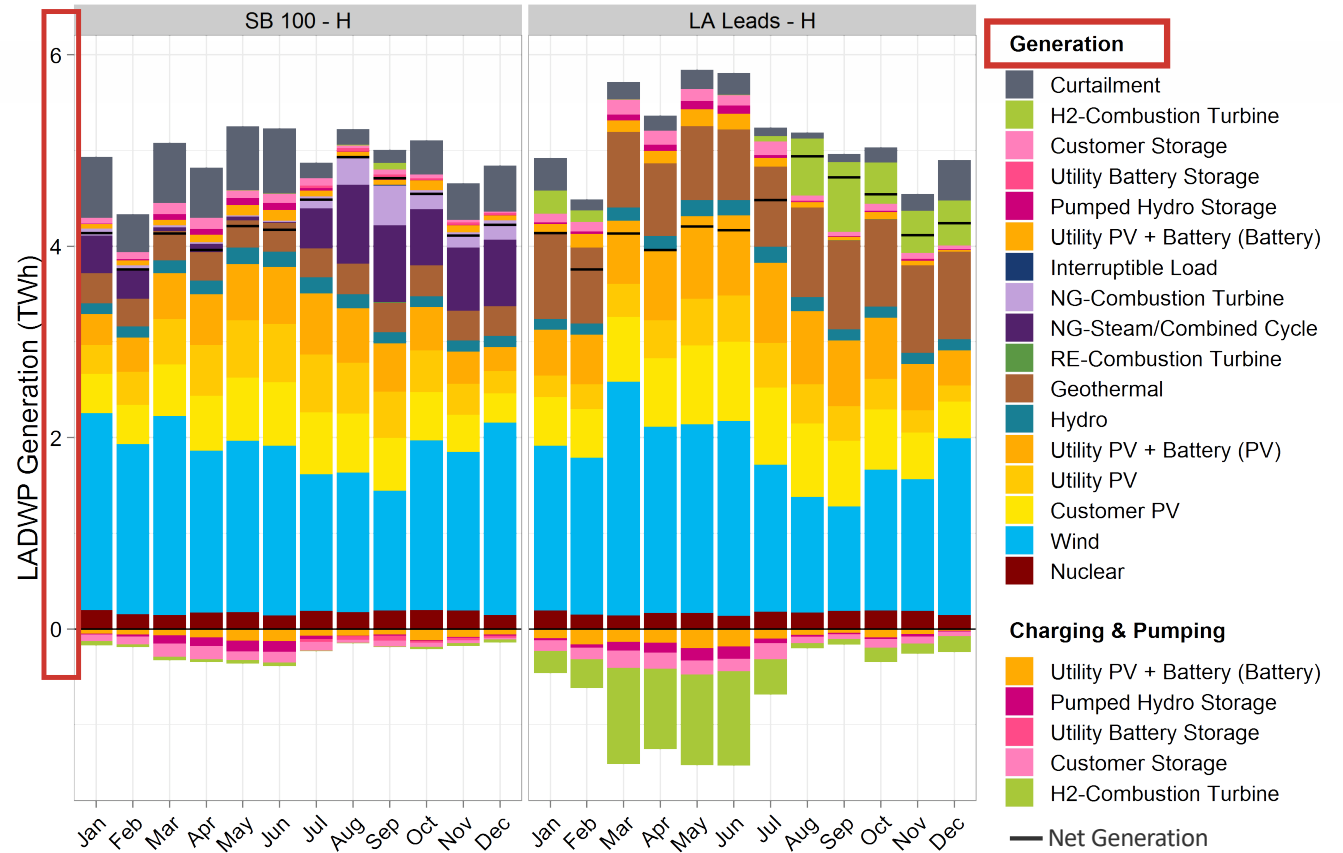
How is the target met? The generation mix

Monthly,
2045



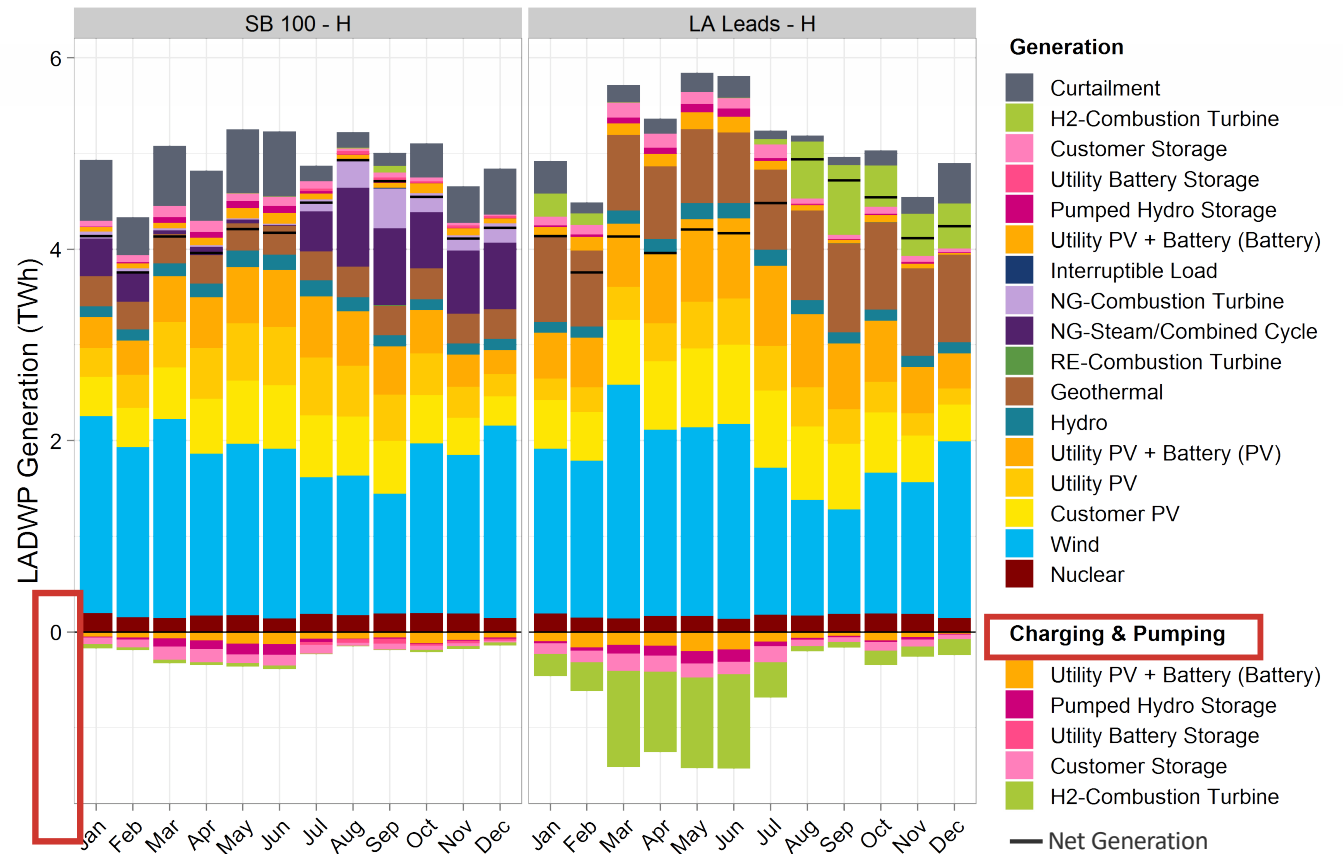
How is the target met?
The generation mix

Monthly, 2045



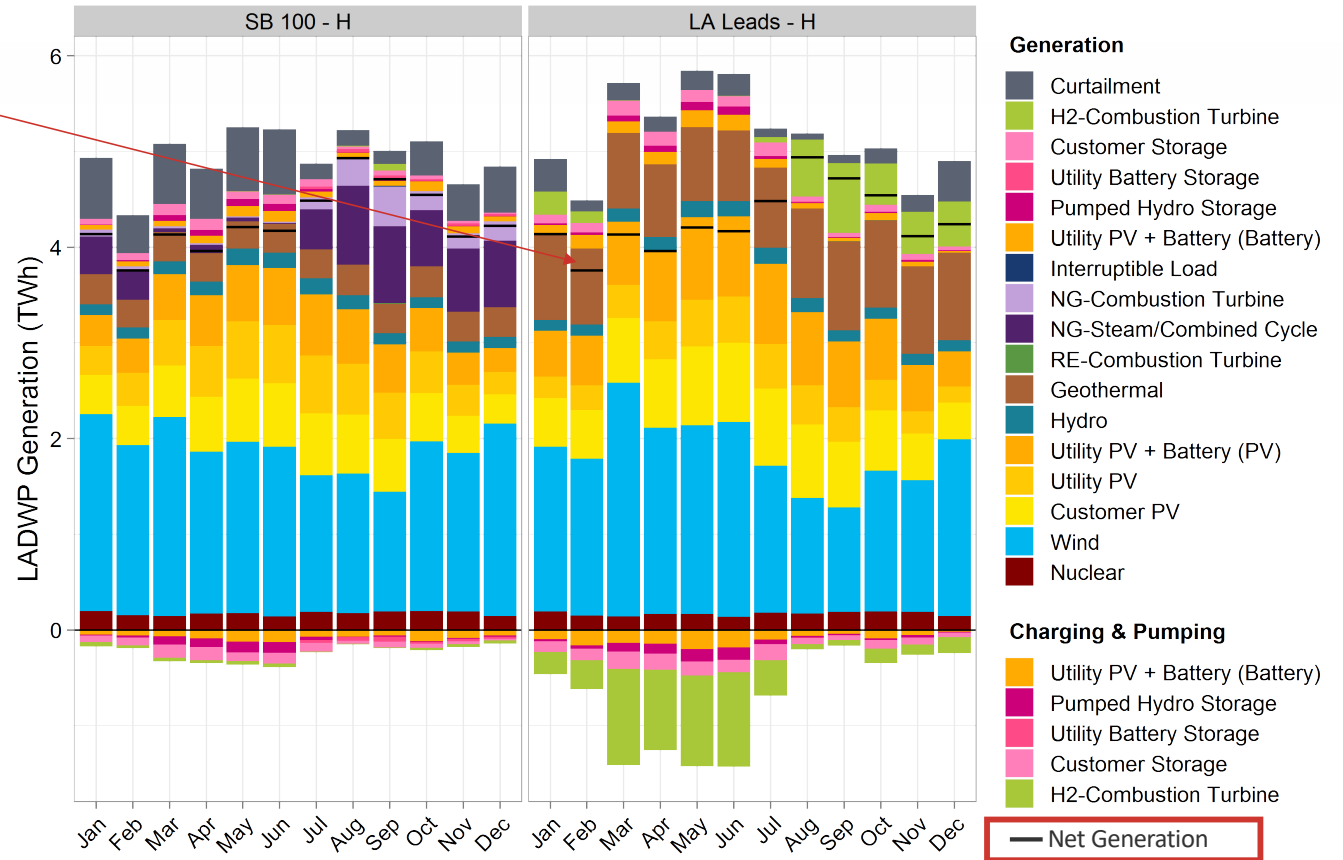
How is the target met?
The generation mix

Monthly, 2045



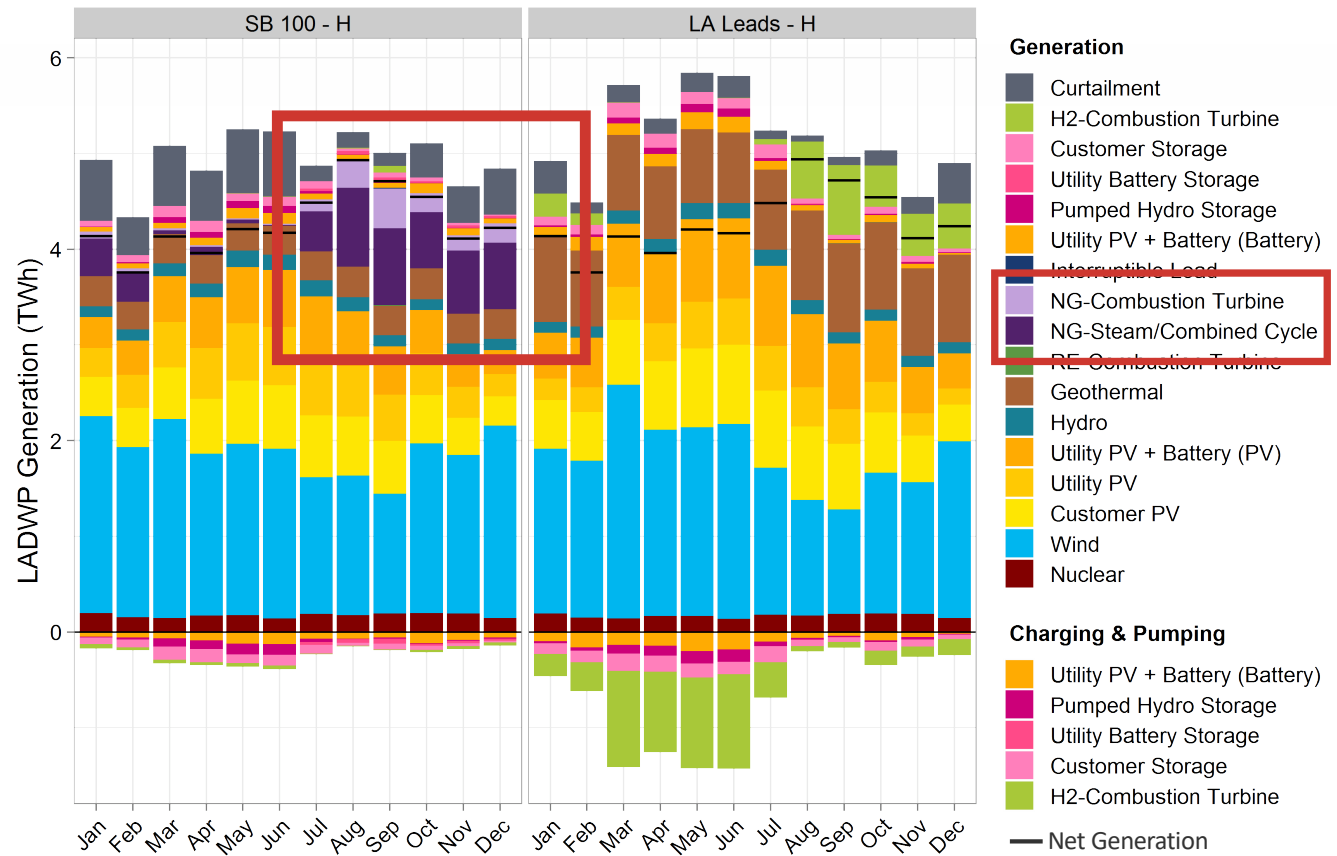
How is the target met?
The generation mix

Monthly, 2045



How is the target met?
The generation mix

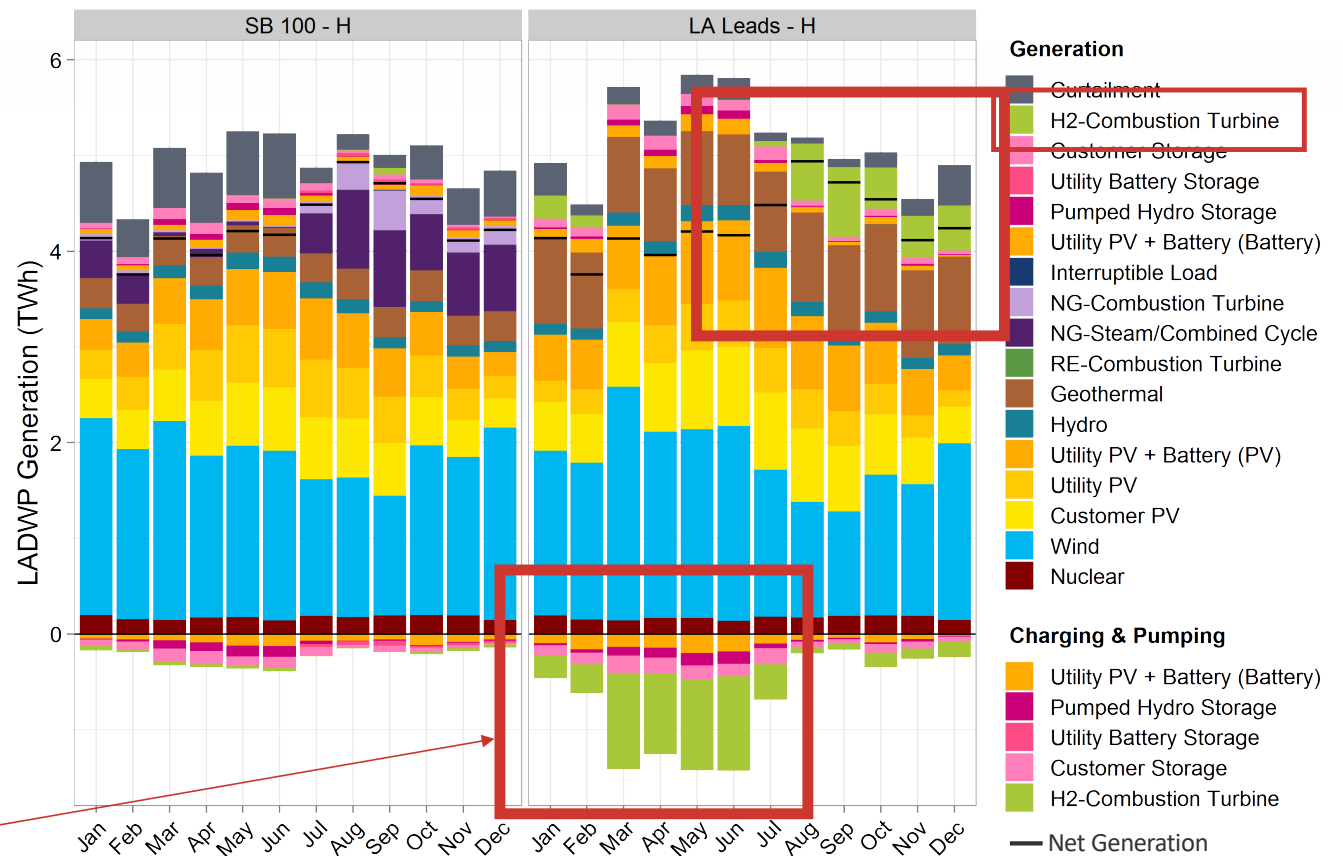
Monthly, 2045



How is the target met?
The generation mix

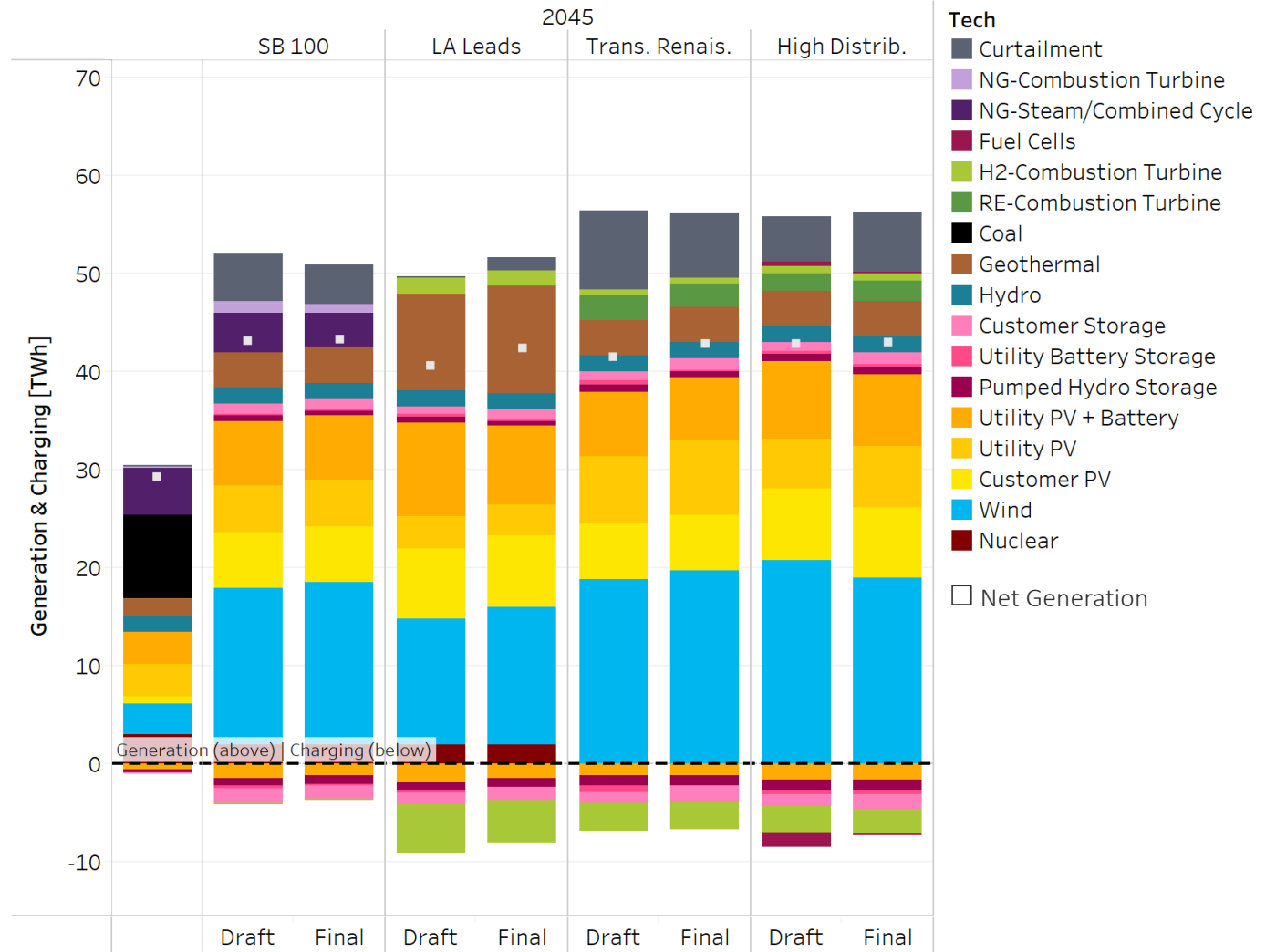
Monthly, 2045

Charging to produce H2 fuel (i.e., seasonal storage)



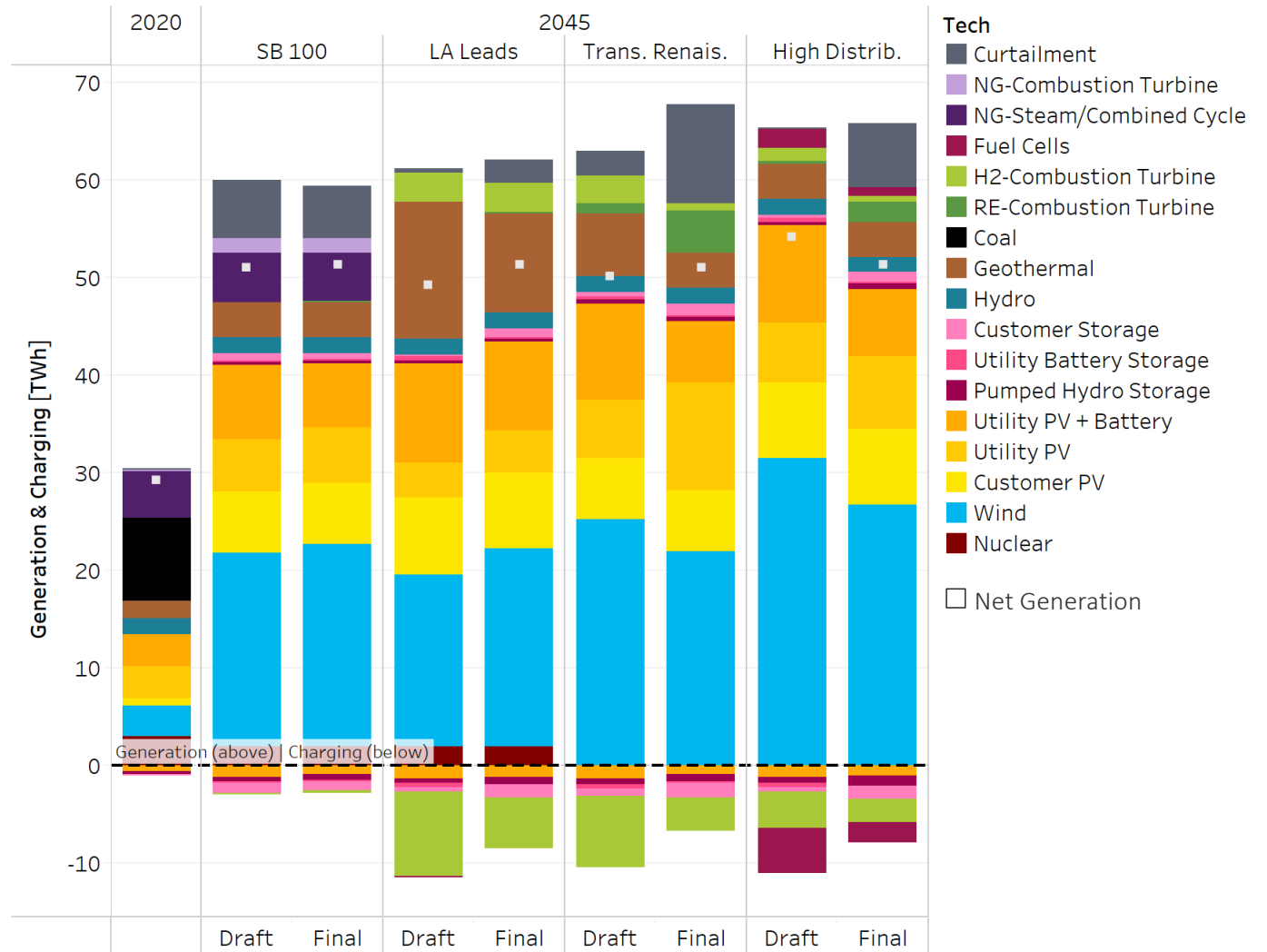
How is the target met? The generation mix

Moderate Load Scenarios, 2045



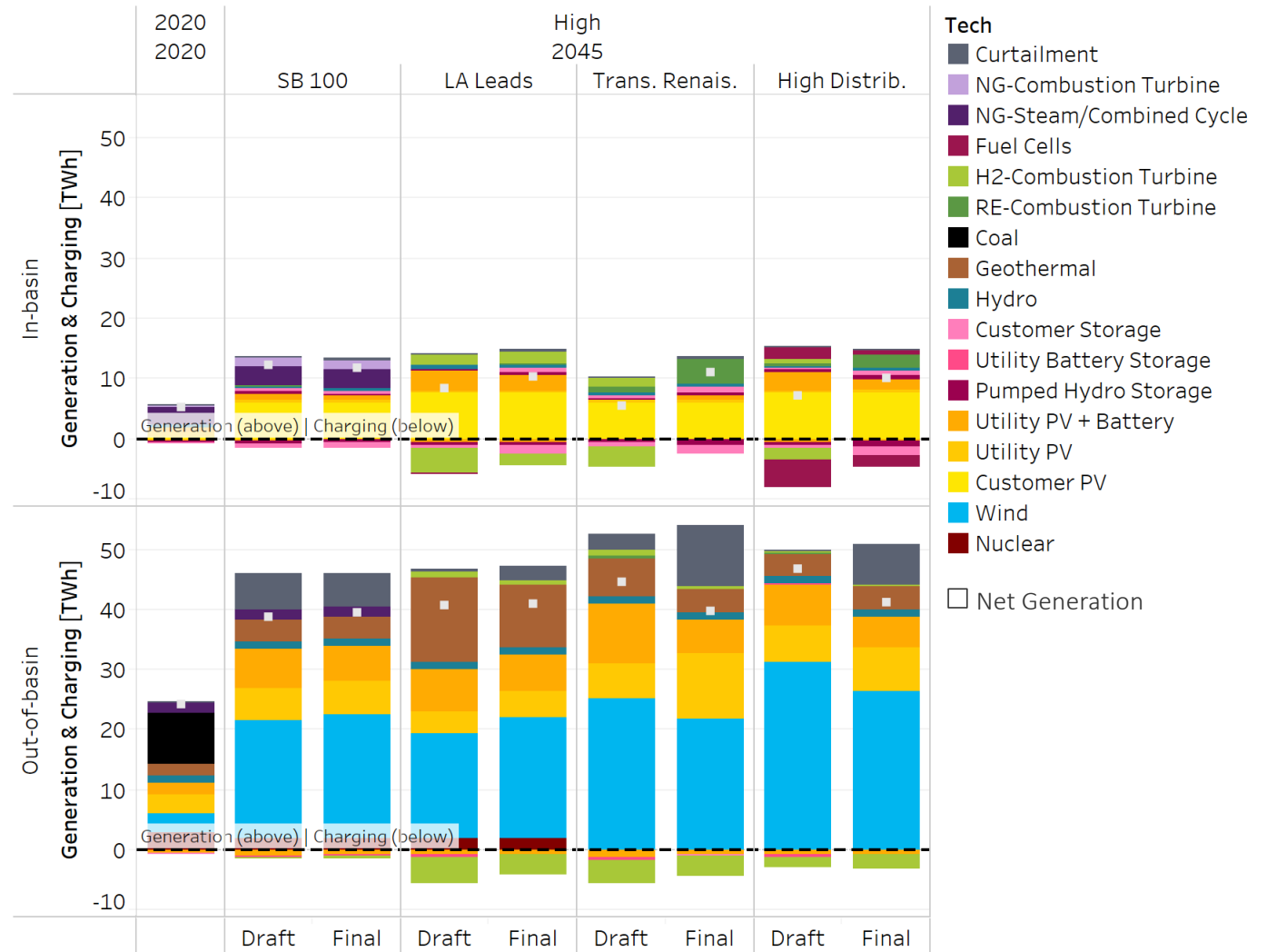
How is the target met? The generation mix

High Load Scenarios



How is the target met? The generation mix

2045 In vs. Out of Basin High Load



Questions?

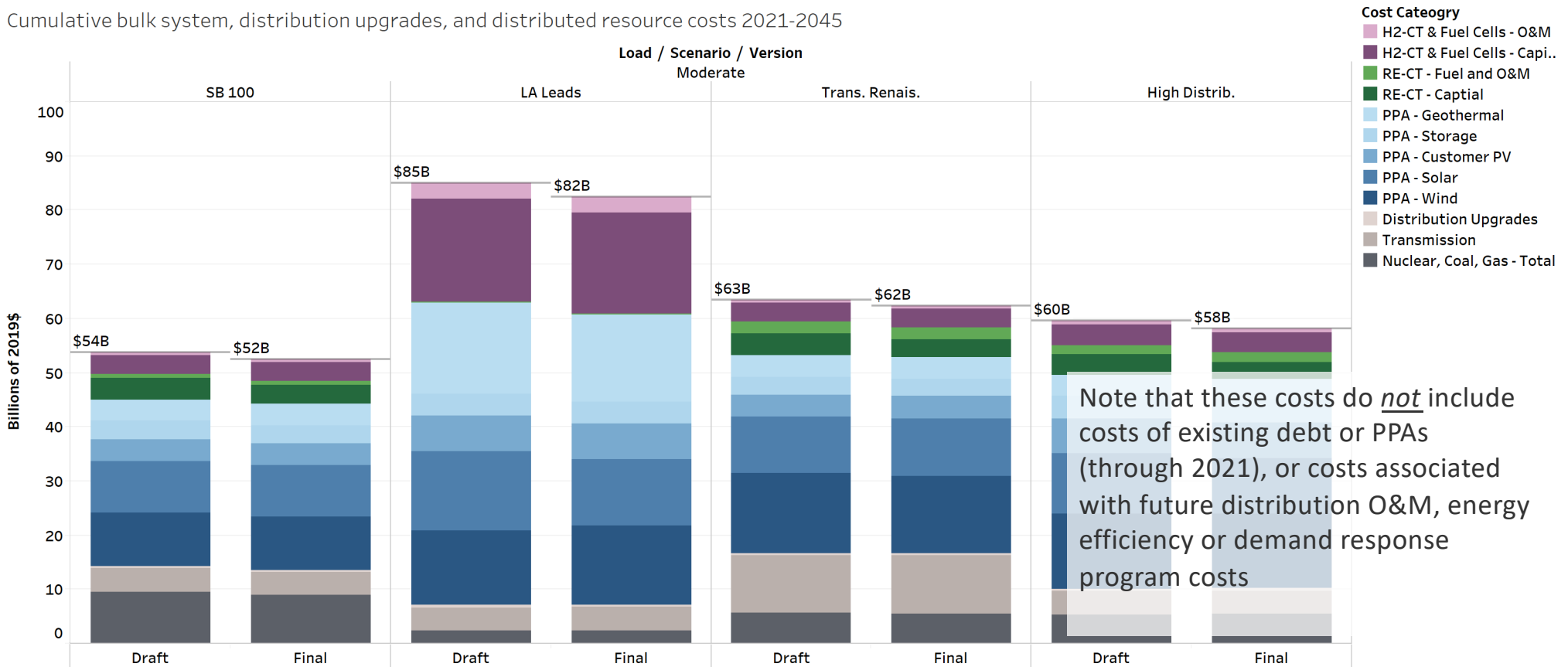
Up Next:

Costs

Reliability

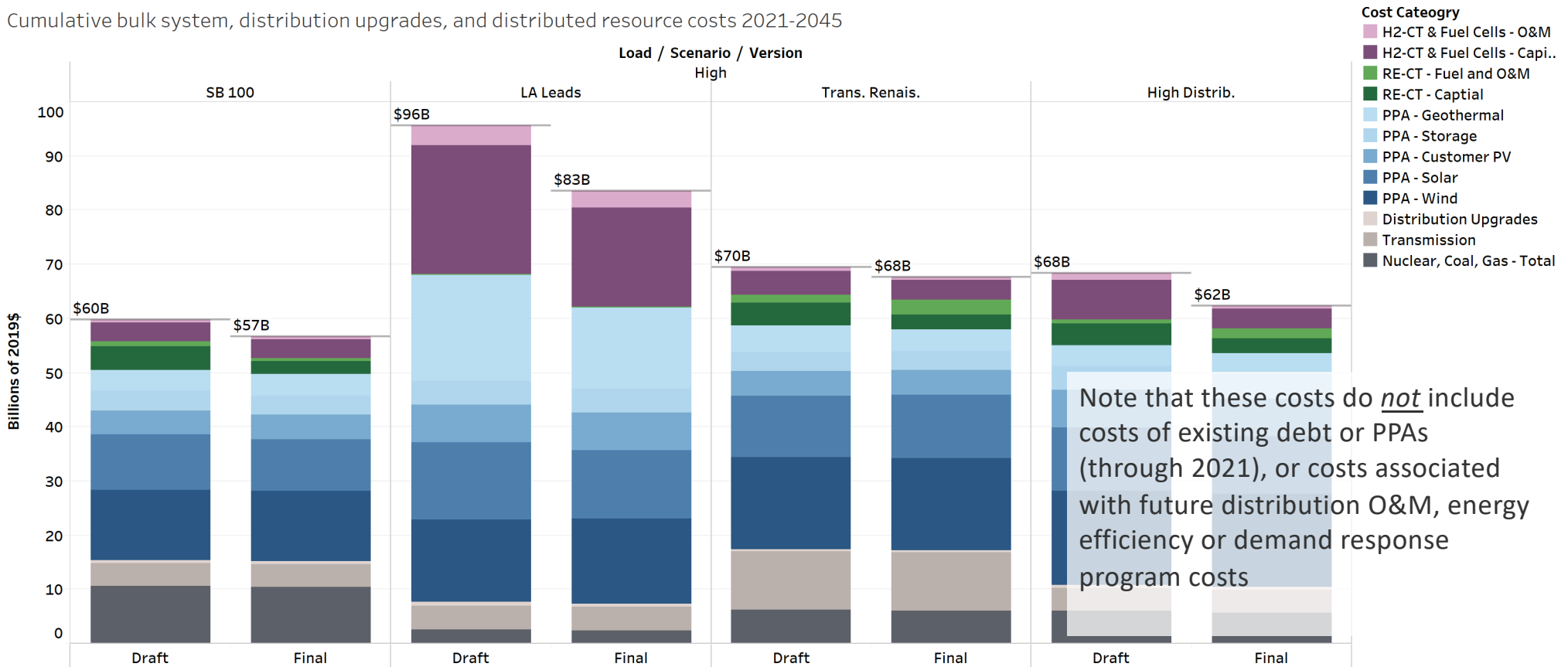
How Much Does it Cost? Comparison with AG13 (“Draft”), Cumulative estimated costs through 2045, Moderate Load

Cumulative bulk system, distribution upgrades, and distributed resource costs 2021-2045

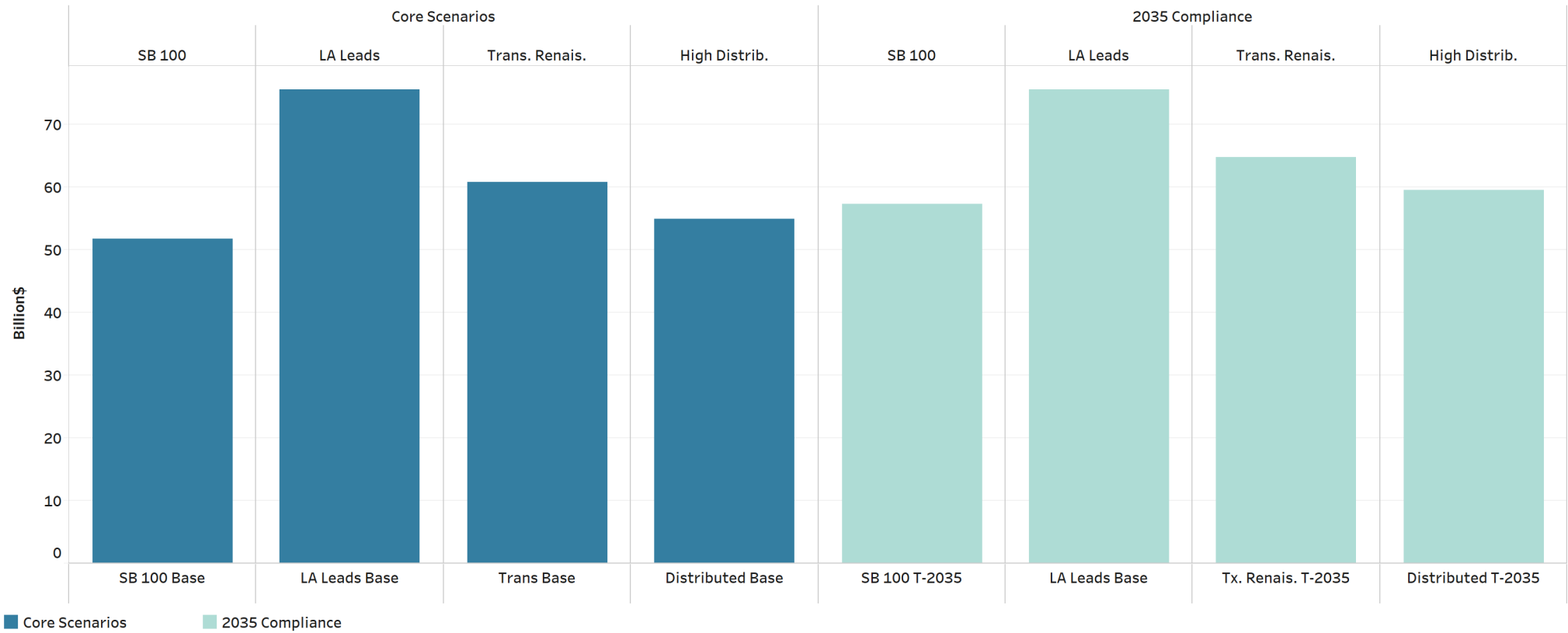


How Much Does it Cost? Comparison with AG13 (“Draft”), Cumulative estimated costs through 2045, High Load

Cumulative bulk system, distribution upgrades, and distributed resource costs 2021-2045



What if every scenario achieved 100% RE by 2035?



High Load Scenarios, Bulk Costs Only

Questions?

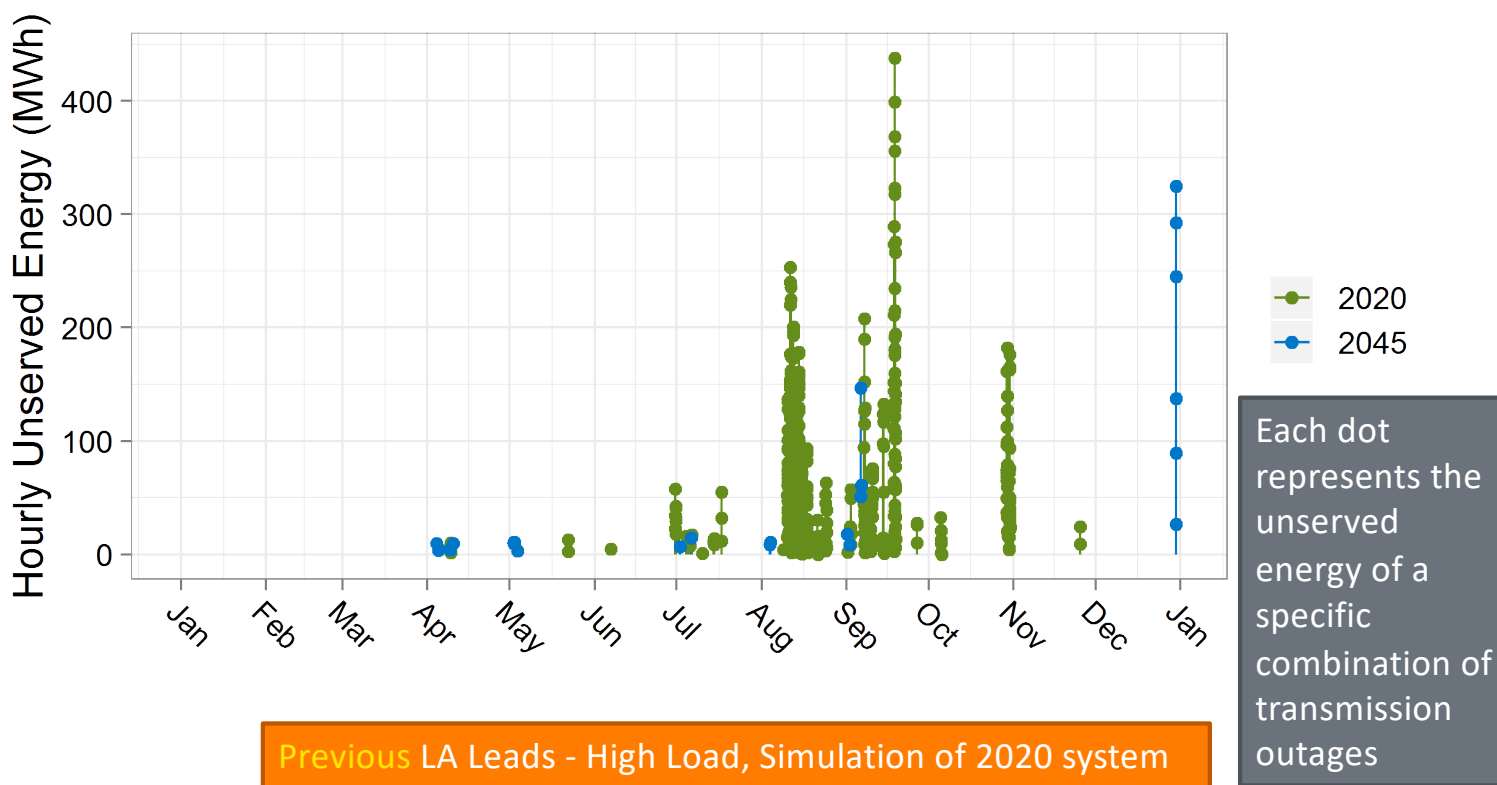
Up Next:

Reliability

How do these revised scenario buildouts hold up under extreme events? **Previous Version**

Unserved energy (=power outage) in year-long transmission outages

The results indicate that the previous version (AG13) of the LA Leads 2045 system was more robust than today's system

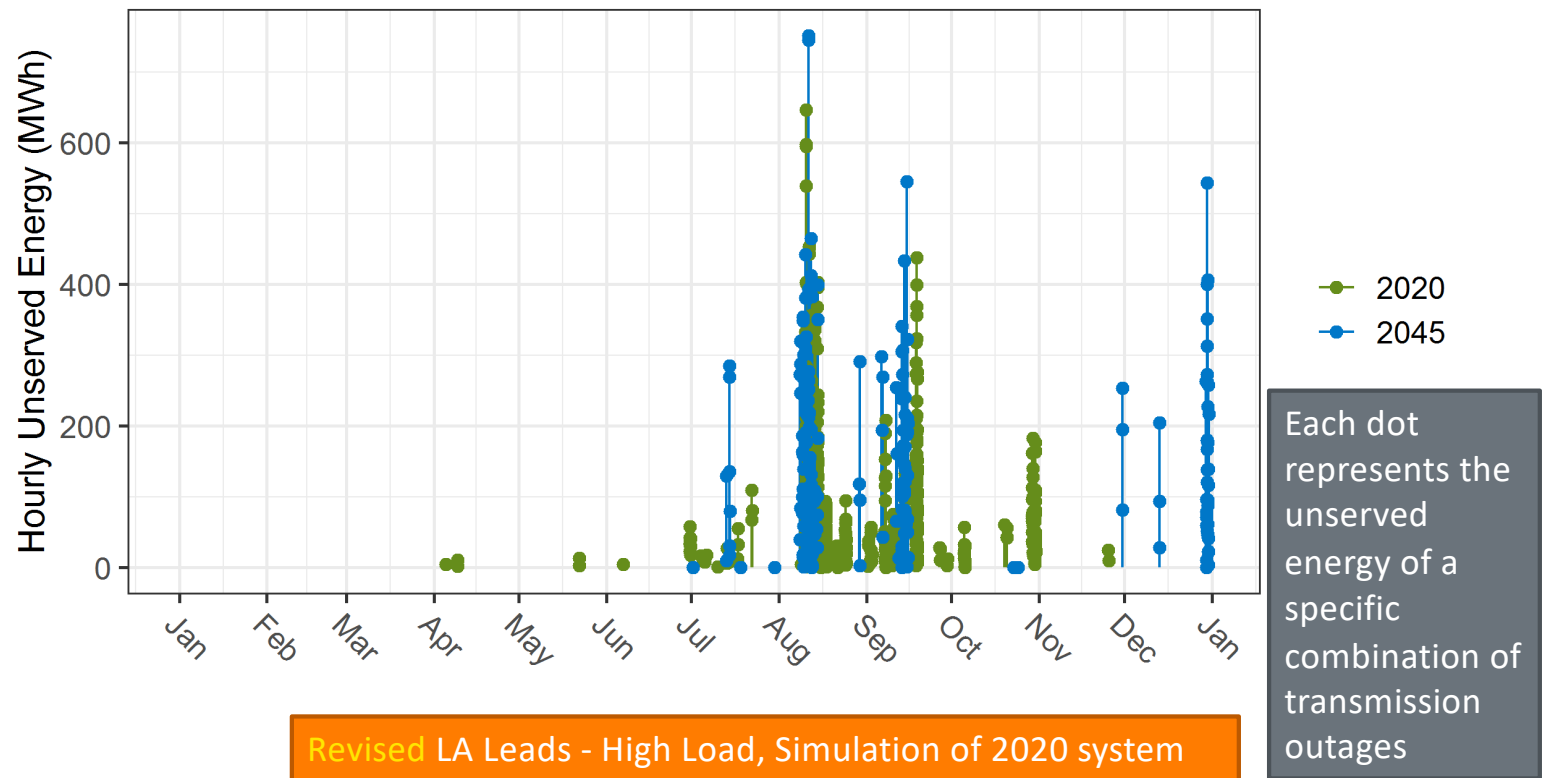


Previous LA Leads - High Load, Simulation of 2020 system vs. 2045 system under a variety of extreme events

How do these revised scenario buildouts hold up under extreme events? Revised (Final) Version

Unservd energy (=power outage) in year-long transmission outages

Performance of the revised LA system is not as robust as system presented at AG13, but the performance is broadly consistent with the current system in extended outage scenarios



Revised LA Leads - High Load, Simulation of 2020 system vs. 2045 system under a variety of extreme events

Summary

- New results show that capacity and costs of prior results could be reduced while still maintaining reliability and robustness to long-duration outages
- Ultimately, reliability and costs are important trade-offs:
 - All else equal, reducing in-basin firm capacity (e.g., CTs, seasonal storage) reduces costs and industrial infrastructure, but decreases system performance
 - Additional resources (e.g., demand response, FACTs) could help maintain higher reliability, or help further reduce costs and capacity needs

Summary

- All of the core conclusions hold under the new results:
 - **Wind, solar, and storage:** Wind and solar are crucial energy sources to achieving 100% RE & diurnal (2-12 hour) storage assets are key to increasing their utilization and value
 - **In-basin firm capacity:** In-basin firm capacity assets are the lowest cost option to maintaining sufficient in-basin energy supply during times of system stress (e.g., outages)
 - **Technology eligibility:** costs are highly sensitive to what technologies are assumed to be eligible to contribute toward compliance
 - **Timing of compliance:** costs are also impacted by the timing of the target year

Summary

- All of the core conclusions hold under the new results [continued]:
 - Options for cost mitigation:
 - RECs or other alternative compliance options,
 - Broader technology and/or fuel-type eligibility,
 - Cross-sectoral coordination (such as partnership with industry),
 - Modernization of load

LA100 Updates

LA100 Updates on...

- Community outreach
- Advisory Group Meeting #15
- LA100 website
- Final report

Community Outreach

Two rounds of community outreach on LA100 planned

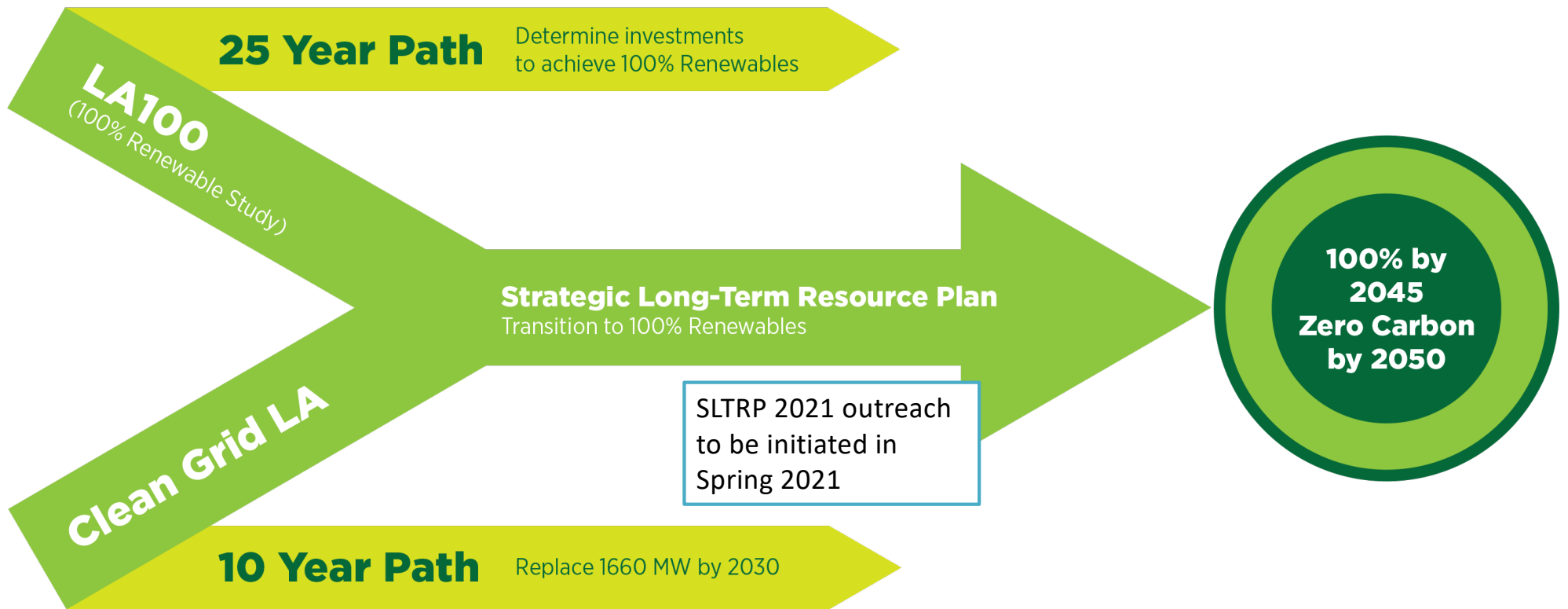
January:

- LA100 introduction
- Explanation of scenarios
- Discussion

March:

- LA100 results
- Explanation of key insights
- Discussion

Reminder: LADWP's Path to 100% Clean Energy



Community Outreach

- **Public meetings in January/February (Round 1)**
 - Five meetings spanning morning, afternoon, evening, and weekend
 - Additional presentations to NC Alliances
- **Virtual community meetings:** Webex and Facebook Live
- **Resources** you can use to get out the word about the events and LA100:
 - www.ladwp.com/cleanenergyfuture
 - LA100 fact sheet (drafted; will be added to website)
 - LA100 intro video (Spanish subtitles as option to select)
<https://www.youtube.com/watch?v=mbQtidp1HCQ&feature=youtu.be>
 - And more...

Round 1 Dates

1. Wednesday evening, Jan 20, 6:30-8:00 pm
2. Thursday afternoon, Jan 21, 1:00-2:30 pm
3. Thursday evening, Jan 21, 6:30-8:00 pm
4. Friday afternoon, Jan 22, 1:00-2:30 pm
5. Saturday morning, Jan 23, 10:00-11:30 am
6. Saturday morning, February 6, 8:30-10:00 am

Round 2 dates in March TBD

Questions or Comments about Community Outreach?

Advisory Group Meeting #15 (Final Meeting!)

Final results for LA100 (spanning January – March)

- Jobs and economic impacts
- Air quality
- Health
- Environmental justice
- Monetization of benefits
- Synthesis across the study

Summary of community outreach discussions

LADWP presentation on rate impact analysis

Final Products

Two primary forms of final products:

1. **Website** (without password)
2. **Report** (available as pdf from NREL and the website)



Website: What's Been Updated

- LA100 videos (intro, complexity)
 - Spanish subtitles added
- Key Findings **by Scenario** updates:
 - Generation
 - Capacity
 - Greenhouse Gas
- Key Findings **by Topic** updates:
 - RE Pathways
 - Greenhouse Gas
 - Local Solar
- Data Viewer—Bulk Layer Added (still bugs)

Distribution
results coming
this week

Rest of results for
Key Findings will
come January –
March

Anticipated Schedule for Final Report

- **January** posted to website the following draft chapters
 - Introduction, Electricity Demand, Customer Solar & Storage
- **Early February** posted to website: the remaining draft chapters
- **March** publish report and go live (password free) with the website

Questions?

Any Topic