



The Los Angeles 100% Renewable Energy Study

Advisory Group Meeting #9

September 19, 2019



Agenda

- Call to Order
- Introductions
- LA100 Updates and Discussion Topics **
- Distributed PV and Storage **
- Lunch
- Jobs and Economic Analysis **
- Air Quality and Public Health **
- Environmental Justice **
- Wrap-up and Next Steps

***Q&A and Discussion*

Tips for Productive Discussions



Let one person speak at a time



Help to make sure everyone gets equal time to give input



Keep input concise so others have time to participate



Actively listen to others, seek to understand perspectives



Offer ideas to address questions and concerns raised by others



Hold questions until after presentations



The Los Angeles 100% Renewable Energy Study

LA100 Updates & Discussion Topics

Jaquelin Cochran, Ph.D.

September 19, 2019



Agenda for This Session

- Climate Change
- Reorganized Scenarios
- LA100 Assumptions
- Modeling Progress

Climate Change

Incorporation of Climate Change

In June, AG members requested that LA100 consider impacts of climate change on the power system; in particular, the impact of projected higher temperatures on space cooling loads

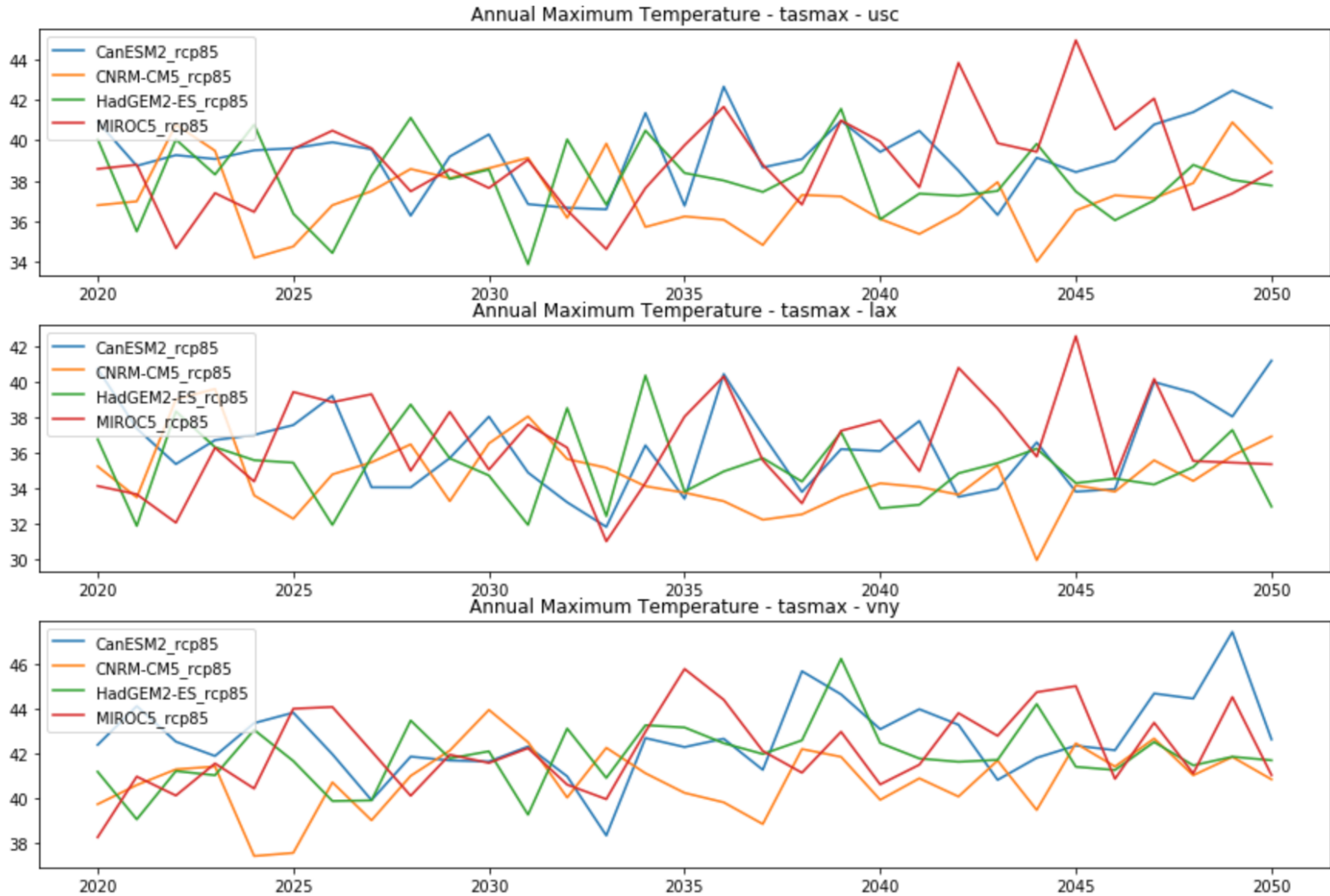


Response

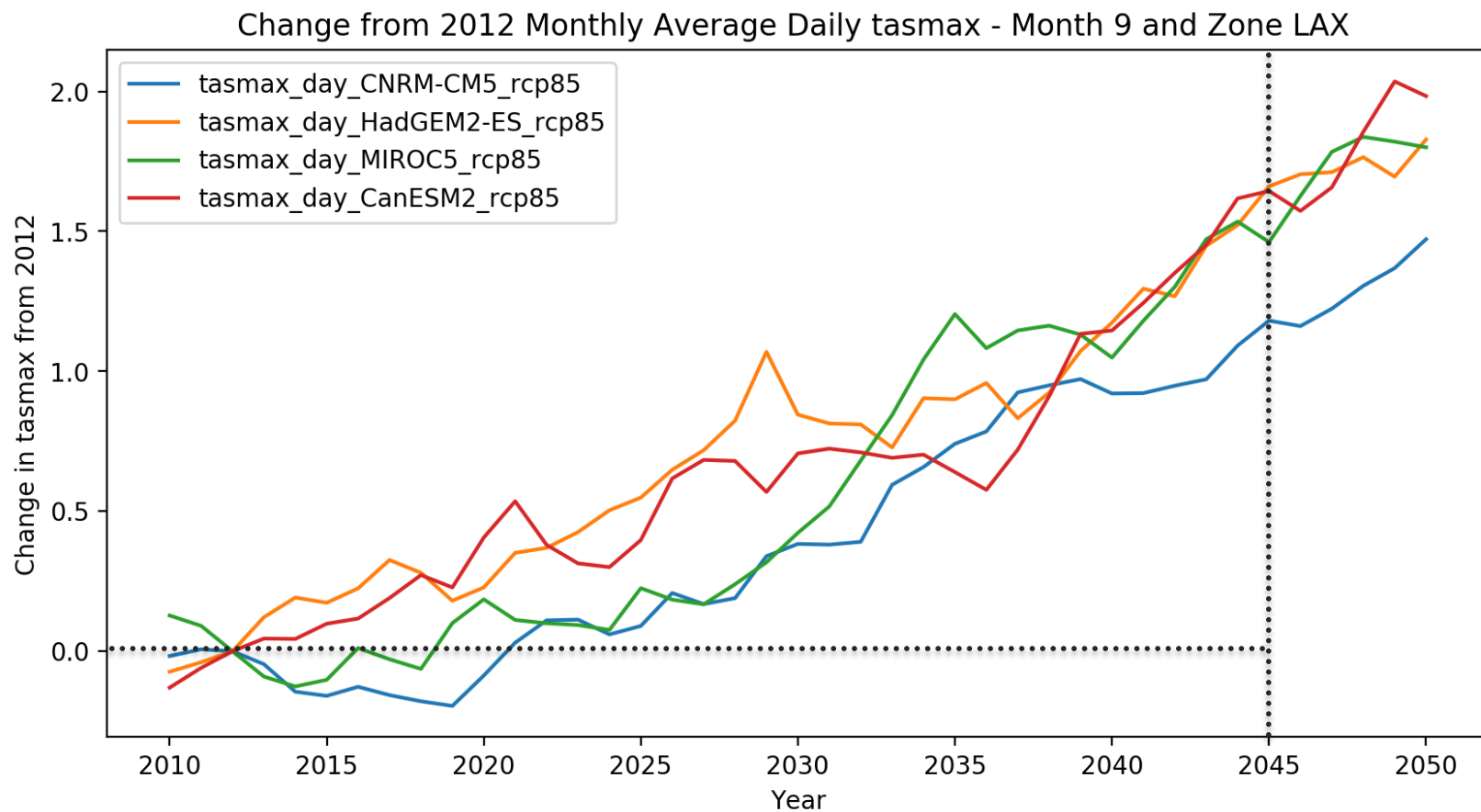
The LA100 load projections will reflect the impact of projected temperature changes on space cooling loads

Global
Climate
Models:

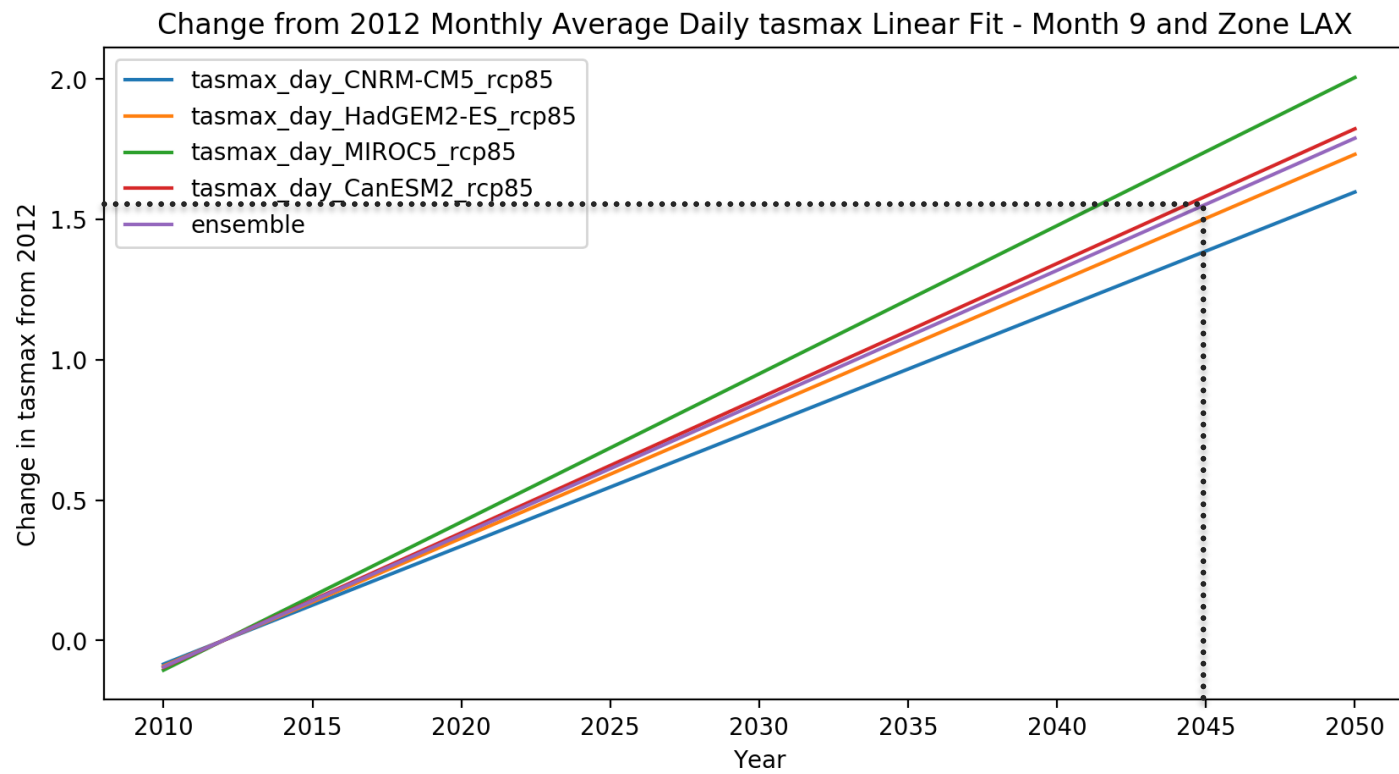
Maximum
Temperature
(Celsius)
for the Three
LA100
Climate
Zones



Change in the 20-year rolling average of daily maximum September temperatures ($^{\circ}\text{C}$) (from 2012-2050)



Linear trend of change in a rolling 20-yr monthly (September) average maximum daily temperature (°C)



1.5 °C = 2.7 °F

Methodology—Data Source

- **Data Source:**
 - UCSD (Scripps Institute of Oceanography) spatially downscaled climate projections from global climate models
 - Four models prioritized by the CA Climate Action Team Research Working Group:
 - HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5
 - Data can be downloaded from <https://cal-adapt.org/>
 - **Data Type:**
 - Daily max and min temperature and humidity projections through 2045 (6km resolution)
 - Averaged to the 3 climate zones used in LA100
 - **RCP 8.5** scenario*: Emissions continue to rise strongly through 2050 and plateau around 2100)
- *RCP = Representative Concentration Pathway

Methodology – Data Processing

- For each global climate model:
 - Calculate monthly means of daily maximum temperatures for all months and years
 - Calculate a 20-year rolling mean of monthly means; for example, the 2035 August value is the average of the August daily max temps from 2026-2045
 - Fit a linear trend to the rolling mean of monthly means
 - Using the linear trend, calculate the deltas between each future year-month, and the 20 year monthly mean from 2012.
 - Calculate the ensemble mean (the average year-month 20-yr delta across the models)
- Apply the month-year ensemble mean delta to the 2012 weather data

Climate Impacts in LA100

What's **Changing** in the Study
Hotter temperatures reflected in
electricity demand (buildings)

Climate Impacts in LA100

What's **Not Changing** in the Study

RE generation profiles

RE plant efficiencies

Line losses

Air quality modeling

Precipitation (hydro availability)

Cloud coverage

Temperatures of cooling waters

Frequency of storms

Same projected increase in air
conditioner adoption

What's **Not Considered**

Fire risks

Climate Impacts in LA100

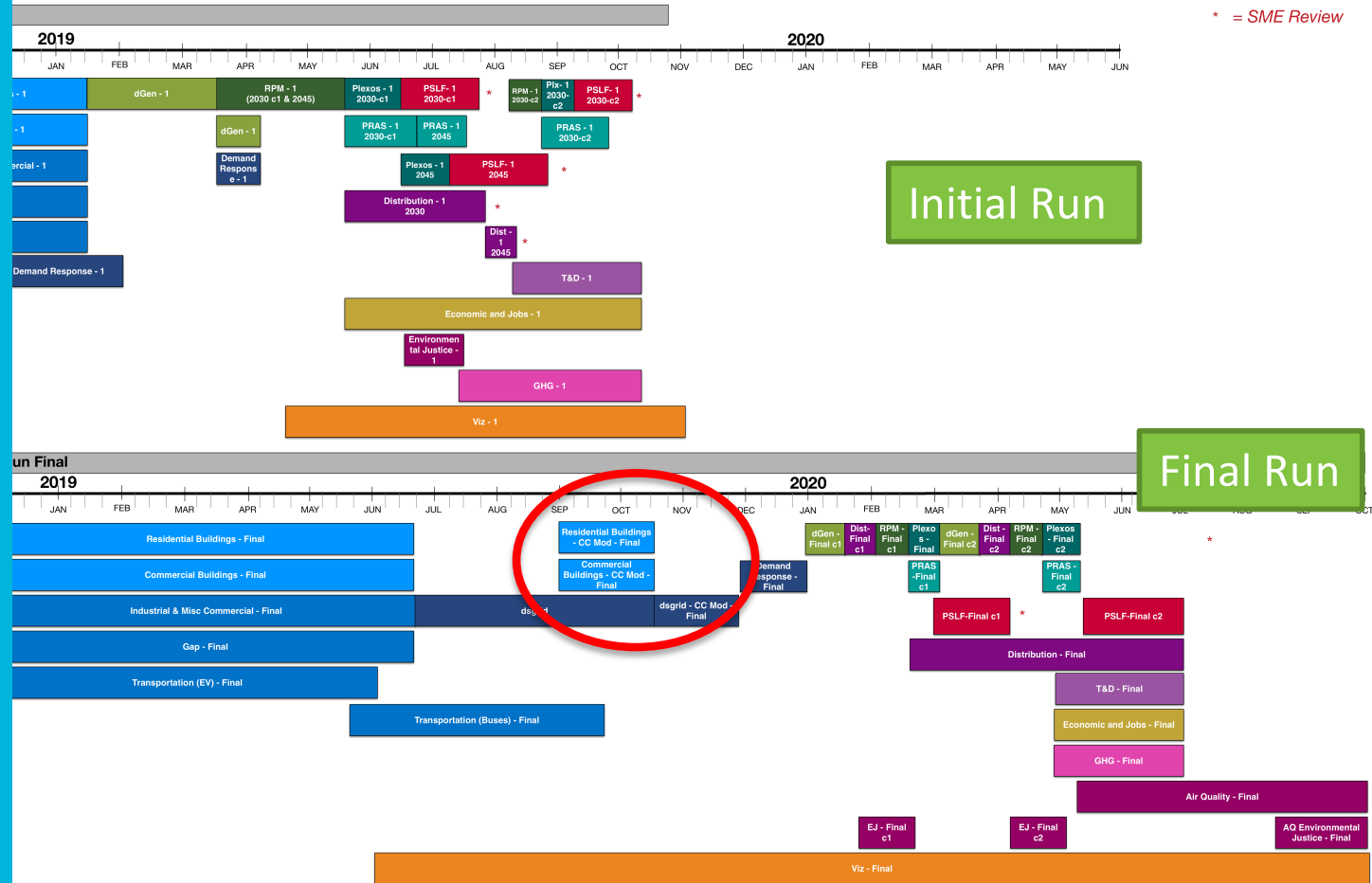
What's **Changing** in the Study

Hotter temperatures reflected in electricity demand (buildings)

- Temperature is the dominant impact to the study
- Other impacts are either difficult to capture or have a small impact relative to other sources of uncertainty

Impact to Timeline

Minimum 6 weeks delay, more depending on start of buildings modeling



Questions on Climate Impacts?

Scenario Reorganization

Scenario Matrix as of June 2019

| | | LA100 Scenarios | | | | | | | |
|--|--|--------------------|--|--------------------------|--------------------------------|--|--|--|--|
| | | SB100 | LA-Leads | Transmission Renaissance | High Distributed Energy Future | Emissions Free | High Load Stress | Load Modernization | Western Initiatives |
| 2030 RE Target | | 60% | 100% Net Renewable Energy | | | | | | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y |
| | Fuel Cells | Y | Y | Y | Y | Y | Y | Y | Y |
| | Hydro - Existing | Y | Y | Y | Y | Y | Y | Y | Y |
| | Hydro - New | N | N | N | N | N | N | N | N |
| | Hydro - Upgrades | Y | Y | Y | Y | Y | Y | Y | Y |
| | Natural Gas | Yes | N | N | N | N | Yes | N | N |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No |
| | Nuclear - New | N | N | N | N | N | N | N | N |
| | Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y |
| | Storage | Y | Y | Y | Y | Y | Y | Y | Y |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Reference | High | Low | High | Balanced | Balanced | Balanced | Balanced |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | N | Yes | N | N |
| Load | Energy Efficiency | Reference | High | Moderate | High | Moderate | Reference | High | Moderate |
| | Demand Response | Reference | High | Moderate | High | Moderate | Reference | High | Moderate |
| | Electrification | Reference | High | Moderate | High | Moderate | High | High | Moderate |
| Transmission | New or Upgraded Transmission Allowed? | Matches 2017 SLTRP | Only Along Existing or Planned Corridors | New Corridors Allowed | No New Transmission | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors |
| WECC | WECC VRE Penetration | Reference | Reference | Reference | Reference | Reference | Reference | Reference | High |

Scientific Challenge to our Analysis



Load projections have changed significantly since scenarios were originally designed



Challenge: Scenarios are not easily comparable with different load levels

RE supply (types, locations) and **electricity demand** (extent of electrification) change simultaneously across scenarios

Example

Transmission Renaissance

Moderate load electrification

VS.

High Distributed Energy Future

High load electrification
→ higher RE capacity → higher costs

Likely takeaway from casual observer?
Cheaper to build remotely than locally

Isolating effects due to **location** of RE (remote vs. local) vs. **quantity** of RE (moderate vs. high electrification) will be challenging

NREL's Proposed Solution

- Reorganize the scenarios to have **two common levels of load electrification & efficiency across all scenarios**
 - Example: Transmission and High Distributed Energy would be evaluated with both moderate and high electrification projections
- Map existing scenarios to reorganized set, each with two levels of load electrification

Reorganized Scenarios

| | | LA100 Scenarios | | | | | | | | |
|---|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | 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 |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No | Y |
| | Nuclear - New | N | N | N | N | N | N | N | N | N |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| 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 |

Previous Scenario Matrix (as of June 2019)

| | | LA100 Scenarios | | | | | | | |
|--|--|--------------------|--|--------------------------|--------------------------------|--|--|--|--|
| | | SB100 | LA-Leads | Transmission Renaissance | High Distributed Energy Future | Emissions Free | High Load Stress | Load Modernization | Western Initiatives |
| 2030 RE Target | | 60% | 100% Net Renewable Energy | | | | | | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y |
| | Fuel Cells | Y | Y | Y | Y | Y | Y | Y | Y |
| | Hydro - Existing | Y | Y | Y | Y | Y | Y | Y | Y |
| | Hydro - New | N | N | N | N | N | N | N | N |
| | Hydro - Upgrades | Y | Y | Y | Y | Y | Y | Y | Y |
| | Natural Gas | Yes | N | N | N | N | Yes | N | N |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No |
| | Nuclear - New | N | N | N | N | N | N | N | N |
| | Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Reference | High | Low | High | Balanced | Balanced | Balanced | Balanced |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | N | Yes | N | N |
| Load | Energy Efficiency | Reference | High | Moderate | High | Moderate | Reference | High | Moderate |
| | Demand Response | Reference | High | Moderate | High | Moderate | Reference | High | Moderate |
| | Electrification | Reference | High | Moderate | High | Moderate | High | High | Moderate |
| Transmission | New or Upgraded Transmission Allowed? | Matches 2017 SLTRP | Only Along Existing or Planned Corridors | New Corridors Allowed | No New Transmission | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors |
| WECC | WECC VRE Penetration | Reference | Reference | Reference | Reference | Reference | Reference | Reference | High |

Where did these scenarios go?

Previous Scenario Matrix (as of June 2019)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|--|--------------------|--|--------------------------|--------------------------------|--|--|--|--|
| | | SB100 | LA-Leads | Transmission Renaissance | High Distributed Energy Future | Emissions Free | High Load Stress | Load Modernization | Western Initiatives |
| | 2030 RE Target | 60% | 100% Net Renewable Energy | | | | | | |
| | Compliance Year for 100% | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y |
| | Fuel Cells | Y | Y | Y | Y | Y | Y | Y | Y |
| | Hydro - Existing | Y | Y | Y | Y | Y | Y | Y | Y |
| | Hydro - New | N | N | N | N | N | N | N | N |
| | Hydro - Upgrades | Y | Y | Y | Y | Y | Y | Y | Y |
| | Natural Gas | Yes | N | N | N | N | Yes | N | N |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No |
| | Nuclear - New | N | N | N | N | N | N | N | N |
| | Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Reference | High | Low | High | Balanced | Balanced | Balanced | Balanced |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | N | Yes | N | N |
| Load | Energy Efficiency | Reference | High | Moderate | High | Moderate | Reference | High | Moderate |
| | Demand Response | Reference | High | Moderate | High | Moderate | Reference | High | Moderate |
| | Electrification | Reference | High | Moderate | High | Moderate | High | High | Moderate |
| Transmission | New or Upgraded Transmission Allowed? | Matches 2017 SLTRP | Only Along Existing or Planned Corridors | New Corridors Allowed | No New Transmission | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors | Only Along Existing or Planned Corridors |
| WECC | WECC VRE Penetration | Reference | Reference | Reference | Reference | Reference | Reference | Reference | High |

Where did these scenarios go?

Reorganized Scenarios

1

SB100:
With moderate and high electrification & efficiency rather than reference to improve ability to compare to other scenarios

| | | LA100 Scenarios | | | | | | |
|--|--|--|--|--|--|--------------------------------|--------------------------|--|
| | | SB100 | High Load Electrification (Load Modernization) | | | High Load | | |
| | | Distributed by Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) | |
| | | % Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | |
| | | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 | |
| Technologies Eligible in the Compliance Year | Biomass | Y | Y | No | Y | Y | Y | |
| | Biogas | Y | Y | No | Y | Y | Y | |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | |
| | Fuel Cells | Y | Y | Y | Y | Y | Y | |
| | Hydro - Existing | Y | Y | Y | Y | Y | Y | |
| | Hydro - New | N | N | N | N | N | N | |
| | Hydro - Upgrades | Y | Y | Y | Y | Y | Y | |
| | Natural Gas | Yes | Yes | N | N | N | Yes | |
| | Nuclear - Existing | Y | No | Y | No | No | Y | |
| | Nuclear - New | N | N | N | N | N | N | |
| Wind, Solar, Geo Storage | Y | Y | Y | Y | Y | Y | | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | Yes | N | N | Yes | |
| Load | Energy Efficiency | Moderate | Moderate | High | High | High | High | |
| | Demand Response | Moderate | Moderate | High | High | High | High | |
| | Electrification | Moderate | Moderate | High | High | High | High | |
| Transmission | New or Upgraded Transmission Allowed? | Only Along Existing or Planned Corridors | 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 |

Reorganized Scenarios

| | | 1 | | | | 2 | | | | |
|--|--|--|--|--------------------------|--------------------------------|--|--|-----------------------|---------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | | | Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | | | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | | | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | | | Y |
| | Biogas | Y | No | Y | Y | Y | No | | | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | | | Y |
| | Fuel Cells | Y | Y | Y | Y | Y | Y | | | Y |
| | Hydro - Existing | Y | Y | Y | Y | Y | Y | | | Y |
| | Hydro - New | N | N | N | N | N | N | | | N |
| | Hydro - Upgrades | Y | Y | Y | Y | Y | Y | | | Y |
| | Natural Gas | Yes | Y | N | N | Yes | N | | | Y |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | | | Y |
| | Nuclear - New | N | N | N | N | N | N | | | N |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | | | Y | |
| Storage | Y | Y | Y | Y | Y | Y | | | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | | | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| 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 |

LA-Leads:
Merged with Emissions Free
Also with moderate electrification

Reorganized Scenarios

| | | LA100 Scenarios | | | | | | | | | |
|--|--|--|--|--------------------------|---|--|--|--------------------------|---------------------|--|--|
| | | Moderate Load Electrification | | | Transmission Renaissance (Load Modernization) | | | | High Load | | |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) | | | |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 100% Net RE | 100% Net RE | 100% Net RE | 60% | | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2040 | 2045 | 2045 | 2045 | 2045 | | |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | Y | Y | Y | Y | |
| | Biogas | Y | No | Y | Y | Y | Y | Y | Y | Y | |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| | 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 | |
| | Natural Gas | Yes | N | N | N | N | N | N | N | Yes | |
| | Nuclear - Existing | Y | Y | No | No | No | No | No | No | Y | |
| | Nuclear - New | N | N | N | N | N | N | N | N | N | |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y | Y | | |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N | |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate | |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes | |
| 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 | |

Transmission Renaissance:
Also with high electrification (Load Modernization)

Reorganized Scenarios

| | | 1 | | | | 3 | | | 2 | | | 4 | |
|--|--|--|--|--------------------------|--------------------------------|--|--|--|--------------------------------|--|--|---|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | High Load | | | | |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Distributed: Also with moderate electrification | High Distributed: Also with moderate electrification | High Distributed: Also with moderate electrification | High Distributed Energy Future | High Load Stress (SB100) | | | |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | | | | 100% Net RE | 60% | | | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | | | | 2045 | 2045 | | | |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | | | | Y | Y | | | |
| | Biogas | Y | No | Y | Y | | | | Y | Y | | | |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | | | | Y | Y | | | |
| | Fuel Cells | Y | Y | Y | Y | | | | Y | Y | | | |
| | Hydro - Existing | Y | Y | Y | Y | | | | Y | Y | | | |
| | Hydro - New | N | N | N | N | | | | N | N | | | |
| | Hydro - Upgrades | Y | Y | Y | Y | | | | Y | Y | | | |
| | Natural Gas | Yes | N | N | N | | | | N | Yes | | | |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No | Y | | | |
| | Nuclear - New | N | N | N | N | N | N | N | N | N | | | |
| Wind, Solar, Geo Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | | | | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N | | | |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate | | | |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes | | | |
| 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 | | | |

Reorganized Scenarios

| | | LA100 Scenarios | | | | | | | | |
|--|--|--|--|---|---------------------|--|--|--------------------------|--------------------------------|--|
| | | 1 Moderate Load Electrification | | | | 2 High Load Electrification (Load Modernization) | | | | 4 High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Emissions Free: Merged with LA Leads Also with Load Modernization | | 100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | | | 0% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | | | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | | | Y | No | Y | Y | Y |
| | Biogas | Y | No | | | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | | | Y | Y | Y | Y | Y |
| | Fuel Cells | Y | Y | | | Y | Y | Y | Y | Y |
| | Hydro - Existing | Y | Y | | | Y | Y | Y | Y | Y |
| | Hydro - New | N | N | | | N | N | N | N | N |
| | Hydro - Upgrades | Y | Y | | | Y | Y | Y | Y | Y |
| | Natural Gas | Yes | N | | | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | Y | | | Y | Y | No | No | Y |
| | Nuclear - New | N | N | | | N | N | N | N | N |
| Wind, Solar, Geo Storage | Y | Y | | | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| 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 |

Reorganized Scenarios

| | | 1 | 5 | 3 | LA100 Scenarios | | | | 2 | 4 | 6 |
|--|--|--|--|--------------------------|--------------------------------|--|--|-----------------------|---------------------|--|----------|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load | |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | | | | | High Load Stress (SB100) | |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | | | | | 60% | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | | | | | 2045 | |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | | | | | Y | |
| | Biogas | Y | No | Y | Y | | | | | Y | |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | | | | | Y | |
| | Fuel Cells | Y | Y | Y | Y | | | | | Y | |
| | Hydro - Existing | Y | Y | Y | Y | | | | | Y | |
| | Hydro - New | N | N | N | N | | | | | N | |
| | Hydro - Upgrades | Y | Y | Y | Y | | | | | Y | |
| | Natural Gas | Yes | N | N | N | | | | | Yes | |
| | Nuclear - Existing | Y | Y | No | No | | | | | Y | |
| | Nuclear - New | N | N | N | N | | | | | N | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | | | | | N | |
| | DG | Distributed Adoption | Moderate | High | Moderate | High | | | | | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | | | | | Yes | |
| 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 | |

High Load Stress:
 With 60% 2030 target to mirror SB100
 This allows comparison with SB100 (High) to show impact of efficiency and demand response

Reorganized Scenarios

| | | 1 | 5 | 3 | LA100 Scenarios | | | | 2 | 7 | 4 | 6 |
|--|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|----------|---|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load | | |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) | | |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 | | |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y | | |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y | | |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y | | |
| | 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 | | |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Y | | |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | Y | Y | Y | | |
| | Nuclear - New | N | N | N | N | N | N | N | N | N | | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N | | |
| | DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate | |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes | | |
| 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 | | |

Load Modernization:
Now applied to four scenarios

Reorganized Scenarios

| | | 1 | 5 | 3 | LA100 Scenarios | | | | 2 | 7 | 4 | 6 |
|--|---|-------------------------------|---------------------------------------|--------------------------|--------------------------------|--|---------------------------------------|--------------------------|--------------------------------|--------------------------|---|---|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load | | |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) | | |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | | |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 | | |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y | | |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y | | |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y | | |
| | 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 | | |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes | | |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No | Y | | |
| | Nuclear - New | N | N | N | N | N | N | N | N | N | | |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y | Y | | | |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | | | |
| Repowering OTC | Haynes, Scattergood, Harbor | | | | | | | | | | | |
| DG | Distributed Adoption | | | | | | | | | | | |
| RECS | Financial Mechanisms (RECS/Allowances) | | | | | | | | | | | |
| Load | Energy Efficiency Demand Response Electrification | | | | | | | | | | | |
| Transmission | New or Upgraded Transmission Allowed? | Corridors | Corridors | Allowed | Corridors | Corridors | Allowed | Corridors | Corridors | Corridors | | |
| WECC | WECC VRE Penetration | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate | | |

Western Initiatives:

We are increasing WECC RE penetration across all scenarios to NREL's mid-level projections (~50% Variable Renewable Energy in 2045)

What We Gain:

Scenarios Can Be Compared by Level of Ambition

Level of Ambition

SB100 vs. Transmission/Distribution vs. LA Leads/Emissions Free
 Natural gas, RECs allowed vs. No natural gas; 2045 compliance; biomass OK vs. Earlier compliance, no local emissions

| | | LA100 Scenarios | | | | | | | | |
|--|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | 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 |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | N | No | No | Y | N | No | No | Y |
| | Nuclear - New | N | N | N | N | N | N | N | N | N |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| 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 | Reference |
| 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 |

What We Gain:

Scenarios Can Be Compared by Location of New RE

Transmission Renaissance
Transmission-oriented growth

vs.

High Distributed Energy
Future
Distribution-oriented growth

| | | LA100 Scenarios | | | | | | | | |
|--|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | 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 |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | Y | No | No | Y | No | No | No | Y |
| | Nuclear - New | N | N | N | N | N | N | N | N | N |
| Wind, Solar, Geo Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| Load | Energy Efficiency | Moderate | Moderate | Moderate | Moderate | High | High | High | High | Reference |
| | Demand Response Electrification | Moderate | Moderate | Moderate | Moderate | High | High | High | High | Reference |
| 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 |



What We Gain:

Scenarios Can Be Compared by Extent of Electrification & Efficiency

Moderate Electrification
 Moderate growth, efficiency, and demand response potential

vs.

High Electrification
 Strong growth, efficiency, and demand response potential

| | | LA100 Scenarios | | | | | | | | |
|--|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | 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 |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No | Y |
| | Nuclear - New | N | N | N | N | N | N | N | N | N |
| Wind, Solar, Geo Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| Load | Energy Efficiency | Moderate | Moderate | Moderate | Moderate | High | High | High | High | Reference |
| | Demand Response Electrification | Moderate | Moderate | Moderate | Moderate | High | High | High | High | Reference |
| 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 |

What We Gain:

Scenarios Can Be Compared by Impact of Efficiency

SB100, High Electrification vs.

High Load Stress
 Identical to SB100 (High Load) but with reference efficiency and demand response

| | | LA100 Scenarios | | | | | | | | |
|--|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | 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 |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | Y | No | No | Y | No | No | No | Y |
| | Nuclear - New | N | N | N | N | N | N | N | N | N |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| Load | Energy Efficiency | Moderate | Moderate | Moderate | Moderate | High | High | High | High | Reference |
| | Demand Response | Moderate | Moderate | Moderate | Moderate | High | High | High | High | Reference |
| 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 |



What We Lose

- Lowest projections for electrification and distributed generation (rooftop PV)
- Variations in WECC renewable energy penetration
- Separate scenarios for LA Leads and Emissions Free

But core scenario distinctions remain.

Reorganized scenarios will be easier to interpret,
communicate, and compare

And the transparency of study increases because impacts
are easier to isolate

Reorganized Scenarios—Questions?

| | | LA100 Scenarios | | | | | | | | |
|---|--|--|--|--------------------------|--------------------------------|--|--|--------------------------|--------------------------------|--|
| | | Moderate Load Electrification | | | | High Load Electrification (Load Modernization) | | | | High Load |
| | | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | SB100 | LA-Leads, Emissions Free (No Biomass) | Transmission Renaissance | High Distributed Energy Future | High Load Stress (SB100) |
| 2030 RE Target | | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% | 100% Net RE | 100% Net RE | 100% Net RE | 60% |
| Compliance Year for 100% | | 2045 | 2035/2040 | 2045 | 2045 | 2045 | 2035/2040 | 2045 | 2045 | 2045 |
| Technologies Eligible in the Compliance Year | Biomass | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Biogas | Y | No | Y | Y | Y | No | Y | Y | Y |
| | Electricity to Fuel (e.g. H2) | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | 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 |
| | Natural Gas | Yes | N | N | N | Yes | N | N | N | Yes |
| | Nuclear - Existing | Y | Y | No | No | Y | Y | No | No | Y |
| | Nuclear - New | N | N | N | N | N | N | N | N | N |
| Wind, Solar, Geo | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Storage | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| Repowering OTC | Haynes, Scattergood, Harbor | N | N | N | N | N | N | N | N | N |
| DG | Distributed Adoption | Moderate | High | Moderate | High | Moderate | High | Moderate | High | Moderate |
| RECS | Financial Mechanisms (RECS/Allowances) | Yes | N | N | N | Yes | N | N | N | Yes |
| 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 |

LA100 Assumptions

LA100 Assumptions

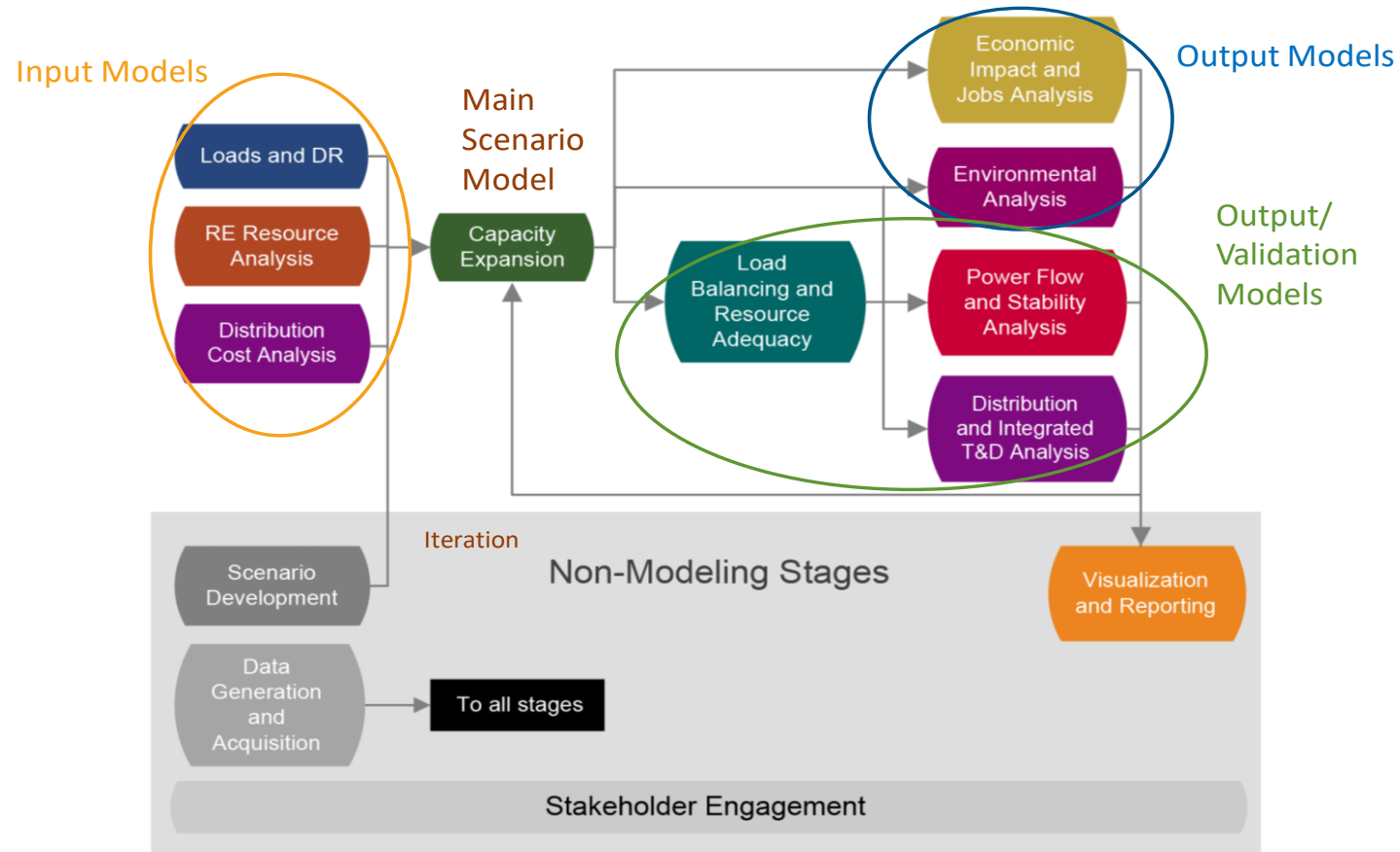
- Assumptions summary and detailed booklet circulated to AG last month
- Follow-up call held September 12
- Summary of call shared at this AG

- This document remains a **working draft**. We will share updated drafts before each AG, highlighting what has changed.

Questions on Assumptions?

Modeling Progress

Modeling Framework



Two Parallel Tracks of Modeling Activity Underway



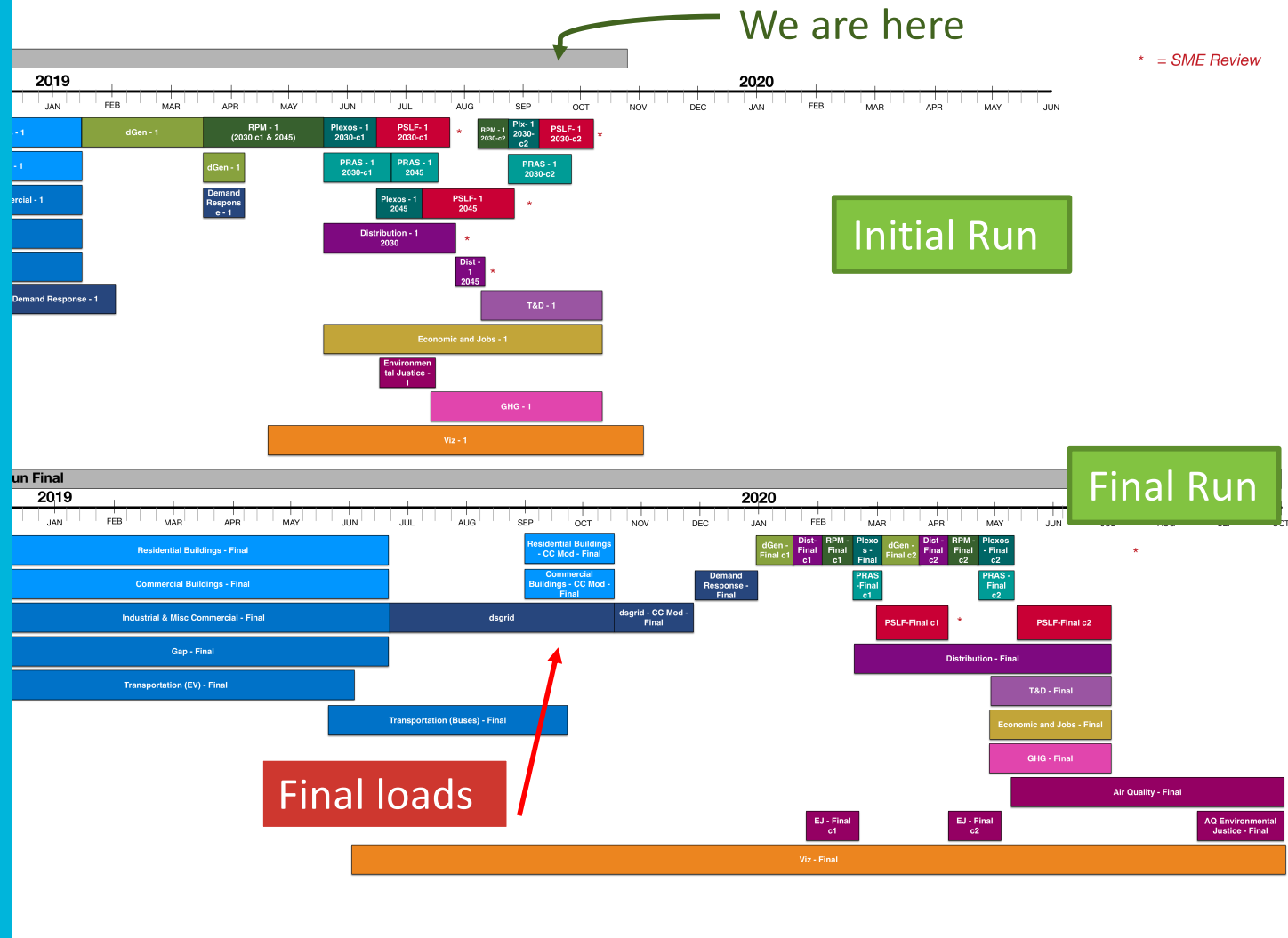
Initial Run Uses Draft Load Results

- 2045 projections are being validated through bulk power models
- Distribution grid models are being finalized
- We have started bridging bulk and distribution systems in September

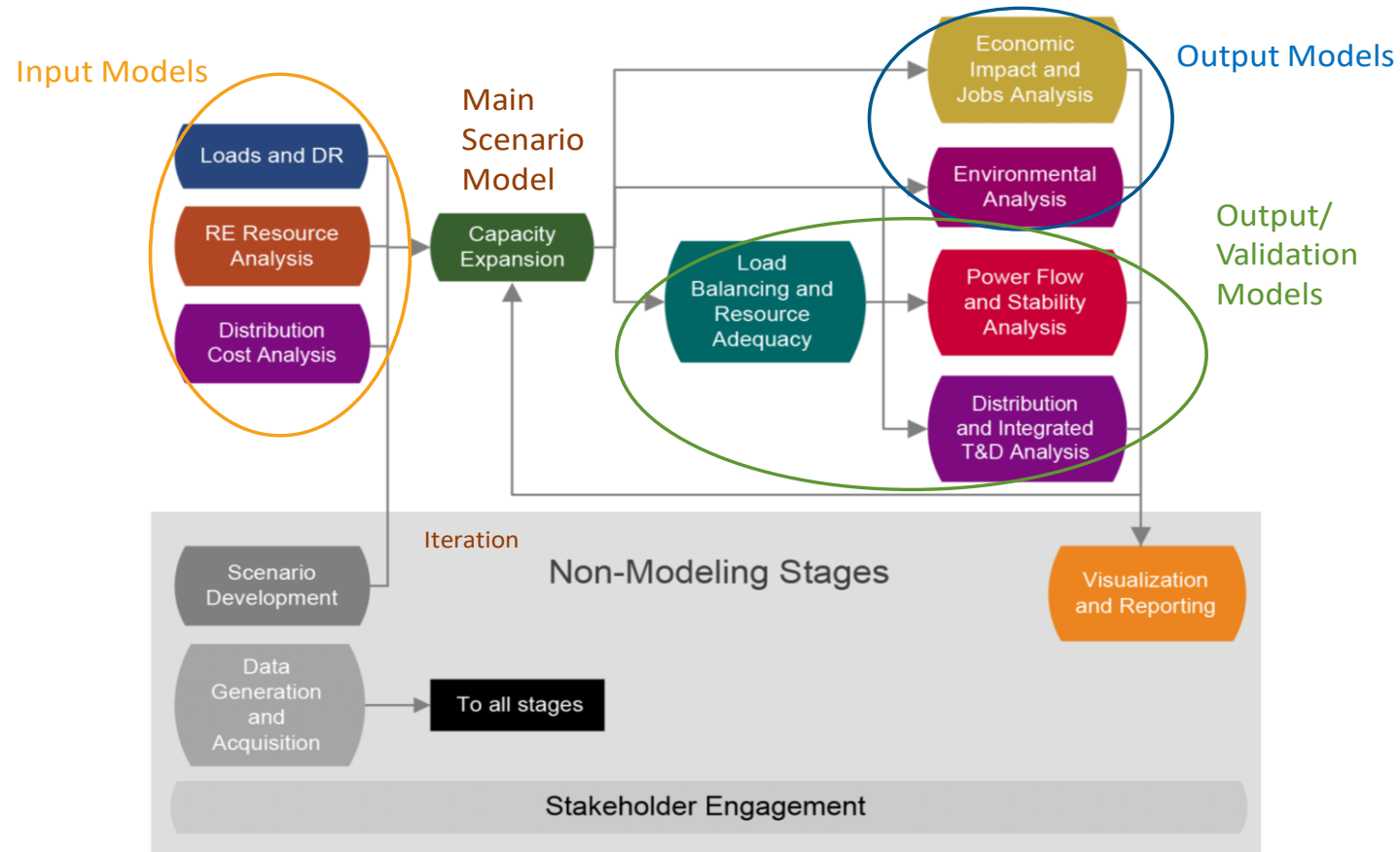


Final Run Uses Final Load Results

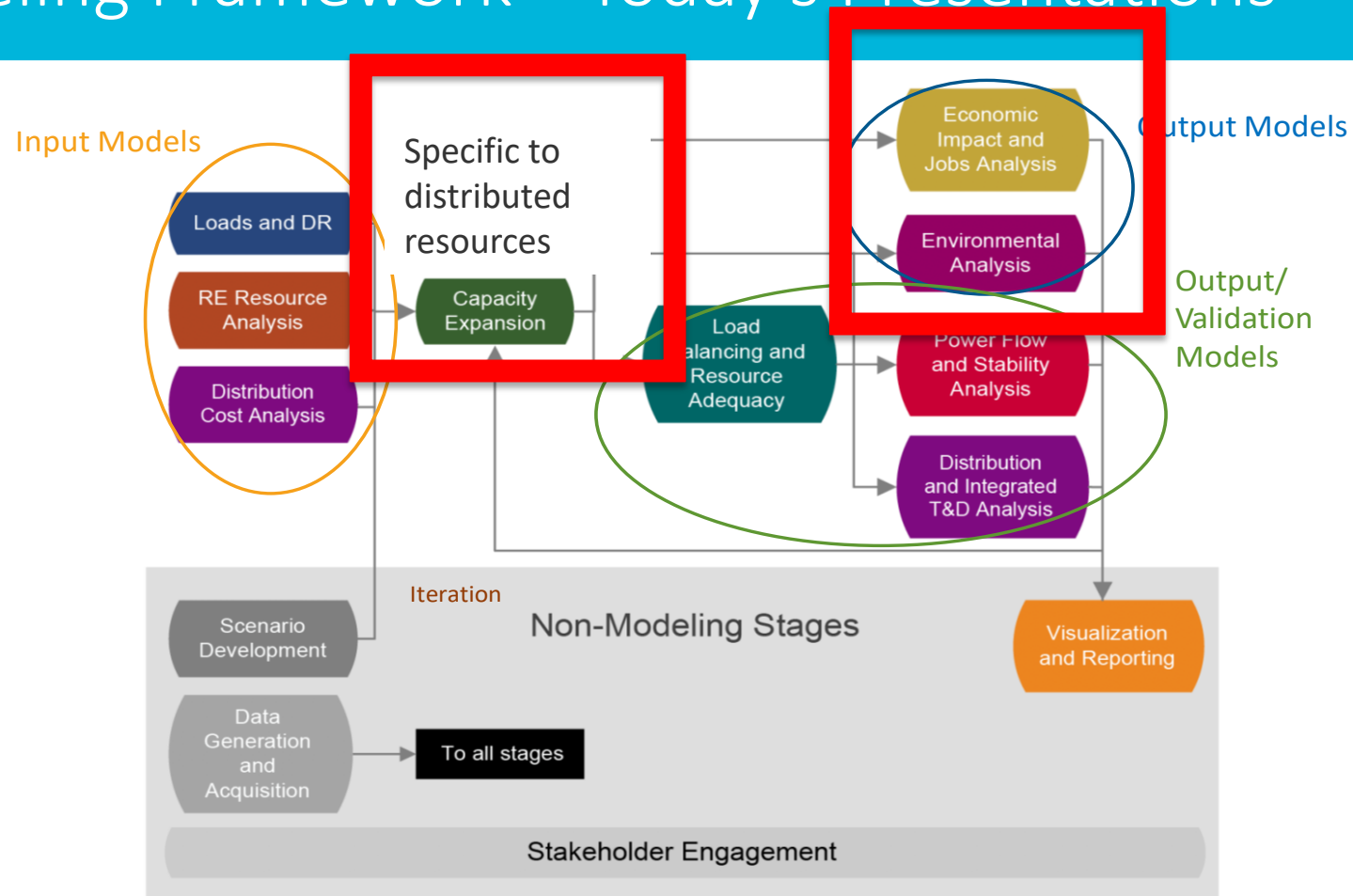
- Buildings load models ready to be rerun with higher temperatures
- Bus electrification is almost complete
- Large effort to integrate bottom-up loads data to transfer to downstream models



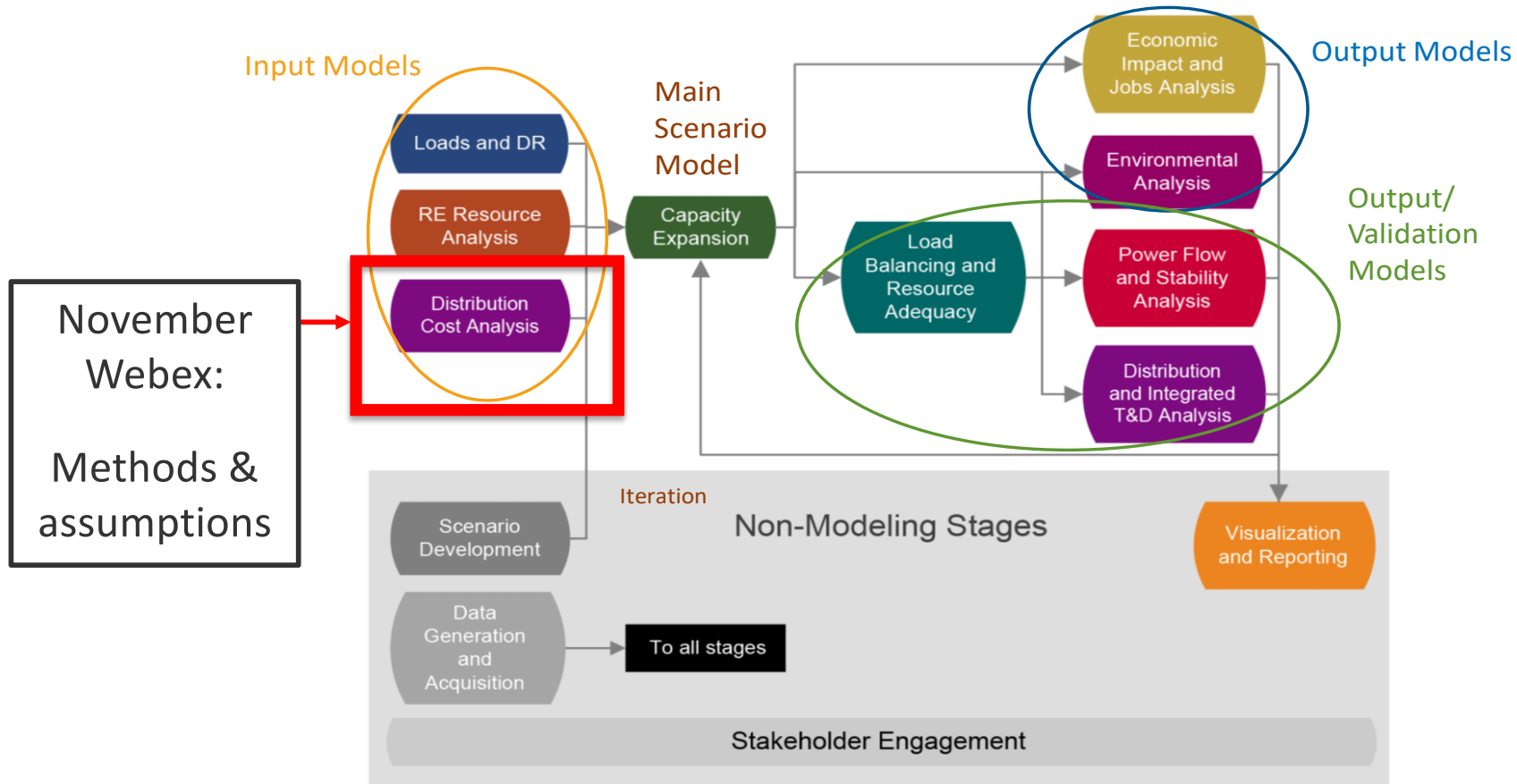
Modeling Framework



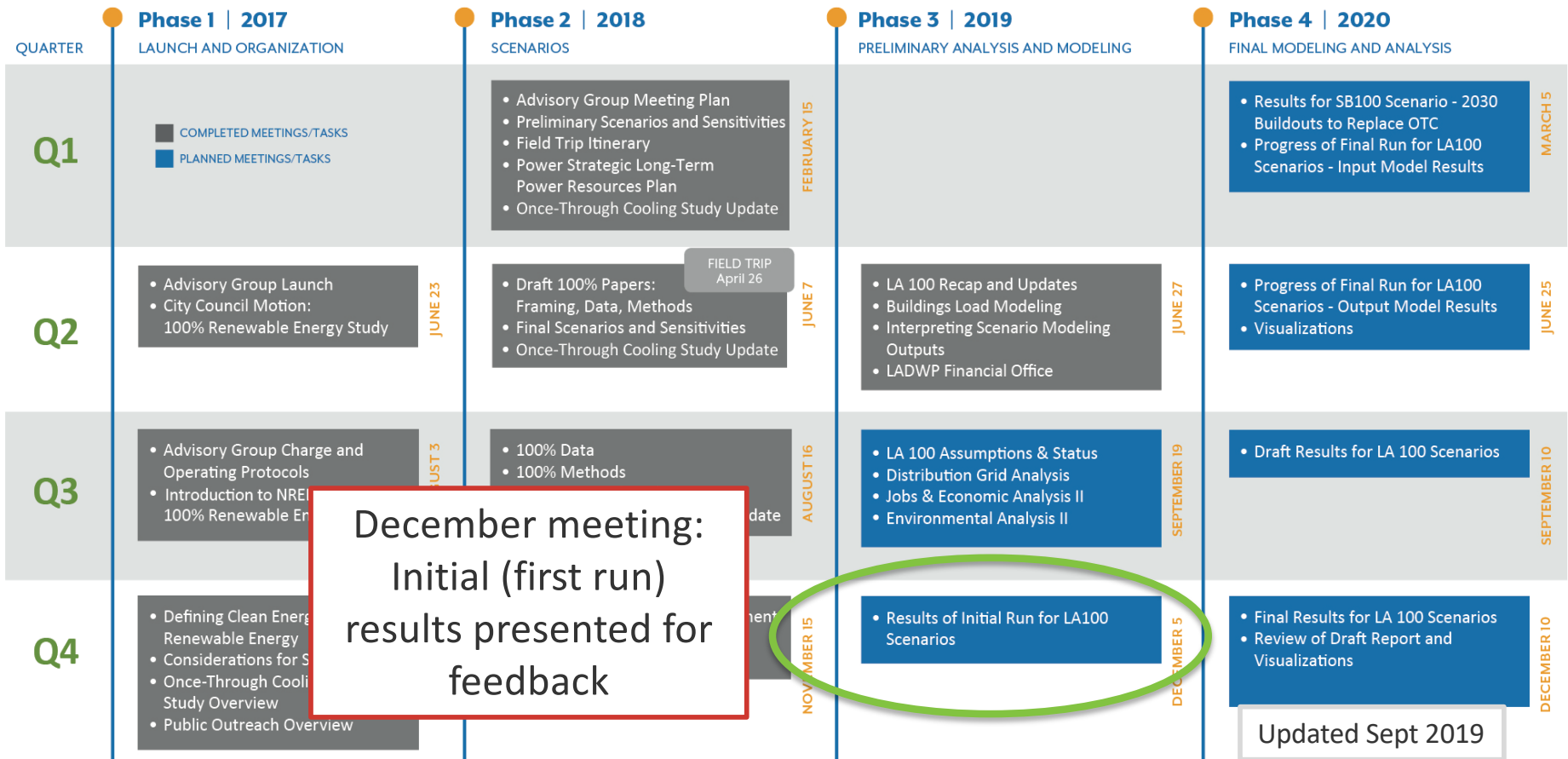
Modeling Framework—Today's Presentations



Modeling Framework—Interim AG WebEx (November)



AG Timeline



Questions?



The Los Angeles 100% Renewable Energy Study