

Workshop Goals

- Provide an overview of the SB 100 joint-agency report requirements, progress to date, and planning
- Present modeling framework, inputs, and assumptions
- Solicit stakeholder and public input on:
 - Modeling scenarios for this report
 - Key reliability considerations for long-term planning
 - Long-term analytical approaches

Today's Agenda

Opening Remarks

- Chair David Hochschild, CEC
- Commissioner Liane Randolph, CPUC
- Commissioner Andrew McAllister, CEC
- Commissioner Karen Douglas, CEC
- ISD Division Chief Rajinder Sahota, CARB

Morning

- SB 100 Overview/Statutory Requirements
- **Session 1: Modeling Inputs & Assumptions**
 - Public Q&A Session

Afternoon

- **Session 2: Reliability Considerations in SB 100**
- **Session 3: Additional Perspectives for SB 100 Analysis**
- Path Forward for this round of SB 100 and Beyond

Public Comment

SB 100 Overview

Terra Weeks
California Energy Commission
February 24, 2020



SB 100 Review

Expands RPS

- 20% by Dec 31, 2013
- 33% by Dec 31, 2020
- **50% by Dec 31, 2026**
- **60% by Dec 31, 2030**



SB 100 Review

Establishes 100% Policy

It is the policy of the state that **eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales** of electricity to California end-use customers by December 31, 2045 and 100 percent of electricity procured to serve all state agencies by December 31, 2045.

PUC 454.53 (a)



SB 100 Review

The 100% Policy...

- Shall **not increase carbon emissions** elsewhere in the western grid and shall **not allow resource shuffling**.
- CPUC, CEC, CARB, and all other state agencies shall **incorporate this policy into all relevant planning**.

SB 100 Review

PUC 454.53 (b)

The CPUC, CEC, CARB, and all other state agencies shall ensure that actions taken in furtherance of subdivision (a) do all of the following:

1. Maintain and protect the **safety, reliable operation, and balancing** of the electric system.
2. **Prevent unreasonable impacts** to electricity, gas, and water customer rates and bills...taking into full consideration the economic and environmental costs and benefits
3. Lead to the adoption of policies and taking of **actions in other sectors** to obtain greenhouse gas emission reductions
4. Not affect in any manner the rules and requirements for the...California **Renewables Portfolio Standard Program**

SB 100 Review

The CPUC, CEC, and CARB shall do both of the following:

1. Utilize Existing Programs

Utilize programs authorized under existing statutes to achieve the policy described in subdivision (a).

2. Issue Joint-Agency Report

In consultation with all California balancing authorities...as part of a public process, issue a joint report to the Legislature by January 1, 2021, and at least every four years thereafter.

SB 100 Review

The joint report shall include the following:

A. A review of the policy

Focused on technologies, forecasts, then-existing transmission, and maintaining safety, environmental and public safety protection, affordability, and system and local reliability.

B. Reliability

Potential benefits and impacts on system and local reliability.

C. Costs/Benefits

The nature of any anticipated financial costs and benefits to electric, gas, and water utilities, including customer rate impacts and benefits.

D. Barriers/Benefits

The barriers to, and benefits of, achieving the policy.

E. Alternative scenarios

in which the policy can be achieved and the estimated costs and benefits of each scenario.

Interagency Coordination



CPUC

Principal: Commissioner Randolph



CEC

Principal: Chair Hochschild



CARB

Principal: Chair Nichols



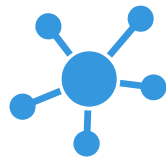
Joint Agency Report Goals



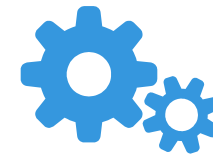
Meet report statutory requirements



Provide direction to the electricity market

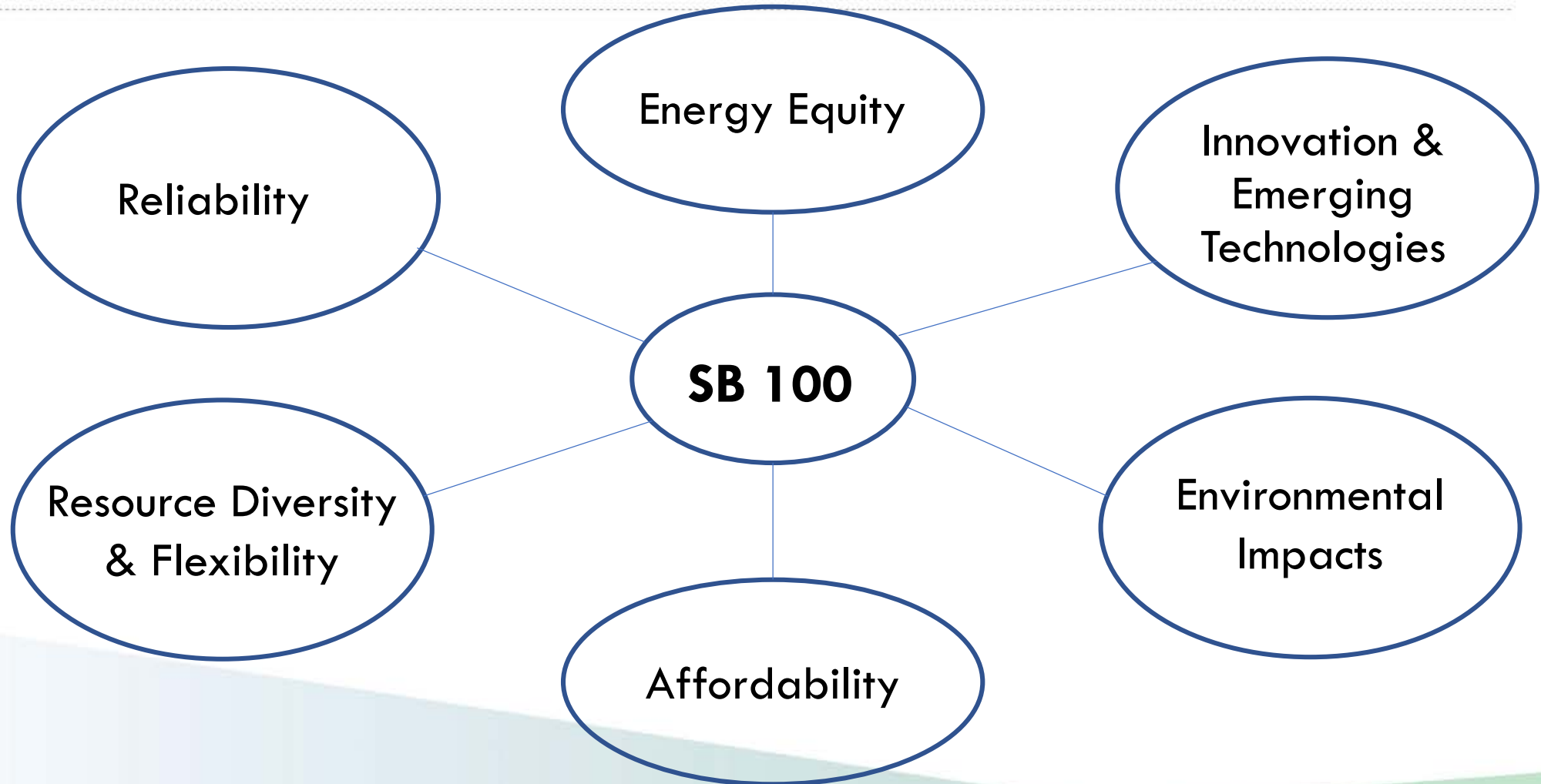


Coordinate planning processes of the State Agencies

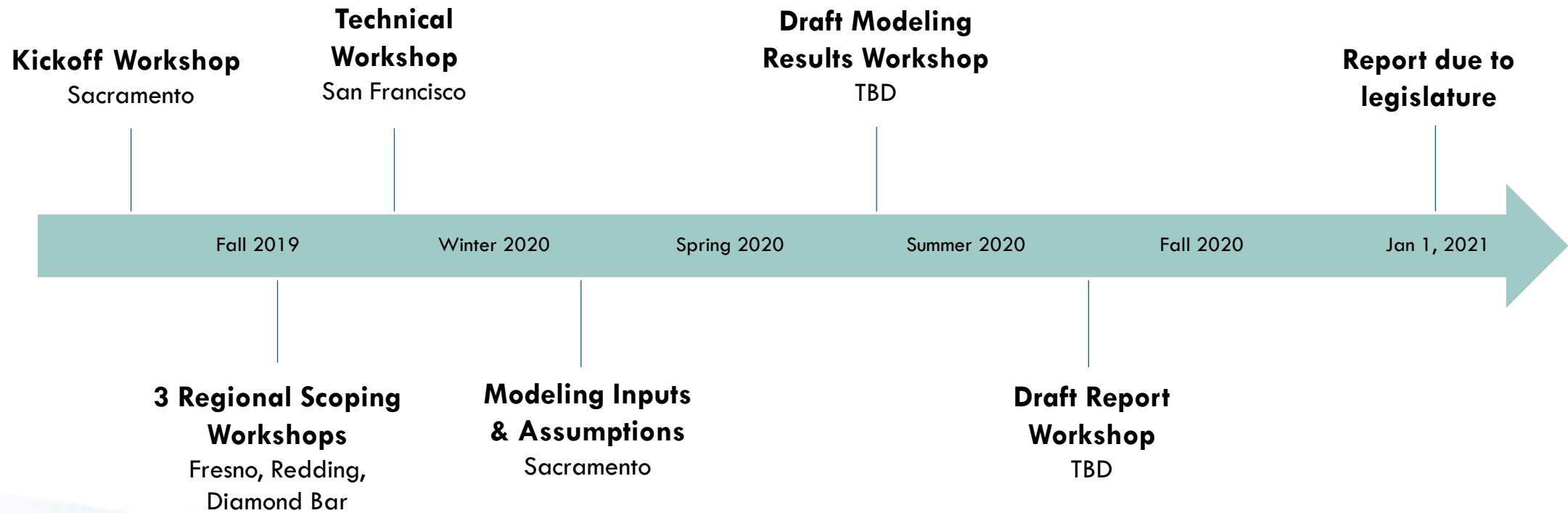


Form consensus on interpretation of statute

Key Considerations



Timeline



SB 100 Comments to date

- Support for a **diverse portfolio** of resources; mix of in-state and regional resources and energy storage
- **Support for specific technologies**, such as large hydro, small modular nuclear, hydrogen, gas with CCS, and bioenergy resources
- Incorporate **resilience planning** and address wildfire risk, including microgrids
- Continue to address **reliability**
- Critical importance of **affordability and energy equity**
- **Address air pollution**, particularly in disadvantaged communities
- Concerns around a **narrow interpretation of the scope** of SB 100 targets

“Don’t be prescriptive”

“Maximize optionality”

“Be technology inclusive”

Thank You



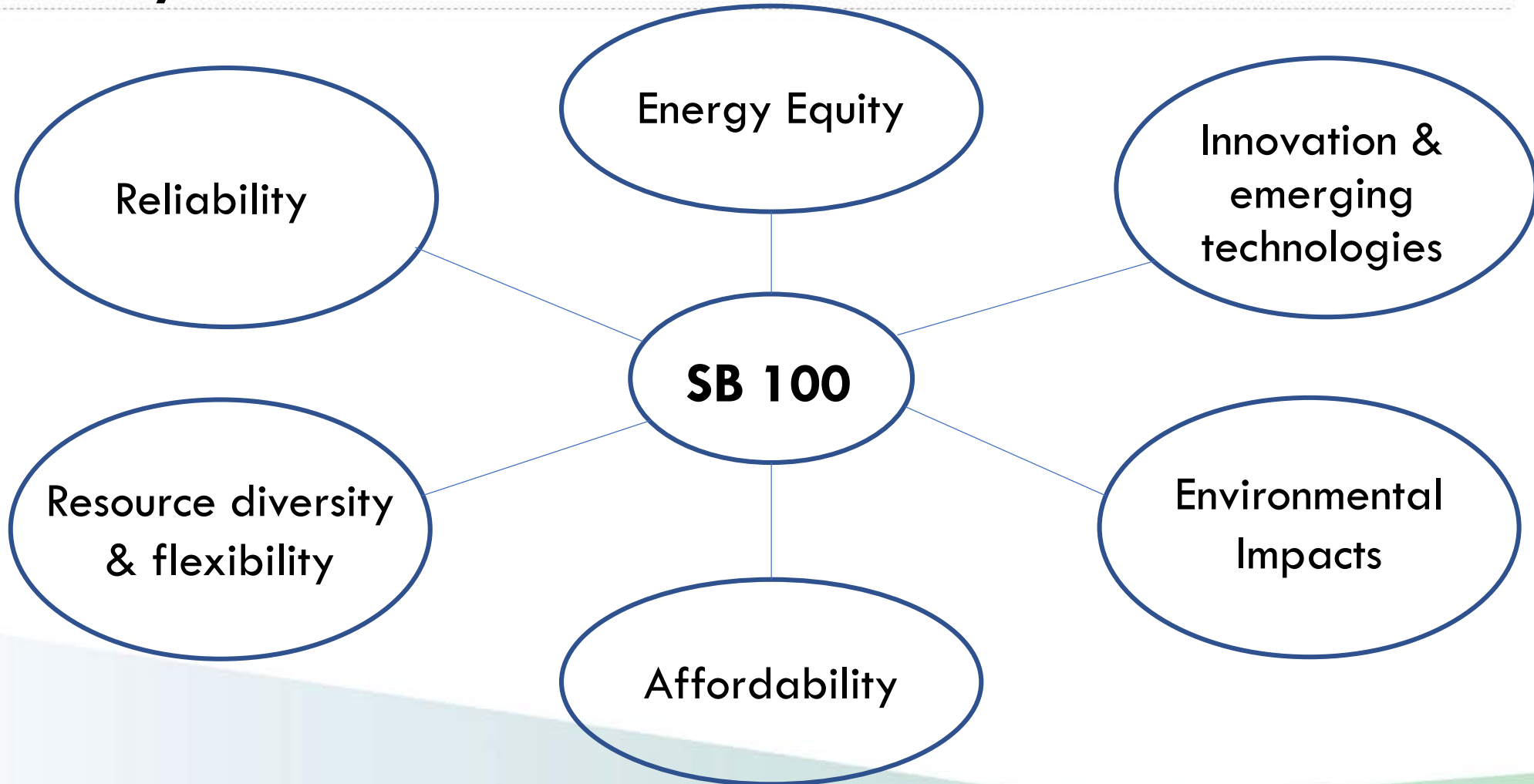
SB 100 Analytical Approach

Mark Kootstra
California Energy Commission Staff
February 24, 2020





Key Considerations





SB 100 Analysis



Quantitative

- Modeling of **statewide resource scenarios** to meet targets
- Evaluation framework for **costs, benefits and impacts**

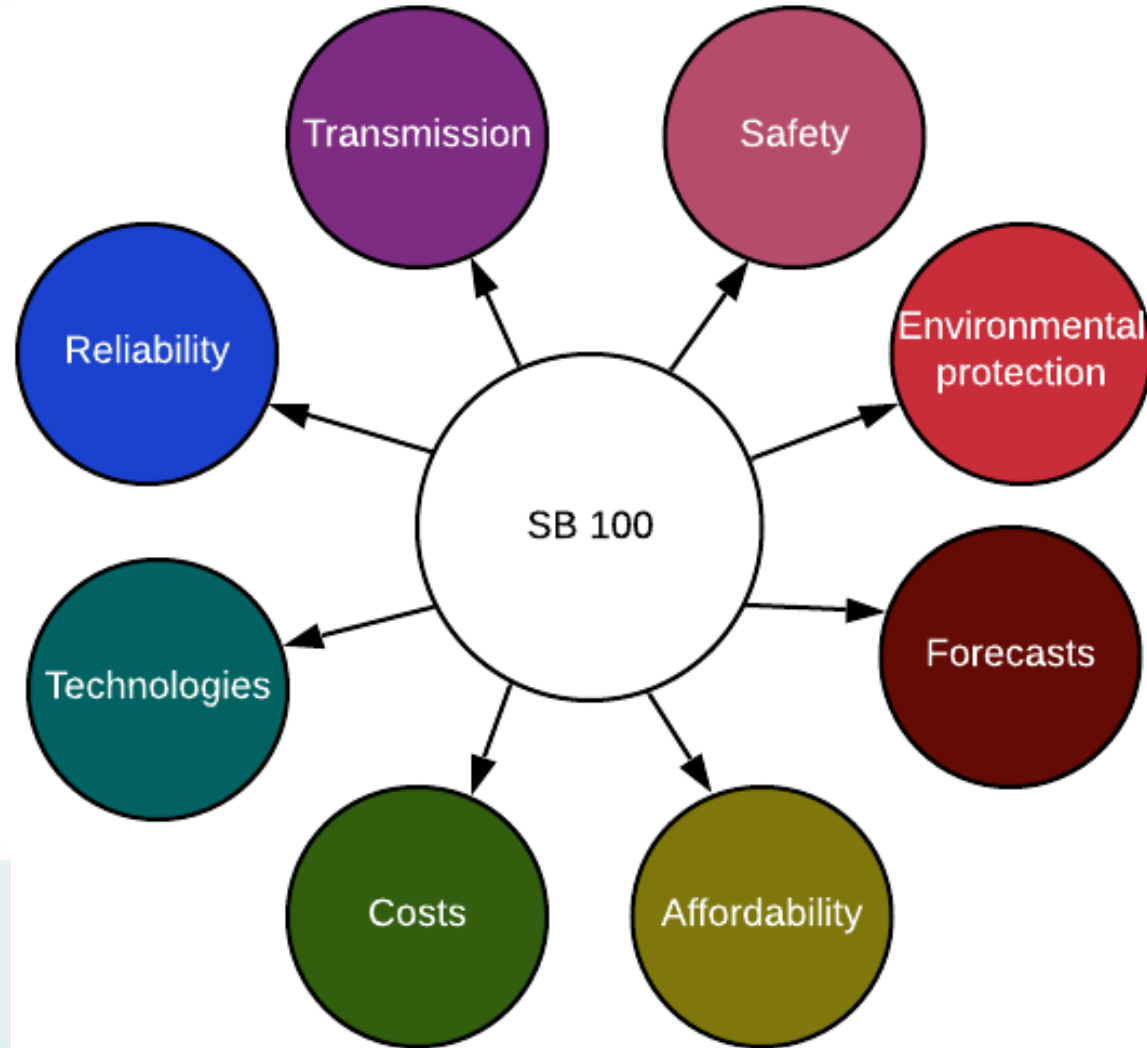


Qualitative

- **Technology trends & projections**
- **System benefits:** reliability, resilience, health & safety
- **Energy equity & affordability**
- **Environmental implications, public safety and land use**
- Interactions with **other sectors**

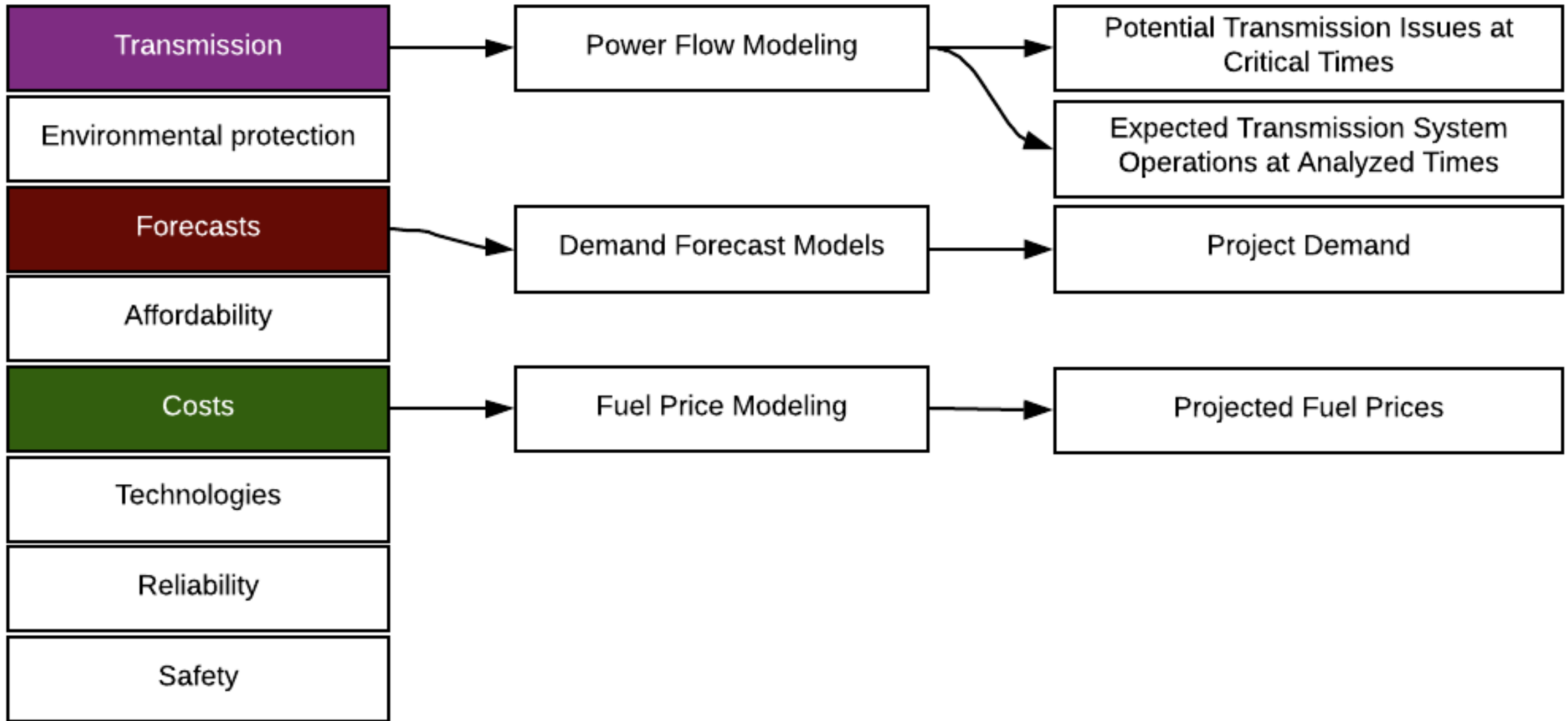


Analytical Requirements



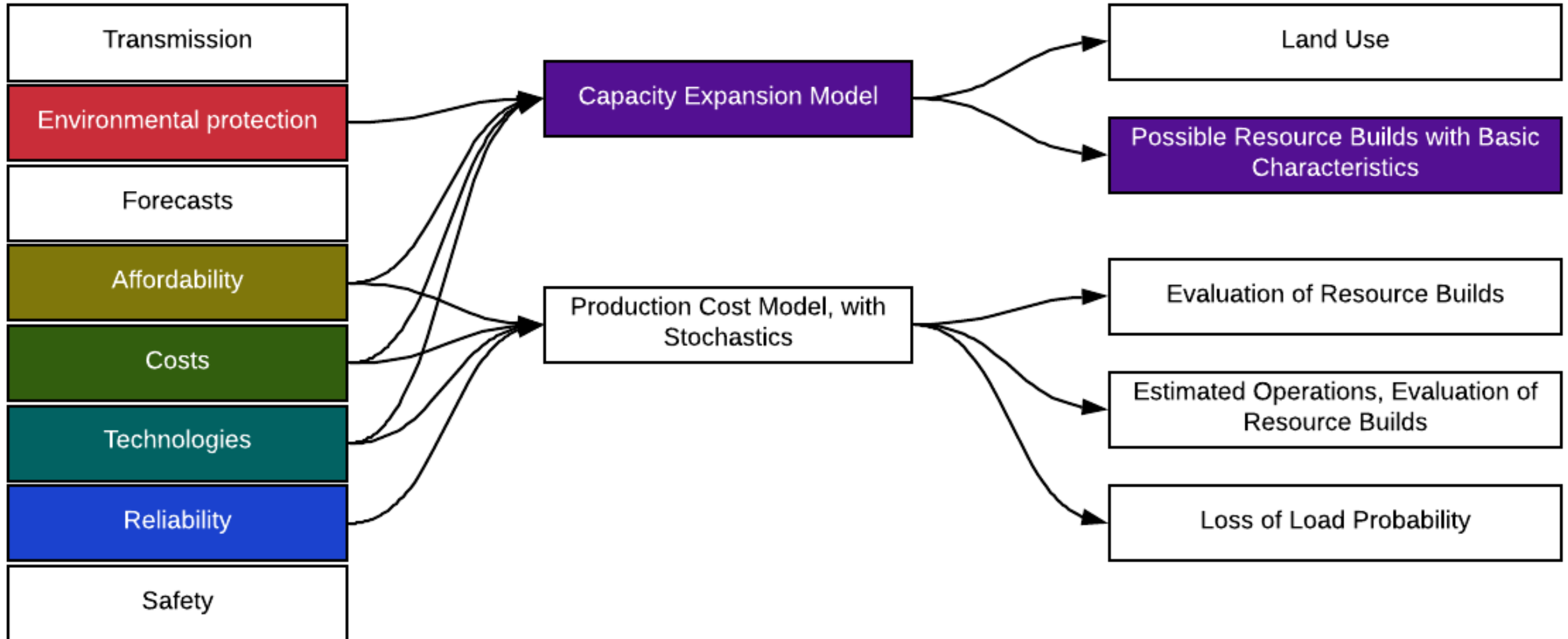


Models that can Support SB 100 (1 of 2)



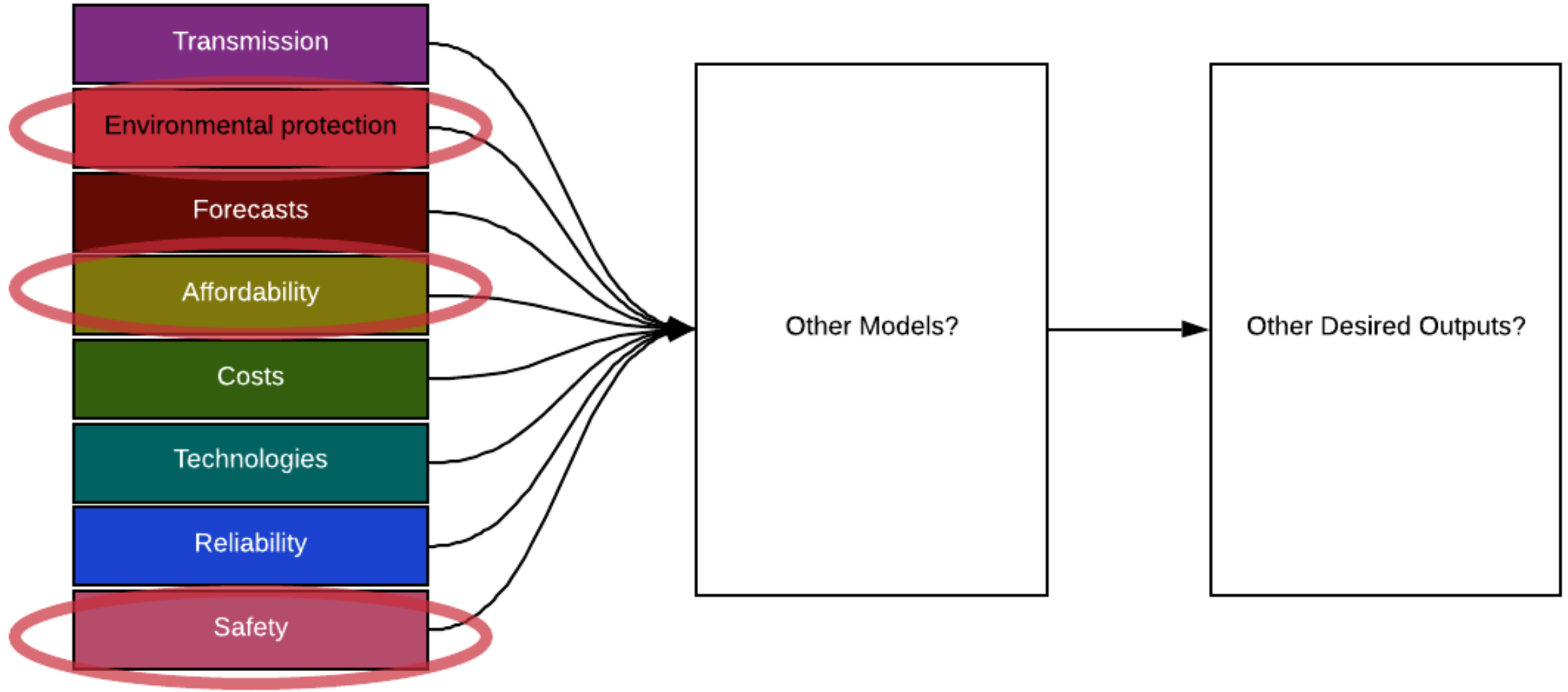


Models that can Support SB 100 (2 of 2)



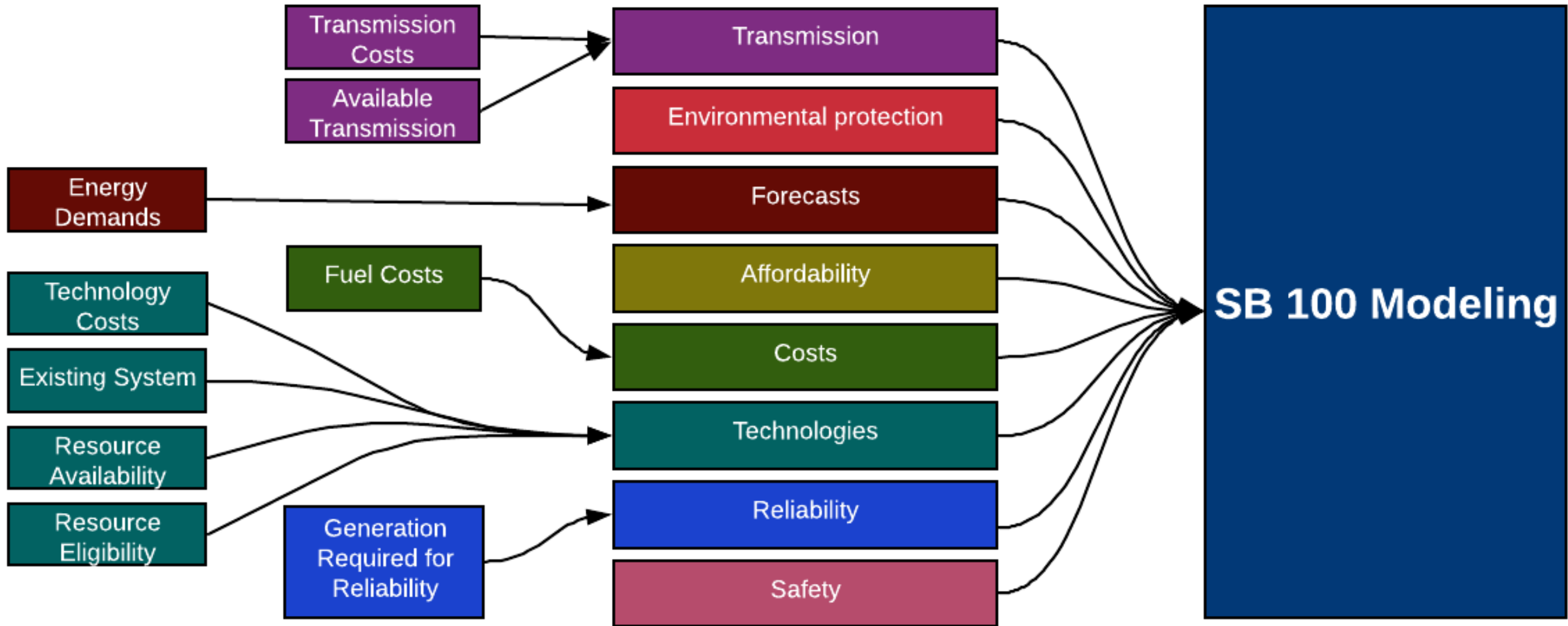


Future Modeling Possibilities



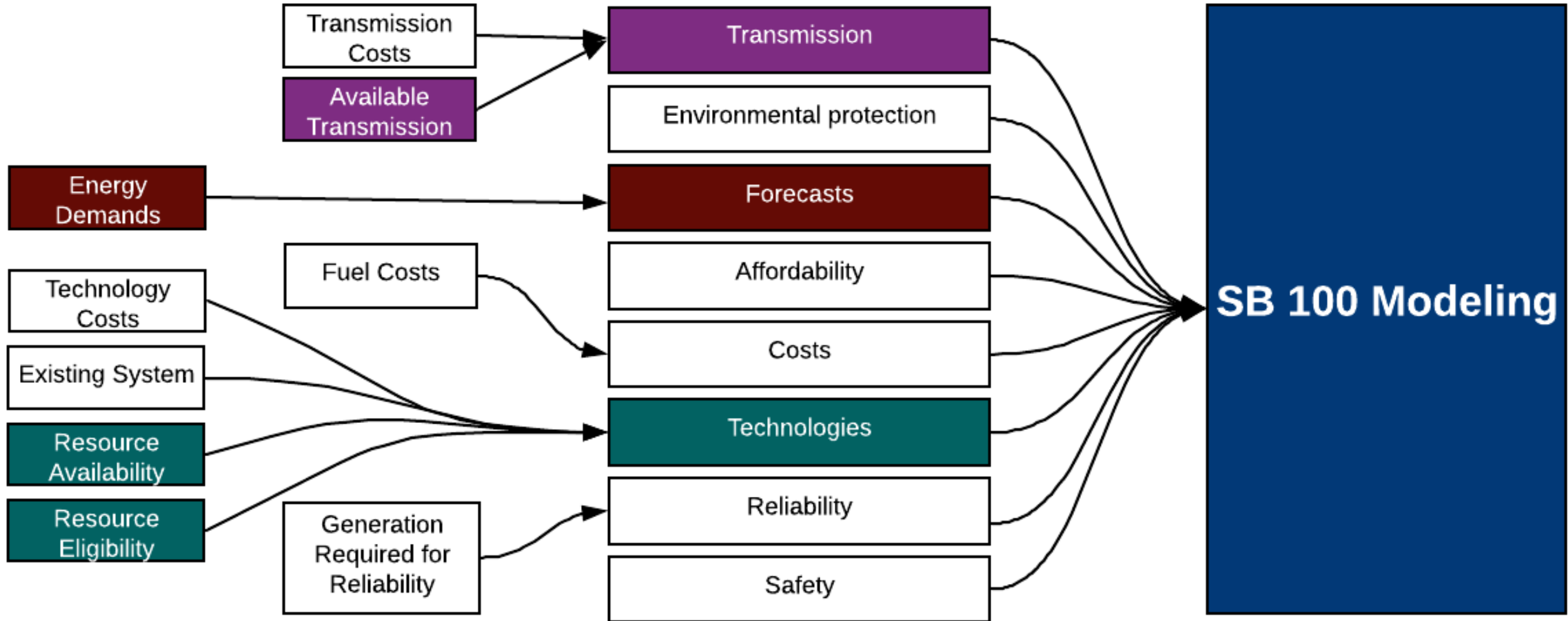


Inputs



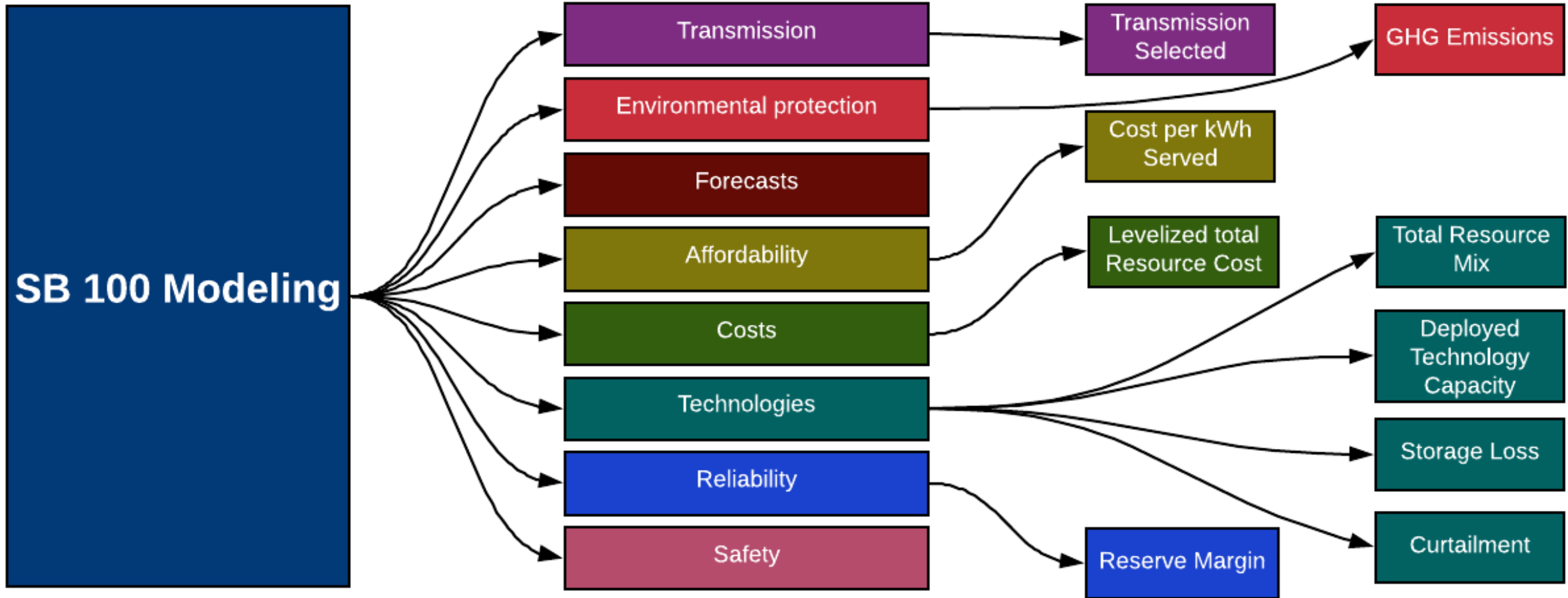


Key Inputs





Outputs



SB 100 Modeling Scenarios





SB 100 Language

PUC 454.53 (a)

It is the policy of the state that **eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales** of electricity to California end-use customers by December 31, 2045.





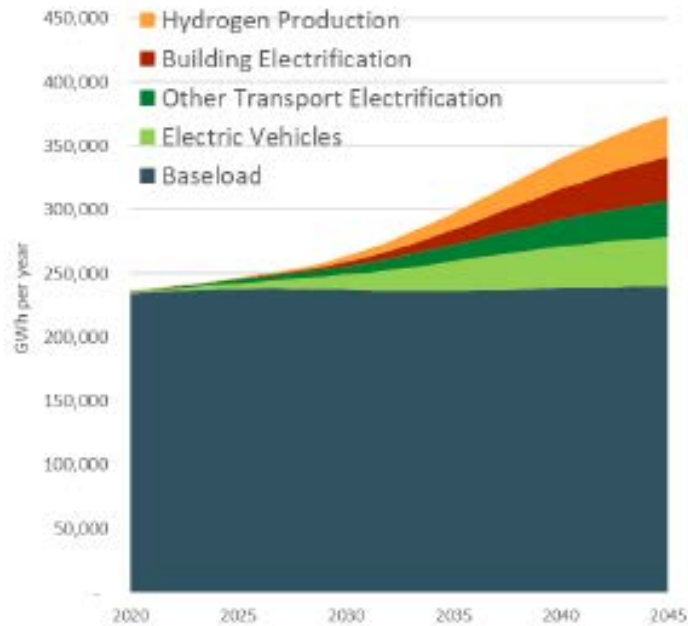
Current Zero Carbon Resource Options

	RPS Eligibility	SB 100: RPS+	SB 100: No Fossil Fuel Combustion
RPS Eligible Technologies	★	★	★
Large Hydroelectric		★	★
Nuclear		★	★
Natural Gas With Carbon Capture and Sequestration		★	

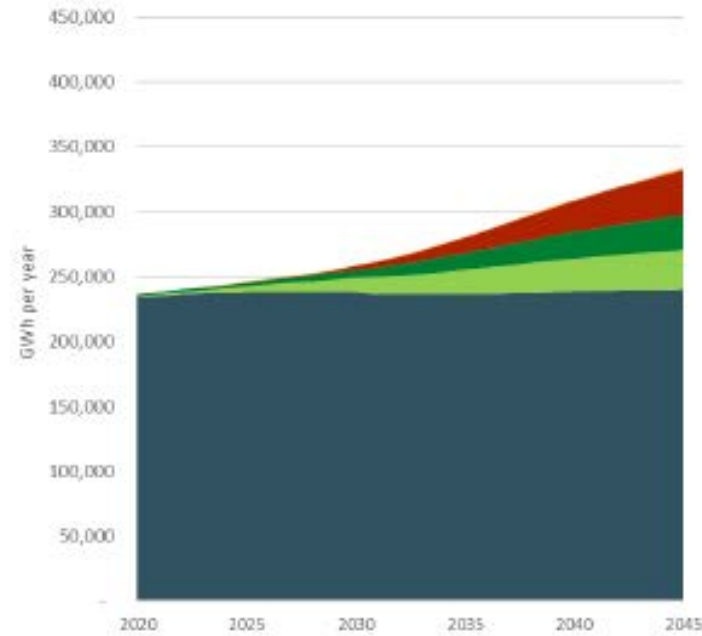


Demand Scenarios

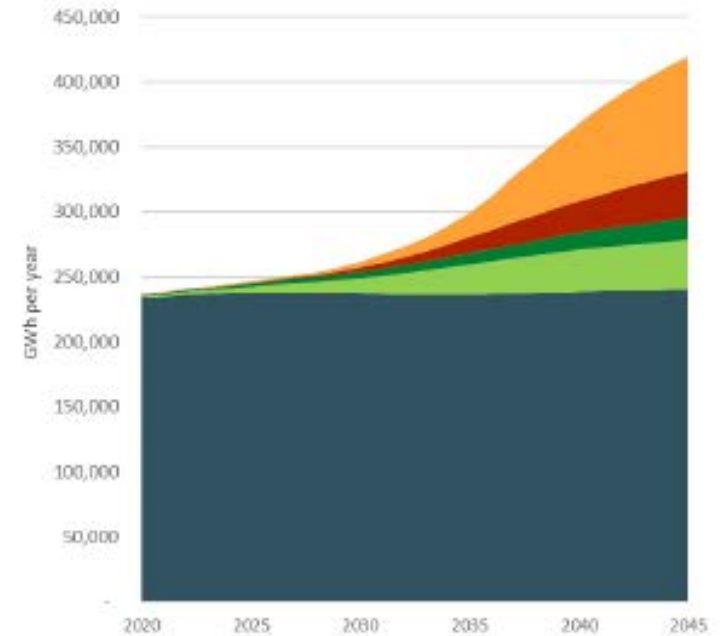
High Electrification



High Biofuels



High Hydrogen



E3 Will also be working with EAD staff to develop a PATHWAYS base case that aligns with the 2019 CED.



Resource Availability

- Full Resource Availability
- Offshore Wind Not Available
- New Out-of-State Transmission Not Available
 - Effectively a Limit on Out-of-State Wind
- Offshore Wind and New Out-of-State Transmission Not Available



Possible Scenario Options

Resource Eligibility	Demand Values	Resource Availability	SB 100 Requirement
RPS+	High Electrification	Full Resource Availability	Zero-Carbon Goal Enforced
No Combustion of Fossil Fuels	High Biofuels	Offshore Wind Not Available	Only 60% RPS Enforced
	High Hydrogen	Out-of-State Transmission Not Available	
	2019 Reference	Offshore Wind and Out-of-State Transmission Not Available	
2 Options	4 Options	4 Options	2 Options



Current Proposed Scenarios

Scenario	Resource Eligibility	Demand Values	Resource Availability
1	RPS+	High Electrification	Offshore Wind and Out-of-State Transmission Not Available
2	RPS+	High Electrification	Offshore Wind Not Available
3	RPS+	High Electrification	Out-of-State Transmission Not Available
4	RPS+	High Biofuels	Offshore Wind and Out-of-State Transmission Not Available
5	RPS+	High Hydrogen	Offshore Wind and Out-of-State Transmission Not Available
6	RPS+	2019 Reference	All Resources Available
7	No Combustion of Fossil Fuel	2019 Reference	All Resources Available
8	RPS+	2019 Reference	60% RPS only for Reference

Thank You



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Reliability Considerations in SB 100

- Moderated by Chris McLean, CEC
- **Delphine Hou**, Director, California Regulatory Affairs at California Independent System Operator
- **Jason Rondou**, Director, Clean Grid LA Strategy Division at Los Angeles Department of Water and Power
- **Jim Shetler**, General Manager at Balancing Authority of Northern California
- **Marilyn del Bosque Gilbert**, Energy Department Manager at Imperial Irrigation District
- **Dan Severson**, Assistant General Manager at Turlock Irrigation District

Additional Perspectives for SB 100 Analysis

- Moderated by Siva Gunda, CEC
- **Erica Brand**, The Nature Conservancy
- **Zainab Badi**, GRID Alternatives
- **Matthew Freedman**, The Utility Reform Network
- **Michael Wara, PhD**, Stanford University
- **Phoebe Seaton**, Leadership Counsel for Justice & Accountability

Additional Perspectives for SB 100 Analysis

- Provide feedback on the 8+ technical scenarios we are planning to evaluate and any additional input on the scope of modeling for this report.
- Discuss longer-term recommendations to improve the results of system modeling and better address broader considerations.

SB 100 Engagement

- Submit comments to CEC Docket 19-SB-100
- Visit the SB 100 Joint Agency Report webpage:
<https://www.energy.ca.gov/sb100>