**Staff Report Item 19**

**TO:** East Bay Community Energy Board of Directors

**FROM:** Stefanie Tanenhaus, Principal Regulatory Analyst, Public Policy

**SUBJECT:** **Integrated Resource Plan Results (Informational Item)**

**DATE:** October 21, 2020

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## Recommendation

Receive update on results of EBCE's Integrated Resource Plan (IRP) analysis.

## Background and Discussion

The IRP proceeding includes two primary components: the biennial study workstream and the mandated procurement workstream. This memo refers only to the biennial study workstream.

The IRP is a long-term planning proceeding intending to evaluate all of the CPUC's electric procurement policies and programs and the reliability and cost-effectiveness of the CPUC-jurisdictional entities'[1] electric supply with the goal of reducing the cost of achieving GHG reductions and other CPUC policy goals. The IRP proceeding looks 10 years forward to determine the least-cost resource mix required to meet these goals while maintaining system reliability.

The IRP also evaluates the contribution of individual entities' resource portfolios to the State's greenhouse gas (GHG) emissions. This IRP cycle, the CPUC required each entity to submit distinct portfolios that achieve their proportional share of two different statewide electric sector GHG targets. On September 1, 2020, EBCE submitted IRPs that provide the desired portfolios of resources based on a statewide electric sector goal of 46 million metric tons (MMT) and a maximum of 38 MMT of GHG emissions by 2030. In July, these portfolios were shared with the Community Advisory Committee and the Board. At that time, the Board also authorized the CEO to approve the final IRP reports and file the two compliance portfolios with the CPUC.

[1] In context of IRP requirements, includes Investor Owned Utilities (IOUs), Energy Service Providers (ESPs), and Community Choice Aggregators (CCAs).

The CPUC permitted entities to submit an alternative portfolio that used different assumptions, provided they were identified and justification for the discrepancies described. EBCE elected not to file an alternative portfolio and instead has focused its efforts on analysis to develop a portfolio of resources that will contribute to more aggressive GHG emission reductions and organizational goal-setting related to achieving those reductions.

This supplemental analysis includes evaluating a 30 MMT scenario, which corresponds to the lowest statewide electric sector goal that the CPUC has explored. In addition, EBCE quantified the costs of procuring additional GHG-free energy to offset the emissions associated with market purchases. Under this scenario, EBCE would be "net GHG-free", that is over the course of the year the amount of clean energy generated from our portfolio and purchased through short-term transactions would equal EBCE's load.

**Discussion**

EBCE evaluated a range of three different GHG targets for its complete IRP analysis. The GHG targets selected were informed by the three primary state-wide electric sector GHG targets that the CPUC explored in its system-wide IRP modeling- 46 MMT, 38 MMT and 30 MMT. 30 MMT corresponds to the low end of the GHG planning target range for the electric sector established by the California Air Resource Board (CARB). CARB, in coordination with the CPUC and CEC, determined a range of 30-53 MMT by 2030 was required by the electric sector for the state to meet its economy-wide GHG reduction goals of 40% below 1990 levels by 2030.

Methodology

EBCE's 46 MMT and 38 MMT compliance scenarios were based on the CPUC's system-level resource portfolios. For the development of the 30 MMT portfolio, EBCE relied on its consultant Ascend Analytics' modeling tools to provide an optimized build-out of resources over time. The portfolio selection was subject to a constraint on the over-all amount of energy provided by long-term contracts. The remaining 50% of energy needed to meet EBCE's load was filled with short-term transactions and spot market purchases. EBCE's short-term transactions were assumed to be made up of RPS and carbon-free purchases from existing resources. Short-term RPS transactions were assumed to fill the remaining need to meet the required 60% RPS by 2030. This need was determined based on EBCE's forecasted load and RPS generation in its long-term portfolio. Short-term carbon-free transactions were then assumed to provide the remaining GHG-free energy required to meet EBCE's GHG target of 0.73 MMT, which corresponds to its load-weighted share of a statewide 30 MMT target. Remaining energy need was assumed to be filled with brown purchases or spot market energy, which has emissions associated with it. As the annual GHG target decreases, the amount of these purchases is reduced. By 2030, less than 20% of EBCE's load can be met with spot market purchases in order to meet a 0.73 MMT GHG target.

Ascend then performed production cost modeling to simulate the hourly performance and evaluate the total costs of the 30 MMT scenario. In addition, EBCE evaluated the estimated range of additional costs required to achieve a net 0 MMT portfolio by purchasing additional carbon-free energy.

Differences in Inputs and Assumptions Between CPUC and EBCE Scenarios

EBCE opted to revise certain inputs and assumptions between the CPUC compliance scenarios and the 30 MMT scenario to better reflect internal forecasts and preferences. The primary differences are described below.

- Load
    - CPUC Analysis: CEC IEPR annual load forecast required. Within the CPUC emissions calculator that was used to create the IRP portfolio, Ascend used the CPUC assumed load shapes but changed the assumed commercial & industrial vs residential ratio to better reflect EBCE's customer base. For the production cost analysis with the IRP portfolio, Ascend simulated load based on historical EBCE load shapes, but scaled the simulations to the IEPR Mid case.
    - EBCE analysis: EBCE load forecast with embedded assumptions for behind-the-meter resource adoption (EE, DR, BTM PV, electrification) was used. Ascend simulated two separate load items – one based on historical EBCE load shape, and the other based on an Ascend-generated EV load profile that begins with NREL charging shapes and gradually evolves over time to a 'smarter' load shape reflecting charging patterns that adjust to TOU rates and resource availability. Both of these evolving load shapes were simulated to match EBCE forecasted yearly load quantities from 2020-2030.
- Resource Costs
    - CPUC Analysis: Renewable resource and financing costs are based on the 2018 National Renewable Energy Laboratory Annual Technology Baseline (NREL ATB). Storage resources are based on Lazard Levelized Cost of Storage 4.0 and NREL Solar + Storage study.
    - EBCE analysis: Ascend cost curves which incorporate recent PPA pricing and therefore reflect current, market information more consistent with EBCE's expectations.
- Candidate Resources
    - Similar resource types are included as new resources in EBCE's portfolio for both the CPUC and EBCE scenarios. In the 30 MMT EBCE scenario however, optimized resource selection was used, and the resource characteristics vary from the CPUC's assumptions. Ascend's modeling includes a combined solar and storage resource, whereas the CPUC models these resources separately. In addition, battery energy storage resources of fixed durations are available in Ascend's modeling, in contrast to the CPUC where energy storage capacity and duration are selected independently. The assumed contributions to resource adequacy (RA) also vary between the CPUC and Ascend by resource type.

The CPUC assumes renewable and storage resources receive reliability credit on a marginal basis, where Ascend's RA accounting is based on existing program rules but with projected declines in storage RA value over time. Finally, in the 30 MMT scenario, staff imposed annual and total limits on the availability of different resource types to reflect a realistic pace of development and current commercial dynamics.

- Risk management and treatment of short-term contracts
    - In the CPUC scenarios, short-term transactions are reflected as specific resource types for GHG accounting purposes. In the EBCE scenario, staff and Ascend chose to reflect commercial products and transactions more accurately through RPS and carbon-free purchases. In addition, allocation of the CPUC's system-level portfolios to EBCE results in a higher portion of EBCE's load covered by long-term contracts (60.5% and 65% in the 46MMT and 38 MMT scenarios, respectively) than in the 30 MMT scenario, which limits long-term transactions to 50% of load.

Results of Analysis

Using the approach described herein, EBCE developed a resource portfolio to achieve a 0.73 MMT emissions target. EBCE is currently evaluating the cost of achieving net zero MMT emissions by 2030. A summary of results follows; additional details and visual aids are included as Attachment 1, "Integrated Resource Plan Results" PowerPoint.

- Resource Mix
    - 30 MMT Portfolio: Total long-term contracted nameplate capacity 3,488 MW by 2030, including 1,600 MW of energy storage (590 MW paired with solar). New renewable resources (primarily solar) make up 1,220 MW. Remaining need is met by short-term contracts with existing resources and market purchases.
- Risk Management associated with Portfolios
    - Long-term contracts provide 50% of EBCE's total energy need, or around 4,800 GWh in 2030.
    - EBCE staff intends to enter into Short Term Contracts in the form of fixed-price energy transactions to fill a portion of its un-hedged position to ensure EBCE is not overly relying on the CAISO system, providing negative contribution to system reliability and as a means of insurance, to protect its customers from volatility in Spot Market prices. It is assumed RPS purchases fill EBCE's remaining RPS position and carbon-free purchases are used to meet EBCE's GHG target. Under a 30 MMT target, less than 20% of EBCE's energy purchases come from the spot market by 2030.
- Reliability of Portfolios
    - Resource Adequacy: The long-term contracts anticipated in this portfolio do not represent sufficient capacity to meet annual or September RA

obligations. Additional RA procurement will be necessary for each year from 2021 to 2030.

- Market exposure: While forecasted market exposure decreases over time, the number of hours when there is some market exposure remains a high portion of total hours. By 2030, the number of market exposure hours are accounted for is 6977 hours per year. However, the volume of market purchases provides a better measure of the degree of market exposure. In 2030 when short-term purchases are accounted for, the average volume of market purchases over all hours compared to load is 16% (50% without short-term transactions). During the evening, when market prices tend to be highest, the average volume of market purchases over all hours compared to load is 10% (35% without short-term transactions).

## Financial Impacts

There is no financial impact. Actual procurement authorization will be brought forth to the board in accordance with EBCE's risk management policies.

## Next Steps

Staff will complete a comparative economic analysis of the four portfolios to provide the Board of Directors with a menu of options for setting EBCE's 2030 clean energy goals. EBCE staff will also seek input from the Community Advisory Committee and the community at large. The analysis may inform procurement criteria and decisions in EBCE's upcoming renewable solicitation.

## Attachments

A. Integrated Resource Plan Compliance Filing PPT

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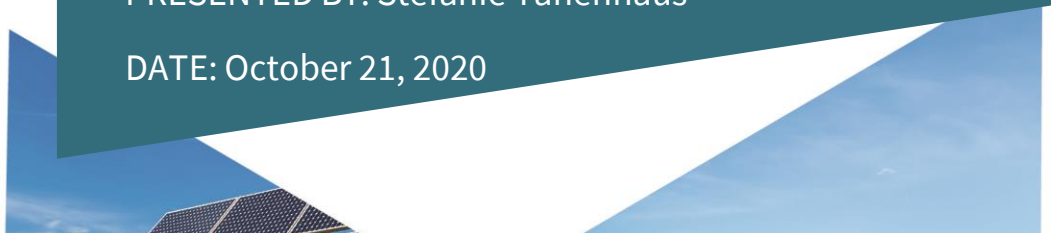
# Integrated Resource Plan Results

PRESENTED BY: Stefanie Tanenhaus

DATE: October 21, 2020



# Overview of EBCE IRP Process

- Phased approach to meet compliance obligations and evaluate portfolios to meet a range of greenhouse gas (GHG) emissions targets for EBCE
- Phase 1: CPUC IRP Compliance Filing
  - Includes two GHG target scenarios that represent EBCE's share of a 46 million metric ton (MMT) and 38 MMT statewide electric sector target
  - Phase 1 results presented to Board in July and September
- Phase 2: EBCE IRP Analysis
  - Includes GHG target scenario that represents EBCE's share of a 30 MMT statewide electric sector target
  - Explores cost of achieving net zero GHG emissions
- Due to differences between CPUC and EBCE inputs, the results across all scenarios are not "apples to apples". Different resource cost, availability and load assumptions  make Total Costs difficult to compare directly.

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# Summary of Scenario Results

| Key Evaluation Metrics | Scenario 1: CPUC 46 MMT i.e. 1.22 MMT | Scenario 2: CPUC 38 MMT i.e. 0.98 MMT | Scenario 3: EBCE 30 MMT i.e. 0.73 MMT |
|---|---|---|---|
| **Carbon Free (by 2030)** | 69% | 76% | 82% |
| **RPS (by 2030)** | 67% | 76% | 60-82% |
| **Resource Mix** (incl. New build vs existing) | 840 MW new RE PPAs<br>460 MW/ 1.7 GWh new energy storage | 1 GW new RE PPAs<br>510 GW/ 2.1 GWh new energy storage | 1.2 GW new RE PPAs (includes 100 MW BTM S+S)<br>1.5 GW/ 6 GWh new energy storage |
| **Risk Mgmt:** Spot Market vs Short-Term vs Long-Term Contracts | Based on CPUC portfolio. Long-term contracts provide ~60% of energy | Based on CPUC portfolio. Long-term contracts provide ~70% of energy | Long-term contracts provide 50% of energy |
| **Reliability** | | | ~50% RA need met by market purchases |

*Note inputs and assumptions vary between CPUC and EBCE scenarios. Adjustments to Carbon Free metric outputs have been made for comparison to account for modeling differences between scenarios. Costs between portfolios are not directly comparable due to the degree of differences in assumptions between scenarios.

# Modeling Approach

1. Develop portfolio of resources under long-term contracts
   - 46 MMT and 38 MMT portfolios based off CPUC's system-level resource portfolios
   - 30 MMT and net 0 MMT portfolios represent optimized buildout of resources over time
2. Perform production cost modeling on portfolios, which includes:
   - Short-term contracts
   - Detailed emissions
   - Hourly spot purchases and sales
   - Ancillary services value

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# EBCE Optimized Buildout Constraints

| | |
|---|---|
| **Optimization Constraints** | • Selects long-term PPA resources up to target of ~50% of total delivered energy.<br>• Yearly Long-Term RPS targets.<br>• Meets yearly RA requirements, optimizing between PPA resources and market RA purchases. |
| **Resource Constraints** | • No new resources until 2022<br>• No 8hr storage before 2026<br>• No in-state hydro available for long-term contracting<br>• Annual build limits for each resource<br>• Max capacity limits:<br>  • Standalone Storage <4 hours – 800 MW<br>  • Geothermal – 300 MW<br>  • Imported Hydro – 100 MW |
| **Other Notes** | • Storage was given a $50/kw-yr credit for sub-hourly dispatch value (conservative estimate)<br>• Short-term purchases layered on top of selected PPAs to achieve RPS, emissions, and spot exposure targets |

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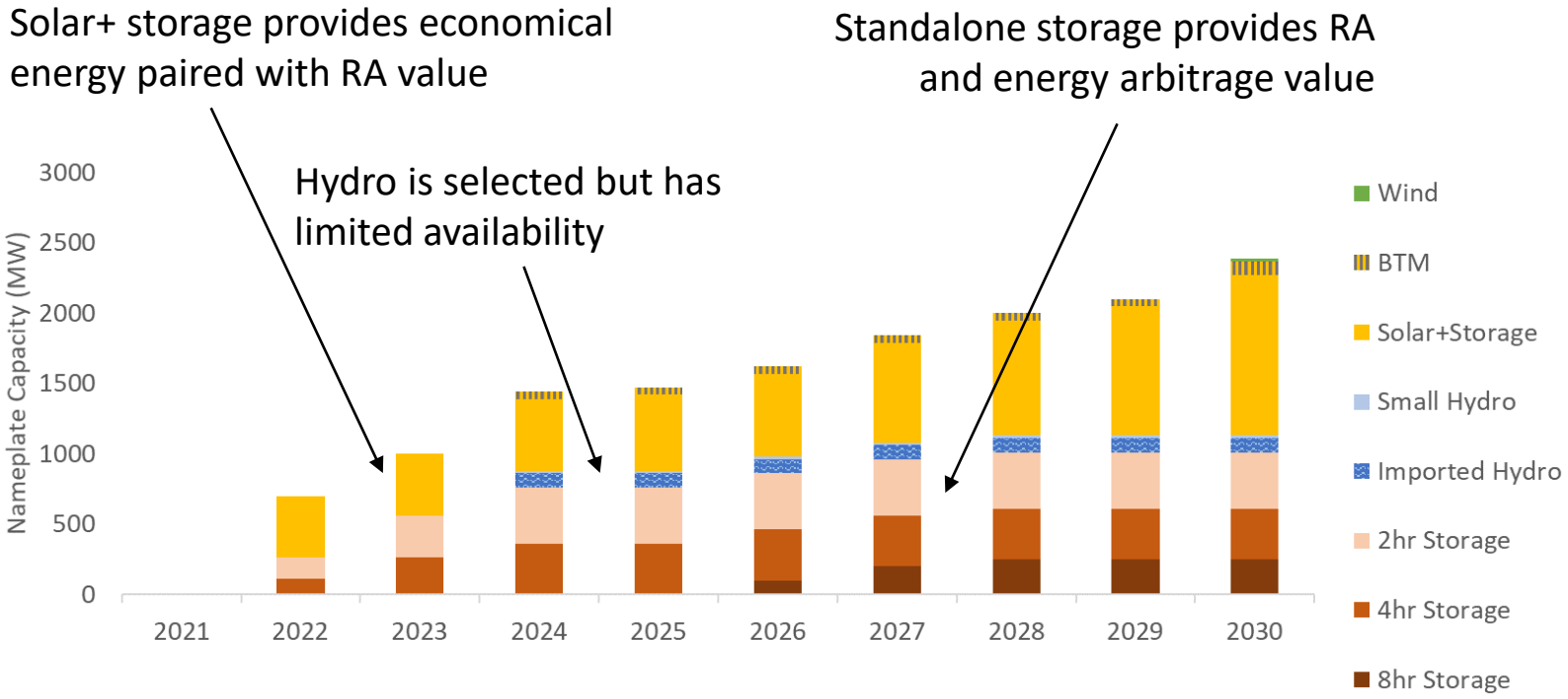
# Inputs & Assumptions

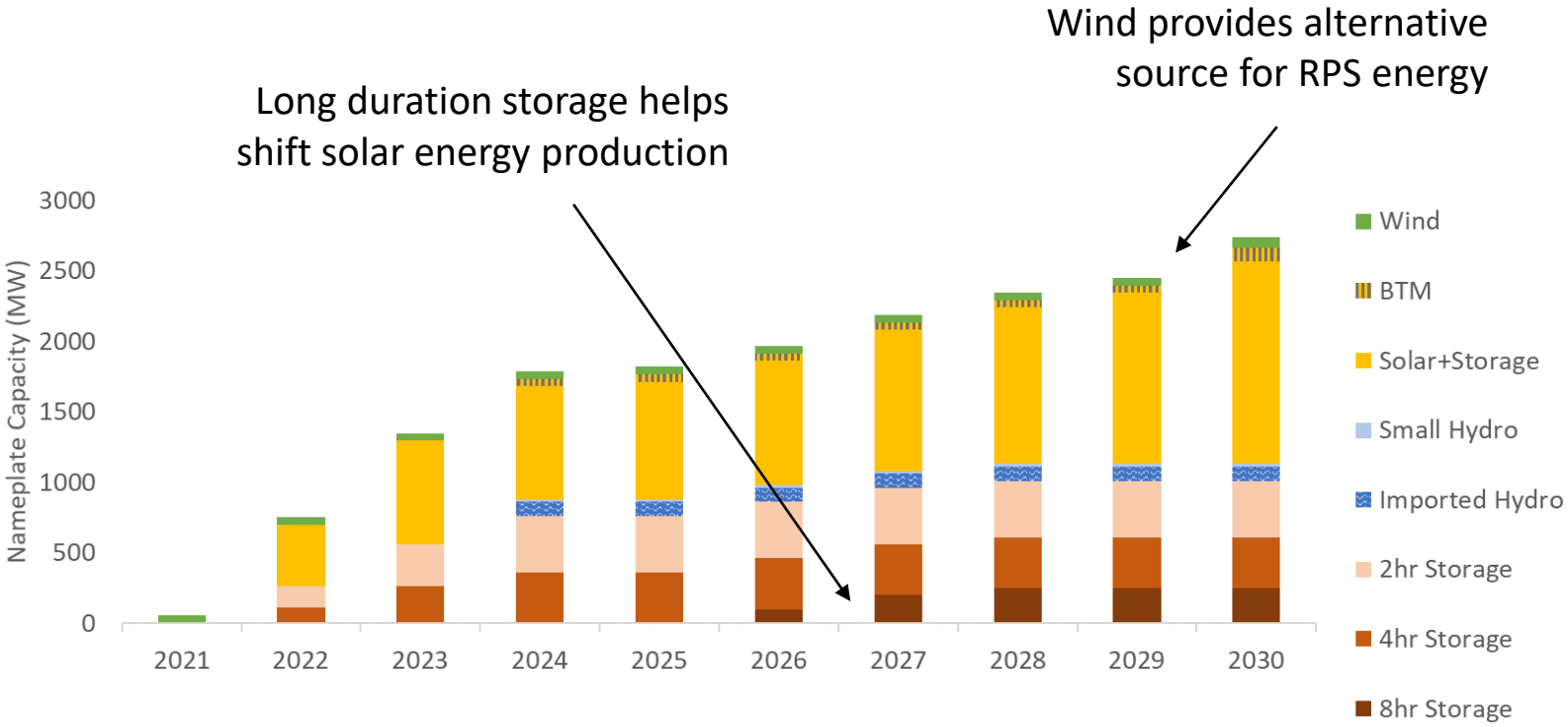
| | Scenario 1: CPUC 46 MMT i.e. 1.22 MMT | Scenario 2: CPUC 38 MMT i.e. 0.98 MMT | Scenario 3: EBCE 30 MMT i.e. 0.73 MMT | Scenario 4: EBCE net 0 MMT |
|---|---|---|---|---|
| **Load** | • CEC IEPR annual load forecast<br>• Modified C&I to Res split<br>• CEC IEPR hourly load modifiers | Same as 1 | • EBCE annual load forecast<br>• EBCE hourly baseline consumption<br>• EBCE/Ascend hourly load modifiers | Same as 3 |
| **Resource Costs** | • CPUC assumptions | | • EBCE/Ascend assumptions | |
| **Candidate Resource**<br>Types, Availability and Characteristics | • CPUC assumptions w/ EBCE-specific adjustments | | • Includes hybrid solar + storage<br>• Fixed storage durations<br>• Custom RE profiles<br>• Annual and total build limits<br>• Modified ELCC/QC assumptions | |
| **Risk Mgmt:**<br>Spot Market vs Short-Term vs Long-Term Contracts | • 61% long-term, remaining spot and short-term GHG emitting | • 65% long-term, remaining spot and short-term GHG emitting | • 50% long-term<br>• ~32% short-term REC/carbon free<br>• ~18% spot | • 50% long-term, remaining 50% REC/carbon free |

# Resource Build (new)




Solar + storage shown as solar nameplate capacity. Storage assumed to be 40% of solar nameplate

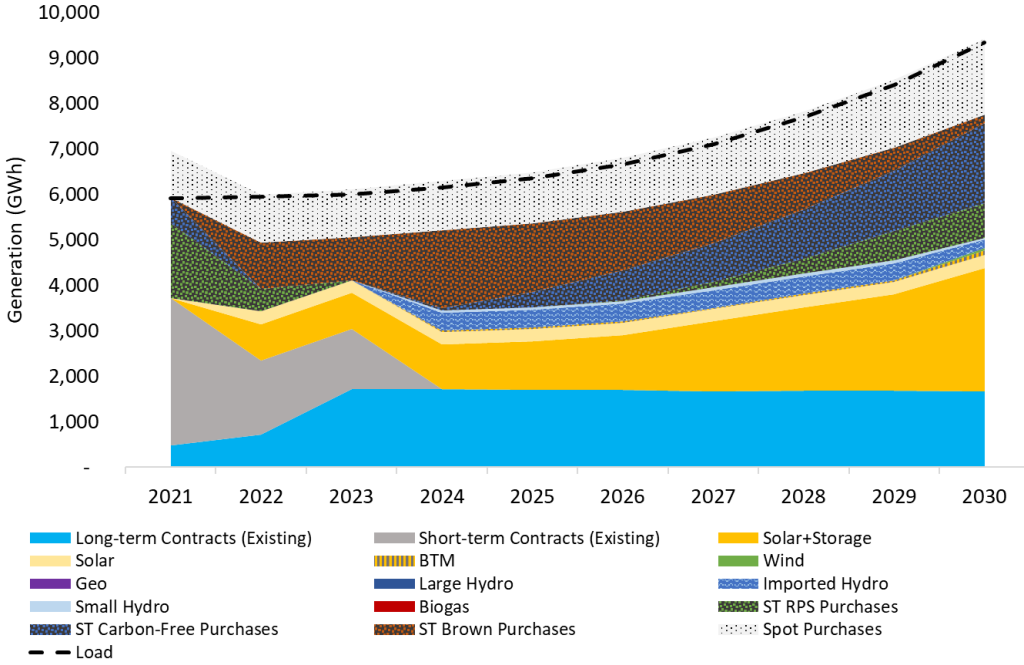
# Resource Build (total)




Solar + storage shown as solar nameplate capacity. Storage assumed to be 40% of solar nameplate

# Energy Position

- Existing resources and solar + storage provide majority of long-term PPA energy
- Short-term and spot market purchases are illustrative
  - Short-term RPS purchases are assumed to fill remaining RPS requirements
  - Short-term carbon-free purchases fill remaining emissions requirements
  - Spot market purchases are kept at <20% of energy
  - Short-term brown purchases disappear as emissions target decreases



# SUMMARY AND NEXT STEPS

- EBCE Staff have identified four distinct procurement pathways for 2030
  - 69% GHG-free CPUC Compliance Pathway
  - 76% GHG-free CPUC Compliance Pathway
  - 82% GHG-free EBCE Pathway
  - 100% GHG-free EBCE Pathway
- Both EBCE Pathways exceed California RPS and GHG-free requirements
- Next Step is to complete comparative economic analysis of each pathway and provide EBCE Board of Directors with a set of options to create a 2030 Clean Energy Goal