EAST BAY COMMUNITY ENERGY

EBCE Co2-free Accounting

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DATE: 7/26/19

1. EBCE Carbon Accounting: Today

EBCE currently uses The Climate Registry to measure and report CO_2 emissions

- **The Climate Registry**: The Climate Registry methodology focuses on matching the amount of electricity used to the total clean energy procured over the course of a year, without any explicit limitations on where the clean energy is generated or consumed. It is an overall climate based emissions calculation and not constrained to CA-only emissions.
  - About the Climate Registry: TCR is an industry standard methodology to account for Co2 emissions and is used by EBCE member jurisdictions like Oakland, IOUs like PG&E and many large corporations
- Under the Climate Registry, EBCE attributes a CO_2 emissions factor per MWh to all purchases to create a per MWh Carbon budget to guide procurement.
- Here is a simple formula to calculate EBCE's emissions factor for 2018 using the Climate Registry method:

  - CAISO Emissions Factor: 0.428 MT- CO_2/MWh
  - Bright Choice Emissions Requirement: 15%
  - Bright Choice Target Emissions Factor: 15% * 0.428 = .0642 MT- CO_2/MWh = 142 lbs CO_2e/MWh

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1. EBCE Carbon Reporting: Today

The Climate Registry Reporting

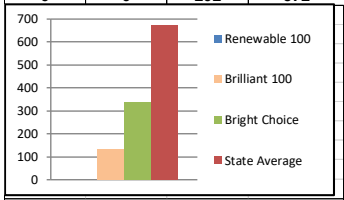
- For 2018, EBCE's unaudited Climate Registry emissions were 101 lbs/MWh (as compared to a target of 142 lbs/MWh)
- Climate Registry accounts for ACS power as Large Hydro and applies the associated emissions factor

Power Content Label Reporting

- EBCE reports to the California Energy Commission through the Power Content Label annually. Currently, the PCL only reports the % and types of energy procured, without CO_2 emissions. Over the course of the next few years the PCL is changing to also include reporting on emissions.
- For 2018, EBCE is reporting 91% procurement from zero/very low emission sources (w/ 62% from zero CO_2 and 29% from very low CO_2)
- PCL is currently consistent with the Renewable Portfolio Standards as established by CA state legislation

East Bay Community Energy
2019 POWER CONTENT LABEL (Draft)

Greenhouse Gas Emissions Intensity (in lb CO_2e/MWh)			
2018 EBCE Renewable 100 Power Mix	2018 EBCE Brilliant 100 Power Mix	2018 EBCE Bright Choice Power Mix	State Average
0	0	101	671



Energy Resources	2018 EBCE Bright Choice Power Mix	2017 CA Power Mix
Eligible Renewables[1]	**42.0%**	**29.0%**
Biomass & biowaste	0.0%	2.0%
Geothermal	1.3%	4.0%
Eligible hydroelectric	0.0%	3.0%
Solar	14.8%	10.0%
Wind	25.8%	10.0%
Coal	**0.0%**	**4.0%**
Large Hydroelectric	**46.4%**	**15.0%**
Natural Gas	**2.6%**	**34.0%**
Nuclear	**0.0%**	**9.0%**
Other	**0.0%**	**<1%**
Unspecified Electricity[2]	**9.0%**	**9.0%**
TOTAL	**100.0%**	**100.0%**
Unbundled RECs retired as a percentage of these electric service products' retail sales:	***2%***	

[1] Unbundled renewable energy credits (RECs) represent renewable investments that do not deliver electricity to the retail supplier's customers. Unbundled RECs are not reflected in the power mix or GHG emissions intensities above.
[2] Unspecified power is electricity that was purchased through open market transactions and is not traceable to a specific generation source or sources.

POWER CONTENT LABEL

ENERGY RESOURCES	2018 EBCE Bright Choice Power Mix	2017 CA Power Mix**
Eligible Renewable	**42%**	**29%**
Biomass & biowaste	0%	2%
Geothermal	1%	4%
Eligible hydroelectric	0%	3%
Solar	15%	10%
Wind	26%	10%
Coal	**0%**	**4%**
Large Hydroelectric	**20%**	**15%**
Natural Gas	**0%**	**34%**
Nuclear	**0%**	**9%**
Other	**0%**	**<1%**
Unspecified sources of power*[1]	**38%**	**9%**
TOTAL	**100%**	**100%**

* "Unspecified sources of power" means electricity from transactions that are not traceable

** Percentages are estimated annually by the California Energy Commission based on the electricity sold to California consumers

[1] *29% of Unspecified Power is low-carbon, Northwest Asset Controlling Supply Power; 9% is from Unspecified Sources*

1. Description of Carbon-Free Energy Sources and expected Carbon Accounting Treatment

Resource Type	Description	PCL	TCR
RPS – PCC1	Renewable energy that is generated and/or consumed in the CAISO. REC and energy are bundled together.	Yes	Yes
RPS – PCC2	Renewable energy that is generated and consumed outside of CAISO, but within western grid. REC and energy are bundled together, with unspecified energy being delivered into California within the same hour that the renewable generation is actually generated.	No	Yes
RPS – PCC3	Renewable energy that is generated in CAISO or outside of CAISO. REC is unbundled from energy and can be sold after the energy is actually generated.	No	Yes, as long as PCC3 generated in same year
CO2-free – CAISO Large Hydro	Large hydro from a specified source (e.g. specific dam) that is generated and/or consumed in the CAISO. Carbon-free attribute and energy are bundled together.	Yes	Yes
CO2-free – CAISO ACS	Large hydro from a specified system of sources (e.g. a geographic area controlled by a single utility with multiple large hydro generators and some small quantity of unspecified energy) that is imported and consumed in the CAISO. Carbon-free attribute and energy are bundled together.	Yes, and accounts for GHG of unspecified	Yes, and accounts for GHG of unspecified
CO2-free WECC Large Hydro	Large hydro from a specified source (e.g. specific dam) that is generated and consumed outside of CAISO, but within the western grid. Carbon free attribute and energy are bundled together.	No	Yes
CO2-free – CAISO Nuclear	Nuclear energy from Diablo Canyon Nuclear Generating Station (DCNGS) or Palo Verde Nuclear Generating Station (PVNGS). DVNGS is located in California. PVNGS is located in Arizona. Carbon-free attribute is bundled with energy.	Yes	Yes

2. Changing Carbon Accounting Landscape:

Power Content Label: the PCL is the California Energy Commission's uniform methodology for tracking and reporting information on all load serving entities' energy portfolios. This has historically been done in a simple way by defining resources by their fuel type (renewable, carbon-free, unspecified, nuclear, or natural gas). Over the course of the next few years, the PCL will start tracking specific carbon intensity of each resource type and – significantly – will only do so in regard to generation emissions in California.

PCL Treatment of Certain GHG-free Resources: Once the new PCL GHG accounting goes into effect – which is expected sometime in 2020 or 2021 for EBCE – four sources of GHG-free energy that count under the Climate Registry will not count under the PCL.

- **PCC 2**: PCC 2 renewables – which are generated and consumed outside of CAISO with an associated import of substitute power – will not count as GHG-free and instead will carry with them the emissions associated with the import. Note that PCC2 renewables will continue to be RPS eligible.
- **PCC 3**: PCC 3 renewables – which is an unbundled REC with no associated power procurement – will not count as GHG-free and instead will carry the emissions associated with the unspecified power that the LSE procures to physically serve load. Note that PCC3 renewables will continue to be RPS eligible.
- **Energy Imbalance Market (EIM) Imported Large Hydro**: large hydro that is imported into the CAISO in the real time market through the EIM will carry the emissions associated with the unspecified power that the LSE procures to physically serve load
- **Out of State Large Hydro/ACS**: large hydro that is both generated and consumed outside of CAISO will carry the emissions associated with the unspecified power that the LSE procures to physically serve load

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2. CO2 Reporting Impact of Changes to PCL

EBCE CO2 Intensity – Climate Registry

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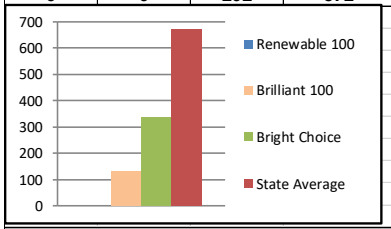

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EBCE CO2 Intensity – PCL (expected)

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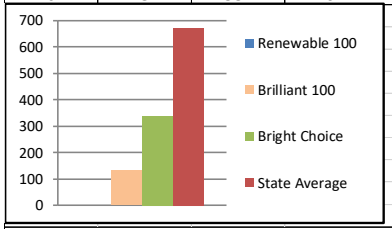
2019 POWER CONTENT LABEL (Draft)

Greenhouse Gas Emissions Intensity (in lb CO_2e/MWh)			
2018 EBCE Renewable 100 Power Mix	2018 EBCE Brilliant 100 Power Mix	2018 EBCE Bright Choice Power Mix	State Average
0	131	337	671



Energy Resources	2018 EBCE Bright Choice Power Mix	2017 CA Power Mix
Eligible Renewables[1]	**39.9%**	**29.0%**
Biomass & biowaste	0.0%	2.0%
Geothermal	1.3%	4.0%
Eligible hydroelectric	0.0%	3.0%
Solar	14.8%	10.0%
Wind	23.8%	10.0%
Coal	**0.0%**	**4.0%**
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Pending changes to PCL will increase EBCE's "accounted" CO_2 intensity by over 120 lbs CO_2e/MWh. If the new PCL guidelines were applied to EBCE 2018 actual procurement, EBCE's 2018 Bright Choice CO_2 emissions factor would shift from 101 lbs/MWh to 337 lbs/MWh – which equates to a shift from 91% CO_2-free to 70% CO_2-free.

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2. Fiscal Impact of PCL Changes

One way to consider fiscal impact of PCL changes is to consider what the incremental costs of buying only PCC1 would be compared to a mix of PCC1 and PCC2 resources. The following is an illustration of a potential fiscal impact to EBCE of pursuing this course of action.

Total Load	6,000,000 MWh		
2020 Renewables Procurement	38% = 2,280,000 MWh		
2020 RPS Requirement	33%		
PCC1 Share of Renewables	65% = 1,482,000	$18/MWh*	75% of RPS required to be PCC1
PCC2 Share of Renewables	35% = 706,800	$7/MWh*	All residual renewables after meeting PCC1 RPS requirement and PCC3 JPA threshold
PCC3 Share of Renewables	3% = 68,400	$3/MWh*	Capped at 5% of of RPS requirement by EBCE JPA
Cost Impact of Swapping all PCC2 and PCC3 for PCC1 to maintain PCL Continuity from 2019 to 2020 Requirements			
Cost of Swapping PCC2 for PCC1	706,800 x $11 = $7,774,800		
Cost of Swapping PCC3 for PCC1	68,400 x $15 = $1,026,000		
Total Cost of PCL Change	$8,800,800 a year		

EBCE estimates that the change to the PCL will increase procurement costs by over $8m a year at 38% Renewables. Given current constraints on PCC1 supply, EBCE expects these costs to increase significantly at higher levels of renewables until such time as EBCE has built the necessary resources to self supply – which EBCE is currently doing and will start delivering benefits when projects come online in 2021

*Illustrative 2019 prices

3. EBCE CO2 Accounting: key considerations

As the Power Content Label starts to account and report CO2 emissions, EBCE needs to consider the impacts of likely changes to the PCL methodology on its emissions reporting.

Pros

1. **Uniform Accounting**: Once the PCL starts accounting and reporting CO2 emissions, it will be the uniform measure of CO2 emissions across all electricity providers in California and is the most accessible metric for consumers.
2. **Alignment with State Policy**: The California Energy Commission has developed the new PCL regulations to reflect California state policy. Aligning CO2 accounting with the PCL has the benefit of ensuring that EBCE is operating in a manner that is well coordinated with California regulations.
3. **More Investment in California**: By limiting the PCL to physically delivered resources into CAISO, more procurement will need to occur in California, which in turn will result in more investment in California over time.

Cons

1. **Limited Supply**: By focusing only on the emissions associated with power that is physically delivered into the CAISO, the PCL approach to CO2 emissions limits the available supply of energy resources that can be procured to reduce the emissions intensity of an electricity provider like EBCE. This supply constraint in turn makes it considerably more challenging to deliver 100% clean energy in the near term. As a reference, in 2017, California's energy supply was 52%-53% CO2-free. As more CCAs seek to procure high-levels of CO2-free energy, supply will be more constrained. The new PCL methodology does not fully align to state legislation related to RPS eligibility, which explicitly allows for PCC2 and PCC3 procurements to meet RPS targets.
2. **Higher Costs**: Removing the eligibility of resources like PCC2s from the CO2-free emissions stack increases costs by forcing an electricity provider to procure from a more constrained set of resources to meet emissions goals. In EBCE's case, staff estimated over $8m in increased procurement costs for the 2018 reference year. Over time EBCE expects these costs to continue to rise.
3. **PCL Does Not Reflect Global Nature of Emissions:** By explicitly limiting CO2-emissions to resources that are physically delivered into CAISO, the PCL does not account for emissions reductions that occur elsewhere in the power system. Given the nature of CO2 emissions, procuring emission reductions from energy resources in Oregon or Washington State delivers the same global benefit as an emissions reduction specifically tied to energy coming into the CAISO.

Other Challenges

One of the most persistent clean energy challenges facing California is transitioning from natural gas peakers to zero emission sources of capacity. Unfortunately, the Power Content Label and the Climate Registry do not effectively account for the emissions benefits of procuring resources like energy storage to displace gas peakers. This illustrates just one of the short comings of currently available carbon accounting when trying to measure actions that benefit the climate.

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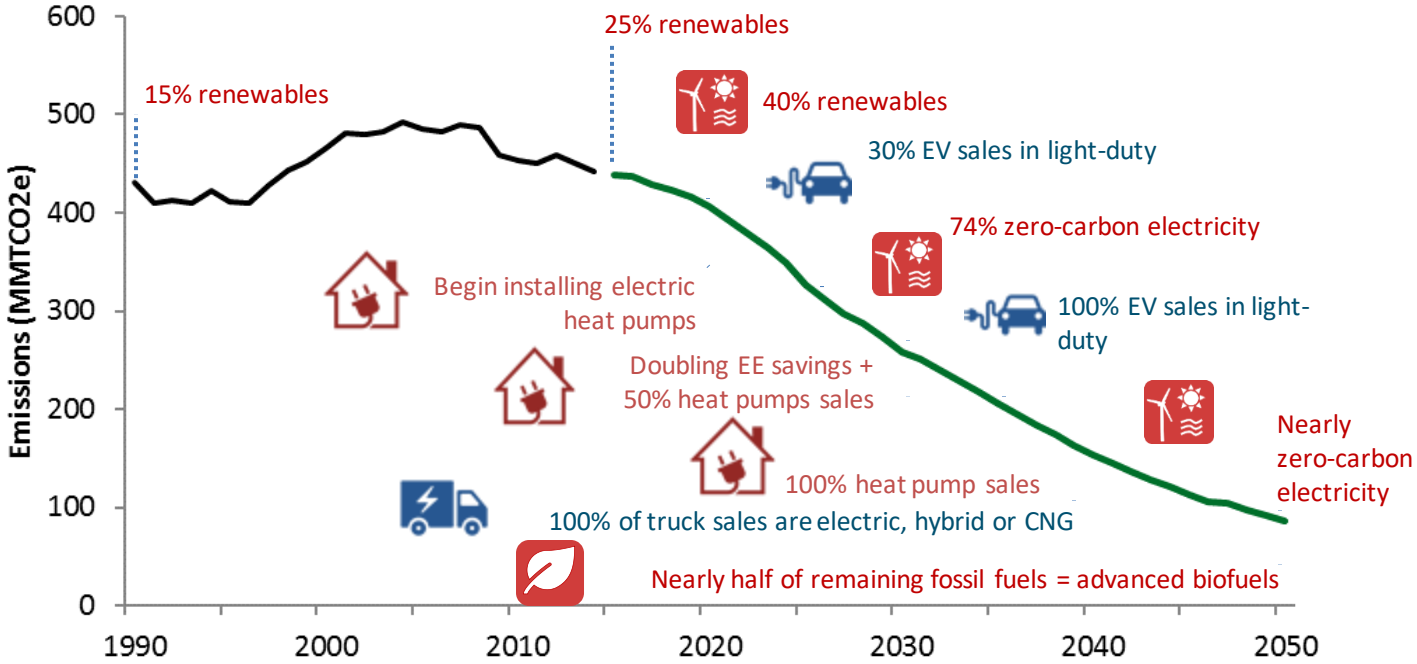
3. CA Energy Supply and Emissions

CA RPS and 100% Clean Energy Regulations state that by 2030 60% of energy comes from RPS renewables and 74% of all energy comes from zero carbon sources. No matter what CO2 accounting methodology EBCE chooses in the near term, EBCE must procure to these mandates over the next ten years, with the RPS acting as the primary catalyst for the procurement of new renewable energy.



Source: E3 report on "Deep Decarbonization in a High Renewables Future" June 2018, CEC-500-2018-012

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3. Next Steps

- Further evaluate costs and benefits of continuing to rely on Climate Registry as basis for CO2 accounting
- Consider the relative importance of achieving near term 100% clean energy versus setting goals based on exceeding California's 2030 and beyond energy policy goals:
  - Set goals above RPS (i.e. 60% RPS by 2025 and 70% RPS by 2030)
  - Set goals for zero emission capacity (25% zero emission RA by 2025 and 50% zero emission RA by 2030)

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