

# Advanced Bioresources Technologies to Transition to a Green Circular Economy

## Is California Ready (yet?) for Advanced Technologies to Process Residual Forest, Ag and Urban Waste into Energy, Fuels and Chemicals?

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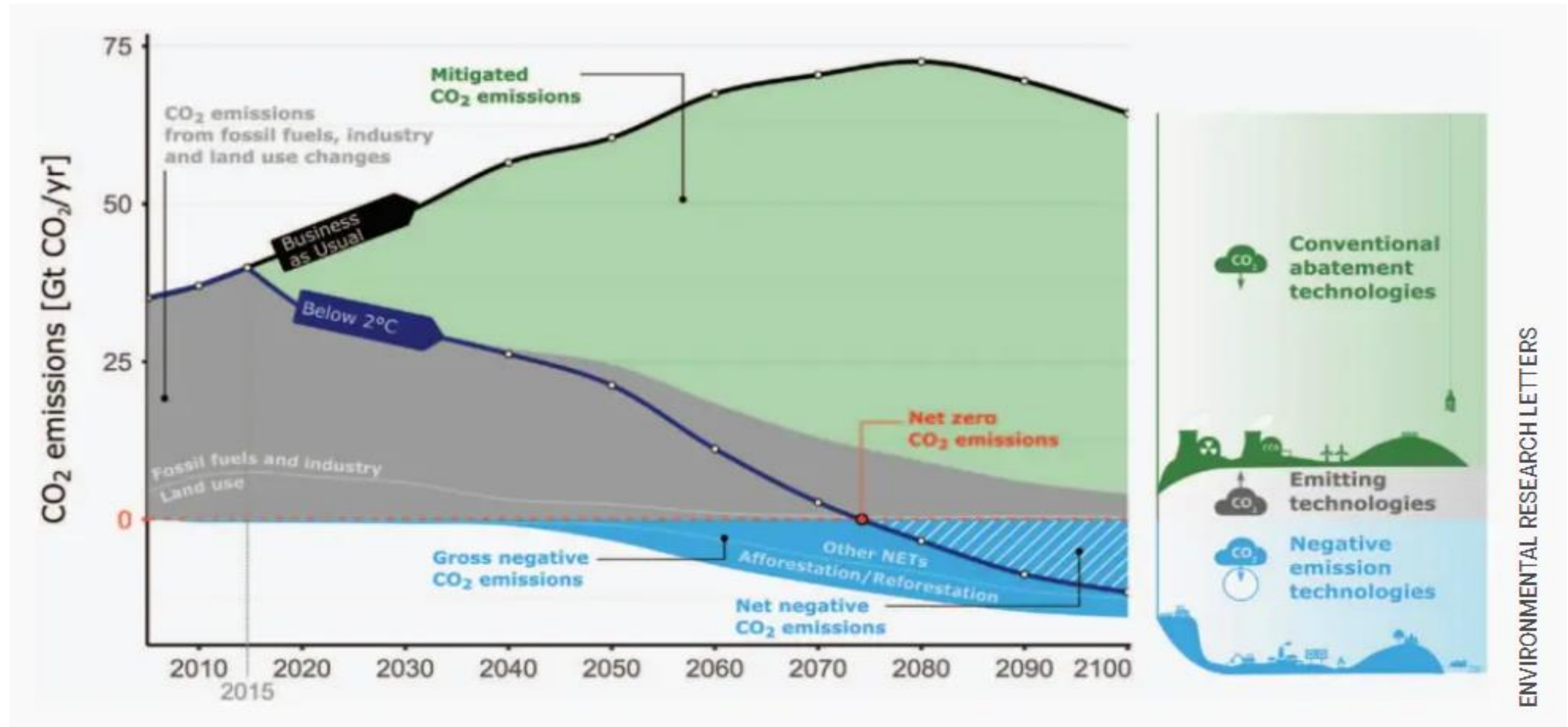
California BioResources Alliance 15th Annual Symposium

Building the Regenerative Carbon Economy in California

November 13, 2020, 1pm Online

# What is Carbon Neutrality? Net Zero?

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# Strategies for Negative Emissions

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## 1. Afforestation and reforestation

- Annual capture potential: between 0.5 and 3.6 billion metric tons.  
Current estimated cost of capture: between \$5 to \$50 per metric ton.

## 2. Bioenergy with carbon capture and storage (BECCS)

- Annual capture potential: between 0.5 and 5 billion metric tons. Current estimated cost of capture: between \$100 and \$200 per metric ton.

## 3. Direct air capture

- Annual capture potential: between 0.5 and 5 billion metric tons. Current estimated cost of capture: between \$200 and \$600 per metric ton.

## 4. Soil carbon

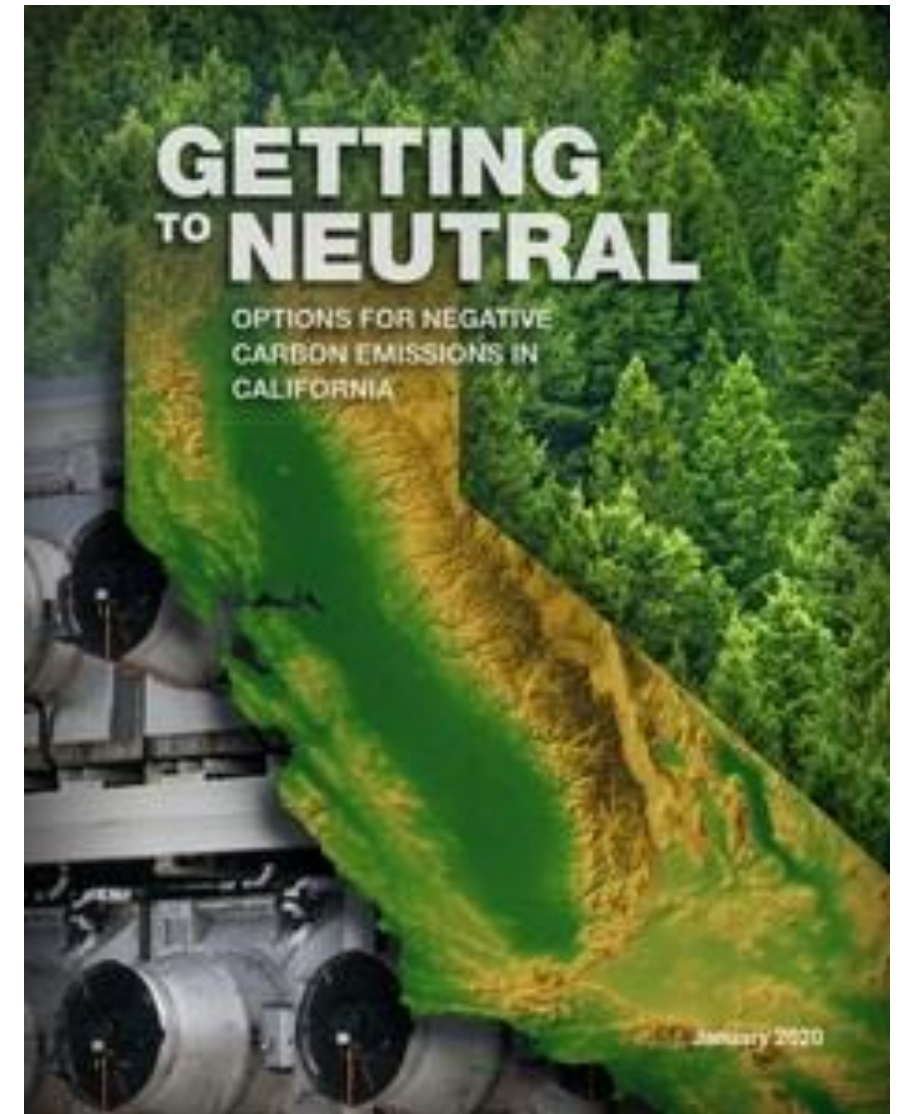
- Annual capture potential: up to 5 billion metric tons. Current estimated cost of capture: between \$0 and \$100 per metric ton.

## 5. Biochar

- Annual capture potential: between 0.5 and 2 billion metric tons. Current estimated cost of capture: between \$90 and \$120 per metric ton.

## 6. Enhanced weathering

- Annual capture potential: between 2 and 4 billion metric tons. Current estimated cost of capture: between \$50 and \$200 per metric ton.



- Food Diversion
- Composting
- Anaerobic Digestion
- Biomass Conversion
- Soil Amendments
- Land Application
- Advanced Microbial and Electrochemical process
- Thermo-Chemical Processing
- Gasification
- Pyrolysis
- Processed Engineered Fuels

“GOOD”



“BAD”

### Technology Examples:

- **Gasification** is a low oxygen, non-combustion process that converts biogenic and/or fossil-based carbonaceous materials to fuels & chemicals.
- **Pyrolysis** is the process of heating organic material at high temperatures in the absence of oxygen or combustion to produce combustible gases, liquids & char.
- **Processed Engineered Fuel (PEF) & Engineered Municipal Solid Waste (EMSW)** converted into a clean, low carbon solid fuel through autoclaving, sorting, screening, drying to meet fuel quality standards for ind. furnaces: >5000 BTU/lb.

**PROBLEM: All the above are considered DISPOSAL NOT DIVERSION or RECYCLING**



- PRC 40192: “solid waste disposal,” “dispose,” or “disposal” means the management of solid waste (by) landfill disposal, **transformation, or EMSW conversion**, at a permitted solid waste facility, unless defined otherwise.
- PRC 40180: “Recycle” or “**Recycling**” means the . . . collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace. “**Recycling**” **does not include transformation, or EMSW conversion.**
- PRC 40201: “**Transformation**” means **incineration, pyrolysis, distillation, or biological conversion other than composting.** “**Transformation**” **does not include composting, gasification, EMSW conversion, or biomass conversion.** (Note: **Incineration** is a waste treatment process that involves the combustion of organic substances contained in waste materials)
- PRC 40117: “**Gasification**” means a technology that uses a noncombustion thermal process to convert solid waste to a clean burning fuel for the purpose of **generating electricity**, and: . . . **does not use air or oxygen in the conversion process**, . . . **no discharges of air contaminants or emissions**, including greenhouse gases, . . . **no discharges to surface or groundwaters of the state** . . . **produces no hazardous waste** . . . .
- Other clarifying changes needed to **biomass conversion** and **EMSW conversion**

1. **Existing Authorized Technologies and Methods:** Food Waste Interception, Composting, Anaerobic Digestion, Soil Amendments, Land Application, Biomass Conversion
2. **SB 1383 Article 2 Regulations:** Reductions in Landfill Disposal – Technologies with GHG Reductions Equivalent to Composting – 0.3 MTCO<sub>2</sub>e/ton Organic Waste – Regs not in effect until 1/1/22
3. **Comply with Gasification** Nonsensical Definition in PRC 40117
4. **Use EMSW Designation** to Produce Fuels – May be Reduction in Landfill Disposal under SB 1383, but still be “Disposal” under other provisions of PRC – but avoids Siting Element obstacles
5. **Solid Waste Permit Exemption** – limited to very small RD&D type facilities with no profit
6. **Pursue Legislation** to Allow Advanced Technology to have a pathway to success based on performance standards.



**ANY QUESTIONS?**  
**Please Hold Them**  
**Until End of**  
**Session !!**

