



## **Bioenergy 101**

California generates enough organic waste to produce 2.4 billion gallons of low carbon transportation fuels, 6,000-7,000 megawatts of renewable power, or 4 million tons of renewable hydrogen per year. Using advanced technology to convert organic waste to energy cuts climate and air pollution, reduces wildfires and landfilling, creates jobs and economic development, and increases the state's energy security. The technologies are proven and the time is now to accelerate bioenergy development in California.

### **What is Bioenergy?**

Bioenergy is electricity, fuel, heat, or energy storage generated from organic waste – food, yard, dairy, agricultural, wastewater, forest or wood waste. Organic waste can be converted to energy through anaerobic digestion, gasification, pyrolysis or other non-combustion conversion technologies.

### **How is Bioenergy Used?**

Bioenergy can generate electricity, transportation fuels, combined heat and power, energy storage, and renewable gas (biogas or hydrogen) for hard to electrify end uses and energy reliability.

- Biogas can be converted to biomethane or renewable hydrogen for use as a transportation fuel in place of diesel in heavy duty vehicles.
- Biogas, biomass and renewable hydrogen from organic waste can be used to generate firm, renewable power that is available when solar or wind are not and can also provide long duration energy storage.
- Bioenergy can be used to power hard to electrify end uses including manufacturing and industrial processes that require combustion, heavy duty transportation, sustainable aviation fuels, and more.

### **What are the Benefits of Bioenergy?**

Bioenergy can provide benefits to every region of California, including rural, urban and Disadvantaged Communities.

- **Reduce Climate Pollution.** Bioenergy cuts greenhouse gas and Short-Lived Climate Pollutant (methane and black carbon) emissions from landfills, dairies, and open burning of forest and agricultural waste. Bioenergy can also provide carbon negative emissions that will be needed to reach carbon neutrality. And the byproducts of bioenergy, especially biochar, can be used for carbon sequestration.

- **Provide Renewable Electricity.** California could generate 6,000 to 7,000 megawatts of firm, renewable power from organic waste. That is power that is available 24/7 to complement intermittent renewables like wind and solar power. Hydrogen, biogas or biomethane generated from organic waste can also provide dispatchable power (ramps up and down quickly) and can provide long duration energy storage.
- **Produce Clean, Low Carbon Fuels.** Transportation fuels generated from organic waste are the lowest carbon fuels in existence and the only fuels that carbon provide negative carbon emissions. California can generate enough fuels from organic waste to replace  $\frac{3}{4}$  of all the diesel used by motor vehicles in the state – a huge benefit for air quality, especially in Disadvantaged Communities.
- **Reduce Landfilling.** More than half of all the waste that is landfilled in California – 22 million tons per year – is organic waste that could be used to produce energy. State law requires that 75 percent of that waste must be diverted to energy, compost, or wood chips. Converting the diverted organic waste to bioenergy plus compost or biochar provides several times greater carbon reductions than compost alone.
- **Protect Air and Water Quality.** Bioenergy protects public health by cutting harmful air pollutants from heavy duty vehicles that run on diesel, fossil fuel combustion at power plants, and air and water pollution caused by wildfires. Bioenergy can also reduce pollution caused by dairy waste and open field burning of agricultural waste.
- **Protect Disadvantaged Communities.** Bioenergy can reduce pollution in Disadvantaged Communities by replacing diesel trucks with zero or near-zero emission trucks that run on carbon negative biogas or hydrogen. Bioenergy can also reduce power plant emissions, odors, and other pollutants that impact Disadvantaged Communities.
- **Reduce Wildfire Risks and Impacts.** Forest fuel treatments are a proven method of reducing the risk and impacts of catastrophic wildfire. Bioenergy reduces wildfire risks by helping to pay for forest fuel treatments and disposing of the excess fuel in biomass power plants rather than wildfire or controlled burns.
- **Produce Jobs and Economic Benefits.** Biogas produces 2 to 6 times as many jobs as fossil fuel gas. Converting organic waste to energy can provide jobs in every region of the state, and provide income and revenues to local governments.