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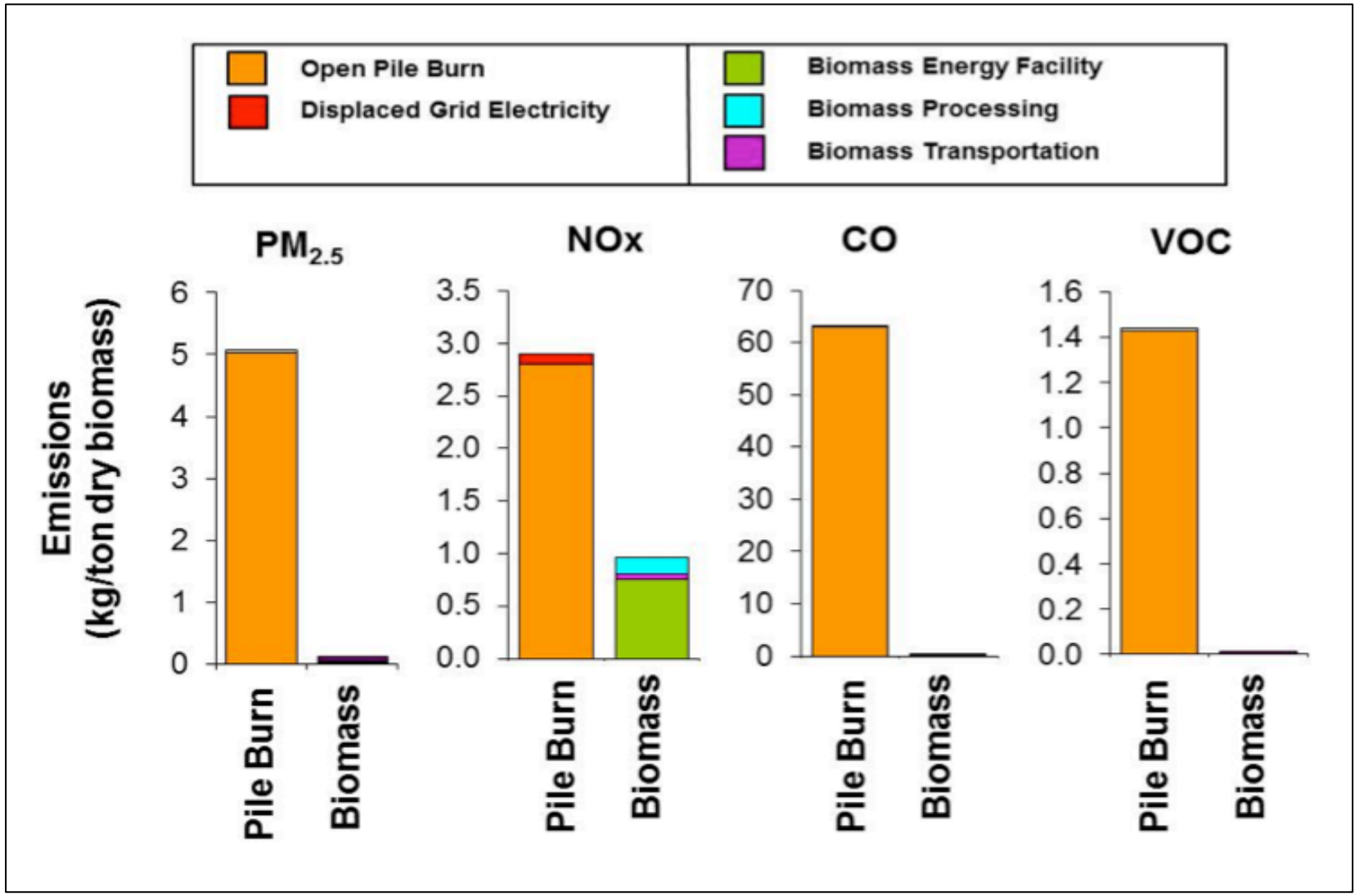
California Biogas Potential from Organic Waste

Feedstock	Amount Technically Available	Billion Cubic Feet Methane	Million Gasoline Gallon Equivalents
Landfill Gas	106 BCF	53	457
Animal Manure	3.4 M BDT	19.5	168
Waste Water Treatment Gas	11.8 BCF	7.7	66
Fats, Oils and Greases	207,000 tons	1.9	16
Municipal Solid Waste (food, leaves, grass)	1.2 M BDT	12.7	109
Municipal Solid Waste lignocellulosic fraction)	6.7 BDT	65.9	568
Agricultural Residue (Lignocellulosic)	5.3 M BDT	51.8	446
Forest, Sawmill, Shrub & Chaparral Residues	26.2 M BDT	256	2,214
BIOGAS POTENTIAL		**468.5**	**4,044**

80% of instate biogas potential is from cellulosic waste

Sources: Rob Williams and Stephen Kaffka, UC Davis, presentation to the California Energy Commission on January 30, 2017; Lawrence Livermore National Lab assessment of forest, sawmill, shrub & chaparral residues

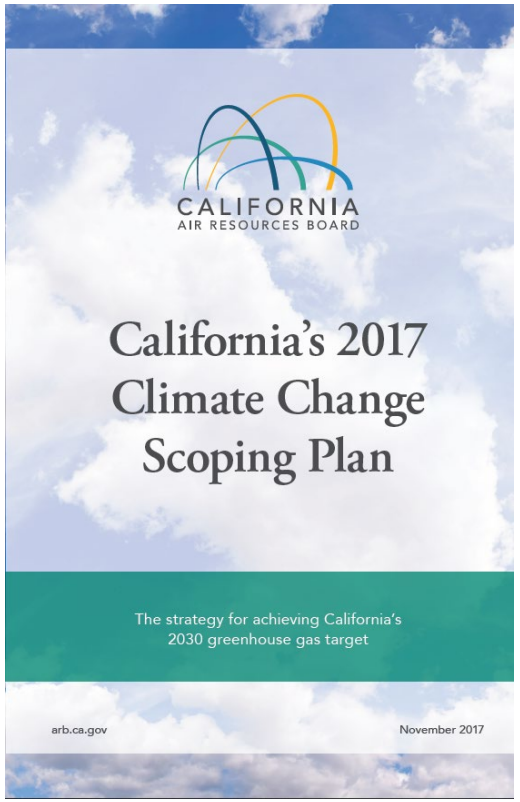


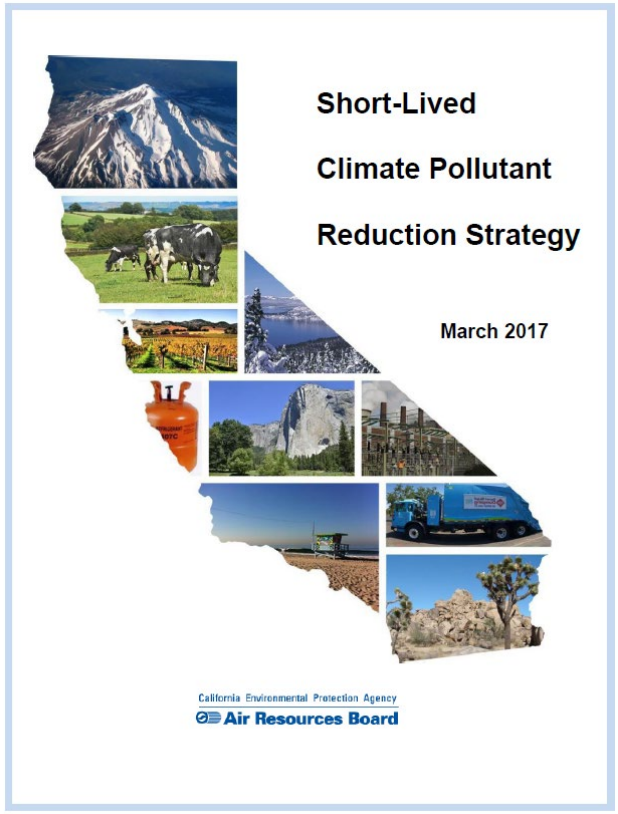
Biomass Reduces:

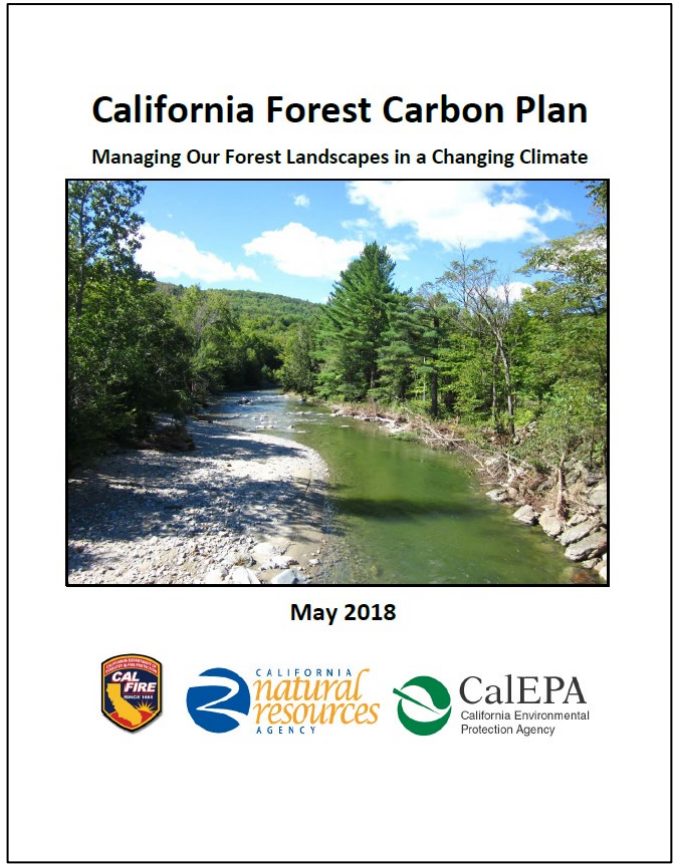
- PM2.5 and black carbon by 99%
- Methane and other VOC's by 95-99%
- NOx by 40-70%

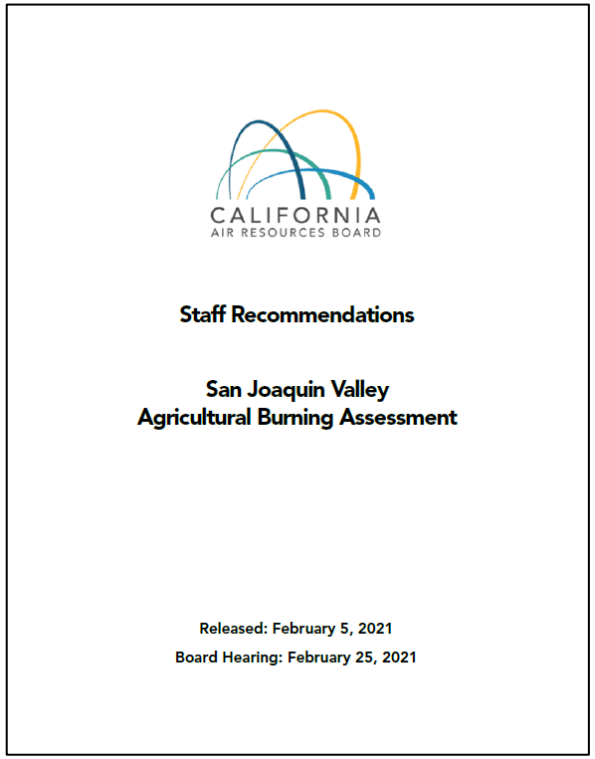
Source: Placer County Air Pollution Control District and the California Association of Air Pollution Control Officers

California's Climate Plans Call for Increased Bioenergy









How can California achieve 125 MT/year of negative emissions by mid-century?

- Natural and Working Lands

25 MT/year

- Waste Biomass Conversion to energy with CO_2 Storage

83 MT/year

- Direct Air Capture with CO_2 Storage

17 MT/year

Technological readiness: mid-to-high – no new breakthroughs required