

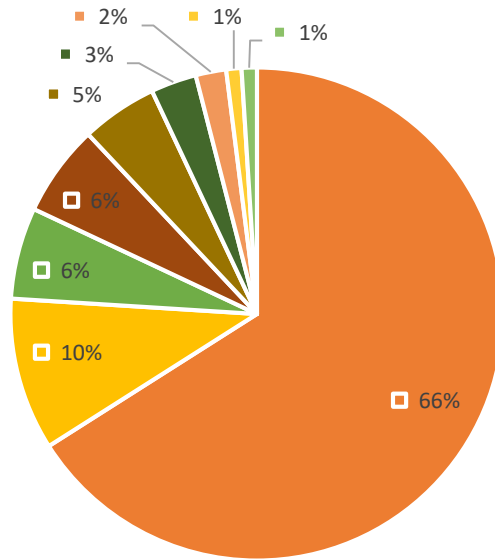


SLCP Cuts = Most Urgent Climate Solution



- UN: Cutting methane is the strongest lever we have to slow climate change over the next 25 years.
- President Biden: Reducing methane is the single most effective strategy to reduce global warming in the near term
- CARB: The science unequivocally underscores the need to **immediately** reduce emissions of short-lived climate pollutants.
- Clean Air Task Force: Cutting methane emissions is the only clear action we can take to avoid irreversible climate tipping points

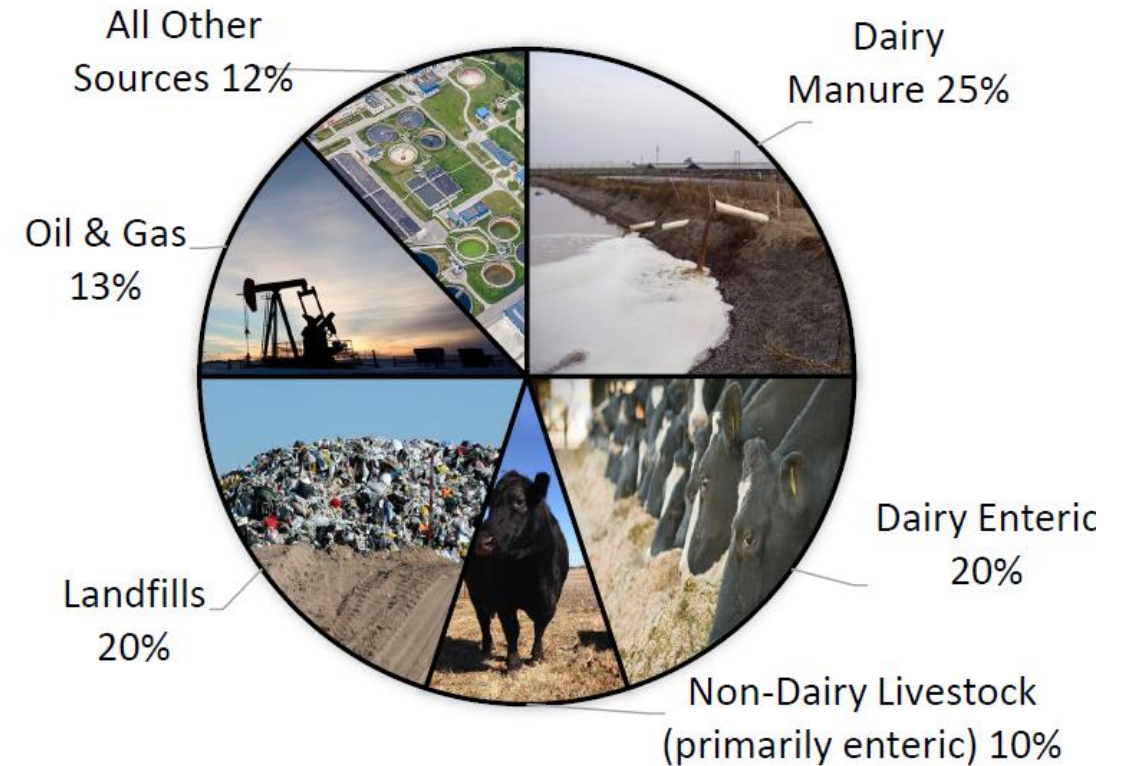
Black Carbon Sources in CA



- Wildfire
- On-Road Vehicles
- Fireplaces
- Miscellaneous
- Off-Road Vehicles
- Industrial Fuel Consumption
- Prescribed Burning
- Ag. Burning

BC is 3,200x more damaging to climate than CO2 over 20 years

Methane Sources in CA



Methane is 84x more damaging to climate than CO2 over 20 years

Bioenergy = biggest opportunity for carbon negative emissions

BECCS can provide 2/3 of all carbon negative emissions needed to achieve carbon neutrality

- Natural and Working Lands



25 MT/year

- Waste Biomass Conversion to Fuels with CO₂ Storage



Todd Nishikawa, Placer City Air Pollution Control District

83 MT/year

- Direct Air Capture with CO₂ Storage



17 MT/year

Estimated Average GHG Reduction Cost Is High With Wide Variation Across Programs

Estimated Average Cost Per Ton of Reduction Varies Greatly

Program	Cost Per Ton ^a
Organics and recycling loans	\$4
Forest health	4
Dairy digester research and development program	8
Organics composting/digestion grants	9
Forest legacy	10
Recycling manufacturing	15
Delta and coastal wetlands restoration	30
State water and efficiency and enhancement program	33
Clean vehicle rebates	46
Sustainable agricultural lands conservation	59
Mountain meadow ecosystems restoration	113
Urban and community forestry	116
Water-energy grant program	141
Affordable housing and sustainable communities	191
Single-family solar photovoltaics ^b	209
Transit and intercity rail capital	259
Single-family energy efficiency and solar water heating ^b	282
Large multifamily energy efficiency and renewables ^b	343
Enhanced fleet modernization program "plus-up"	414
Truck and bus voucher incentives	452
Incentives for public fleets pilot project for DACs	725
Overall Average	\$57

^a Calculated as the amount of cap-and-trade funds awarded to a program divided by the total estimated greenhouse gas (GHG) emission reductions from the projects that receive cap-and-trade funds.

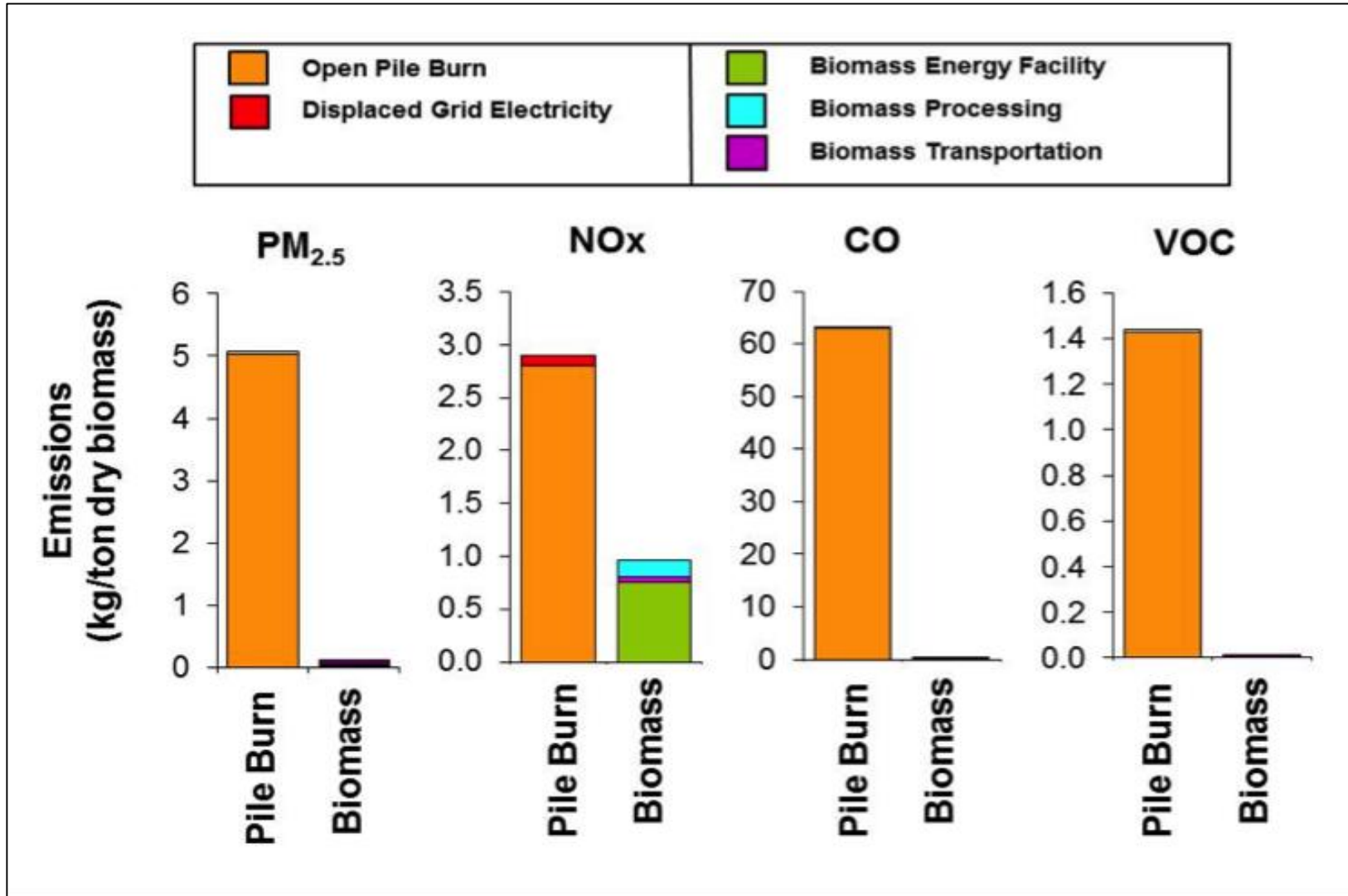
^b Assumes GHG reductions at the midpoint of the administration's estimated range.
DACs = disadvantaged communities.

- Administration's data suggests average cost of \$57 per ton reduced.

- Diesel trucks = largest source of air pollution in SJ Valley and South Coast Air Districts
- Diesel causes ½ of smog and toxic air contaminants in SJV



- Wildfire = biggest source of air pollution in bad wildfire season
- Pollutes more than entire transportation or power sector
- 2020 fires alone offset 20 years of carbon reductions in CA
- 1 megafire smoke causes thousands of premature deaths



Biomass Power

Reduces:

- PM_{2.5} by 99%
- Methane, other VOCs by 95-99%
- NO_x by 40-70%

California's Renewable Gas Potential from Organic Waste

Feedstock	Amount Technically Available	Billion Cubic Feet Biomethane	Million Gasoline Gallon Equivalents	Tons of Hydrogen (assuming 85% conversion efficiency)
Landfill Gas	106 BCF	53	457	
Animal Manure	3.4 M BDT	19.5	168	
Wastewater 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 M 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	
TOTAL		468.5	4,044	4,038,793

Source: Rob Williams and Stephen Kaffka, UC Davis, presentation to the California Energy Commission on 1/30/17; Lawrence Livermore National Lab assessment of forest, sawmill, shrub & chaparral residues, Jan2020

THANK YOU

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