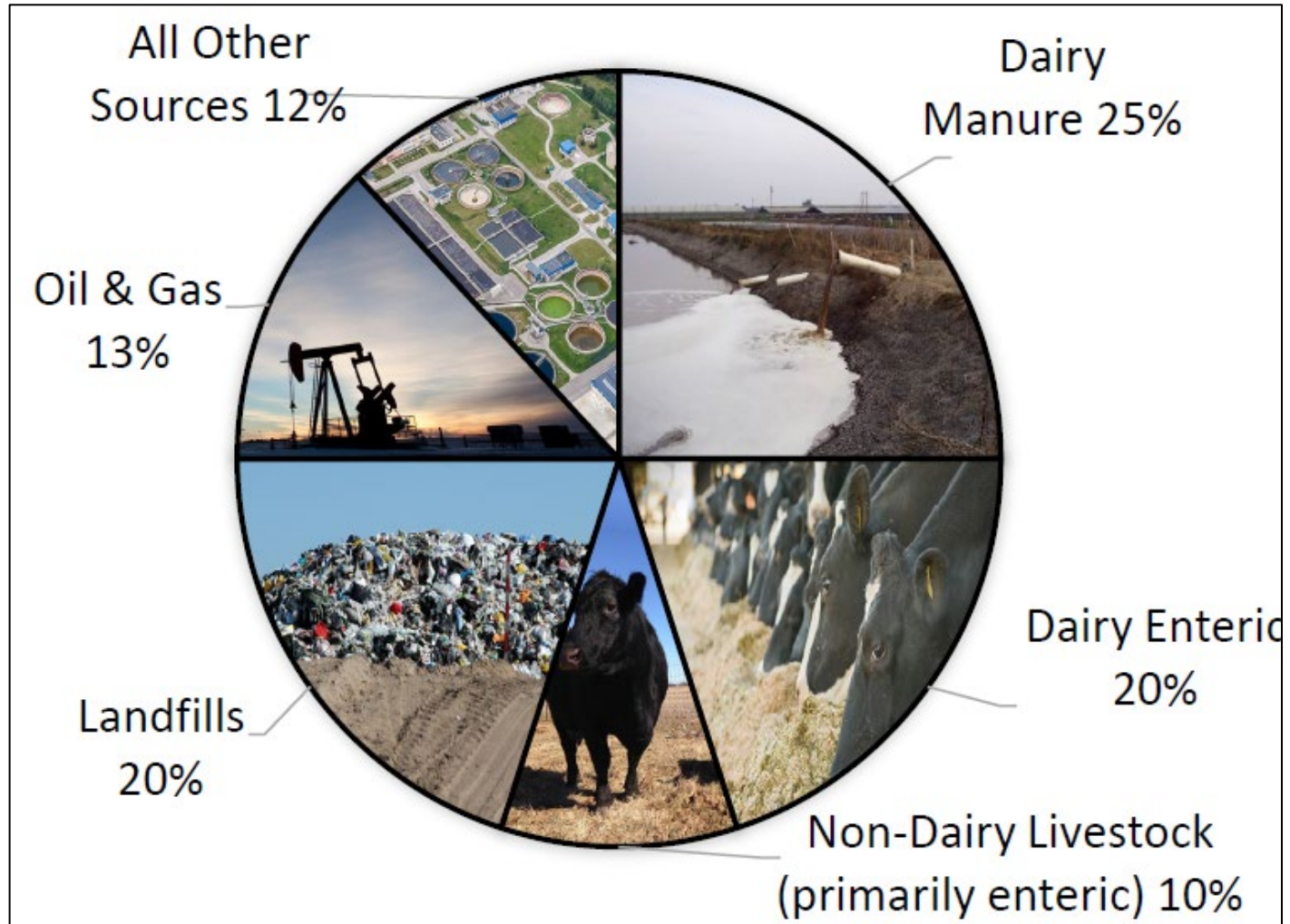
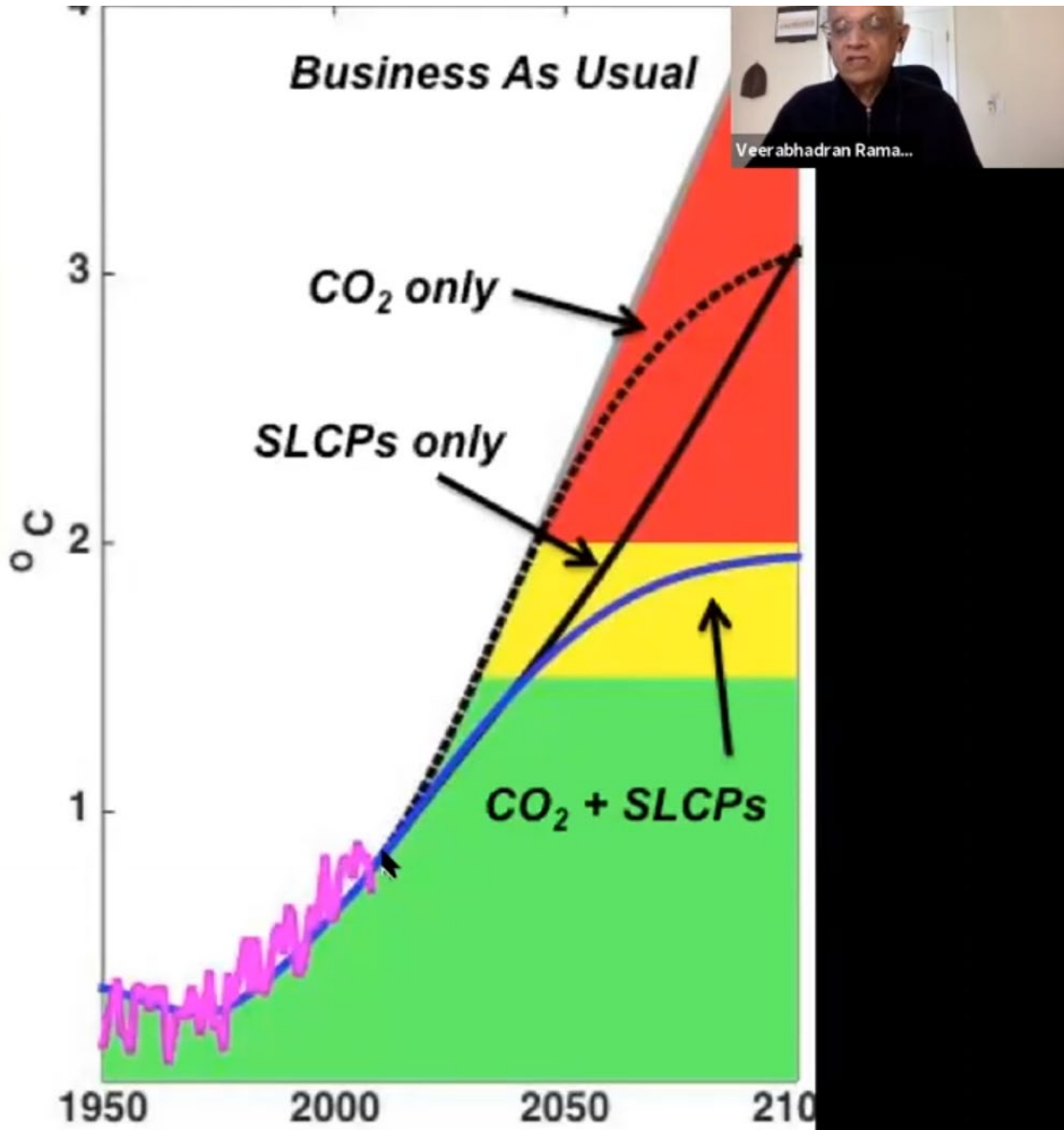




# Methane Sources in CA



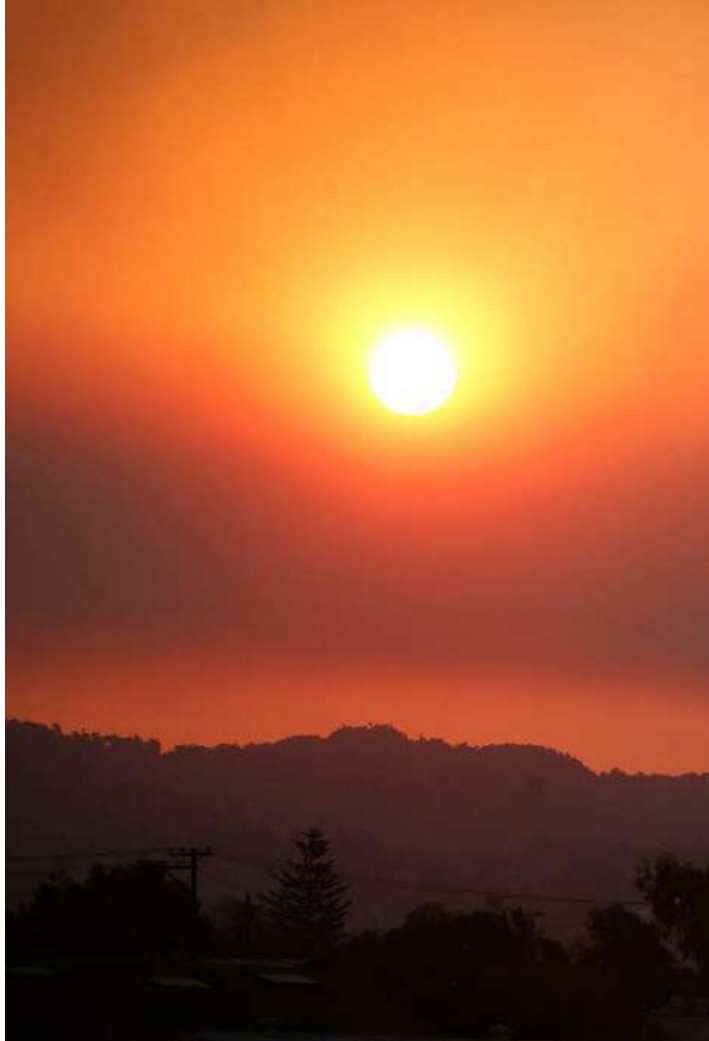
**Methane is 84x  
more damaging to  
the climate than  
CO2 over 20 years**



Dr. V. Ramanathan, UCSD  
Scripps Institute:

**“SLCP Reductions are  
The Last Lever We  
Have Left to avoid  
catastrophic climate  
change”**

# 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”
- CARB: Reducing SLCPs will “provide immediate benefits – both to human health locally and to reduce warming globally”
- ALA: cutting methane is one of the fastest, best ways to reduce pollution that’s contributing to climate change. The technology is available, and it’s highly cost-effective.”

# 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 CO<sub>2</sub> Storage



83 MT/year

- Direct Air Capture with CO<sub>2</sub> 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 <sup>a</sup>
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 <sup>b</sup>	209
Transit and intercity rail capital	259
Single-family energy efficiency and solar water heating <sup>b</sup>	282
Large multifamily energy efficiency and renewables <sup>b</sup>	343
Enhanced fleet modernization program "plus-up"	414
Truck and bus voucher incentives	452
Incentives for public fleets pilot project for DACs	725
<b>Overall Average</b>	<b>\$57</b>

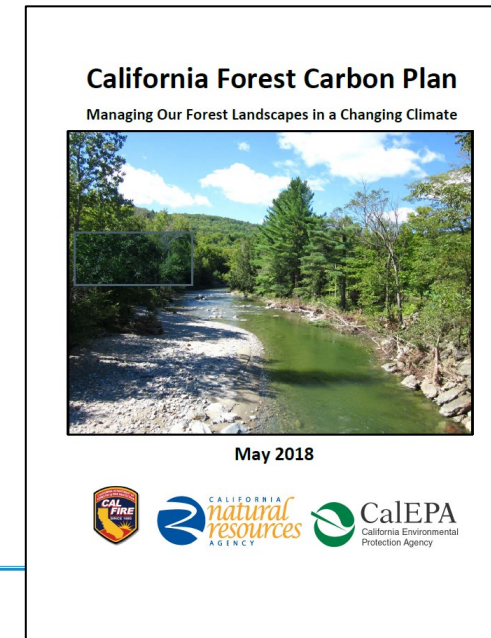
<sup>a</sup> Calculated as the amount of cap-and-trade funds awarded to a program divided by the total estimated greenhouse gas (GHG) emission reductions from the projects that receive cap-and-trade funds.

<sup>b</sup> Assumes GHG reductions at the midpoint of the administration's estimated range.  
DACs = disadvantaged communities.

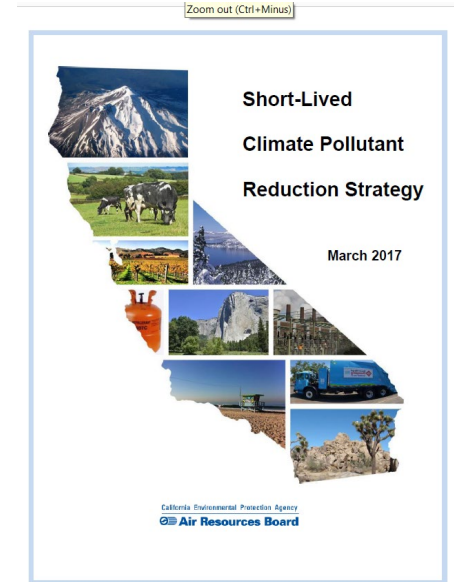
- Administration's data suggests average cost of \$57 per ton reduced.

# State Plans Calling for Bioenergy

- Short-Lived Climate Pollutant Reduction Strategy – CARB
- 2022 Climate Change Scoping Plan - CARB
- Forest Carbon Plan / 2020 Wood Utilization Plan - CNRA, CalEPA, BOF
- Plan to phase out open burning of ag waste – CARB
- Plans to achieve carbon neutrality



2022 SCOPING PLAN FOR ACHIEVING  
CARBON NEUTRALITY  
NOVEMBER 16, 2022



- Diesel trucks = largest source of air pollution in SJ Valley and South Coast Air Districts
- Diesel causes half the NO<sub>x</sub> and Toxic Air Contaminants in SJ Valley
- Biogas and H<sub>2</sub> can cut those pollutants 90-99%



# Other Benefits of Bioenergy:

## Energy, Grid Benefits:

- Firm, renewable power
- Dispatchable power
- Long duration energy storage
- Microgrid support
- Sustainable Aviation / Maritime Fuels

## Jobs and Economic Benefits:

- 3-4 times more jobs than solar or wind power
- More permanent jobs
- Higher skill, higher paying jobs

## Environmental / Public Health Benefits:

- Methane and odor reduction
- PFAS and microplastics destruction
- Fossil fuel reduction



# Bioenergy Markets in CA (cont'd)

## Electricity

- BioMAT program for smaller projects
- BioRAM for utility scale projects
- Requirements for “firm power” and “resource adequacy”
- Biogas and biomethane can be used in natural gas plants
- Long duration storage



## Fuels

- Low Carbon Fuel Standard
- Sustainable Aviation and Maritime Fuels
- Pipeline biomethane procurement program
- Hard-to-electrify end uses

# Bioenergy Markets in CA

## Hydrogen

- CA committed to H2 development, even w/o federal support
- Projects in development using urban and forest biomass
- Green ammonia



## Carbon

- BECCS
- Huge opportunity for carbon negative emissions and carbon sequestration
- Market growing for CCSU



# **2025 Successes and Failures**

## **Successes:**

- Enacted AB 70 –
  - Defines “pyrolysis” in statute
  - Requires CalRecycle to adopt pipeline biomethane pathway under SB 1383
- Extended sales tax exemption for bioenergy, recycling equipment
- \$46 million for DEBA, including \$12.5 million for water utilities
- First diverted organic waste to hydrogen project approved in Richmond, CA

## **Failures:**

- No SB 1383 \$\$ in state budget or climate bond (Prop 50)
- Governor vetoed SB 643 for a CDR program and \$\$, including BECCS
- Lost one diverted organic waste to hydrogen project
- Lost \$1 billion in hydrogen hub funding and numerous federal grants for bioenergy

# Challenges and Solutions

• Technology bias	➡	• Need objective, science-based performance standards
• Outdated/political definitions	➡	• Need technically accurate definitions
• Failure to account for all benefits	➡	• Need to better quantify and monetize benefits
• Lack of public funding, especially for cellulosic waste	➡	• Need to get CalRecycle \$\$\$ and re-allocate CEC or other \$\$\$
• Permit timelines	➡	• Need permit consolidation
• Shrinking / shifting markets	➡	• Need secure, long-term markets for all types of bioenergy
• Interconnection costs and timelines	➡	• Need serious interconnection reform / acceleration / rate-basing

# THANK YOU

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**Bioenergy**  
Association of  
**California**