Air Quality and Health Cobenefits of Different Deep Decarbonization Pathways in California

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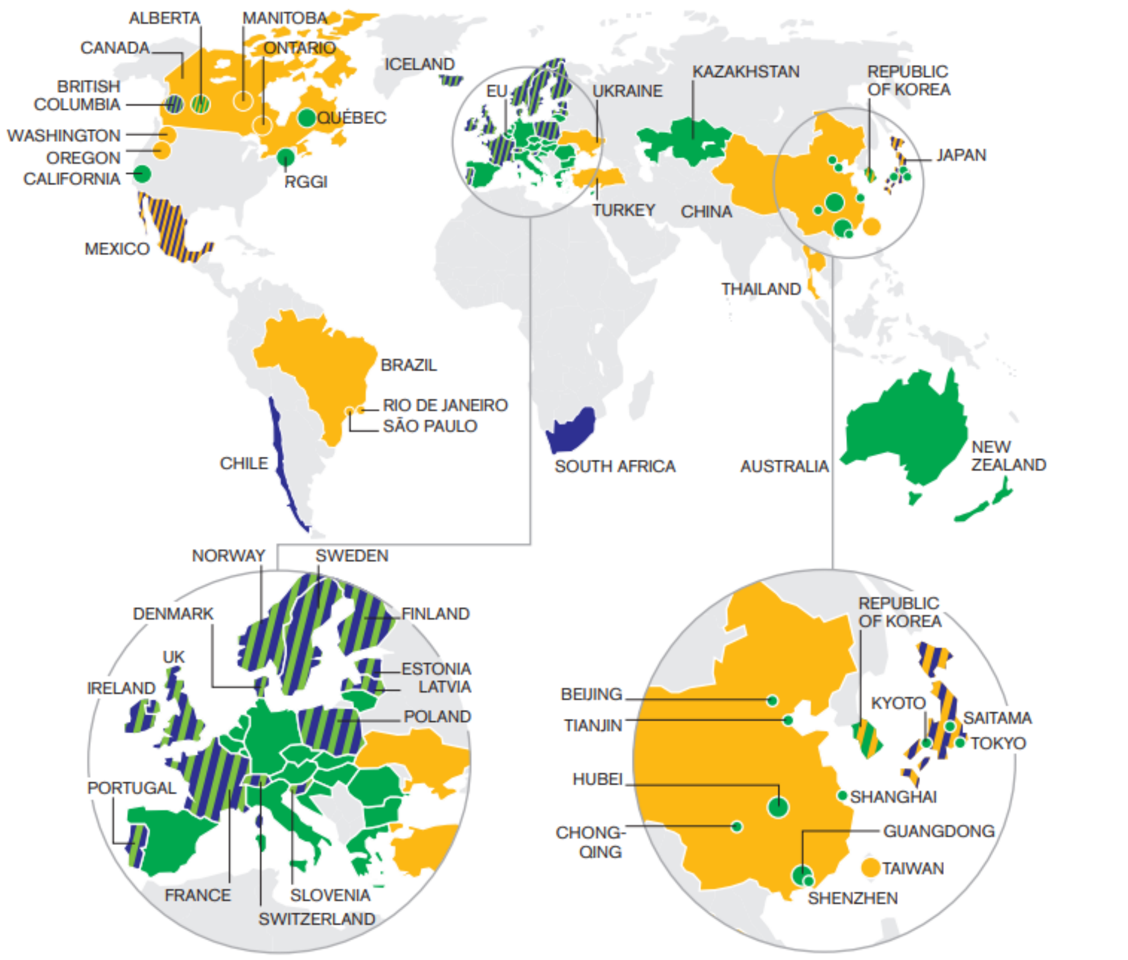
Background

- Current carbon pricing strategies do not consider air quality and health impacts
- The relationship between GHG reduction policy choices and health impacts can inform future policies

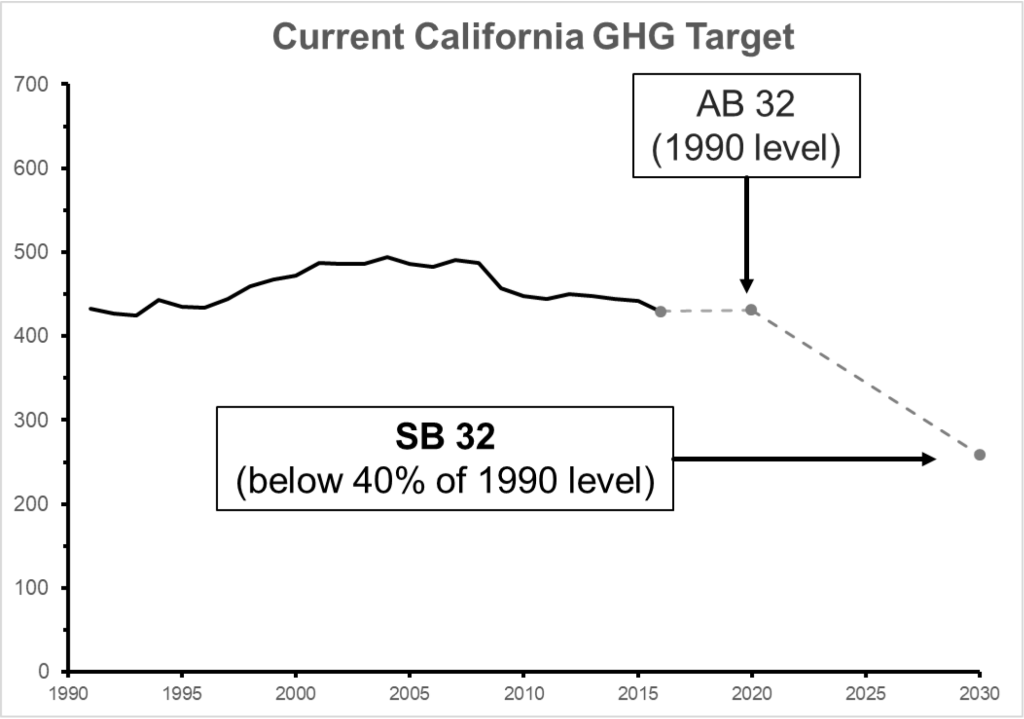


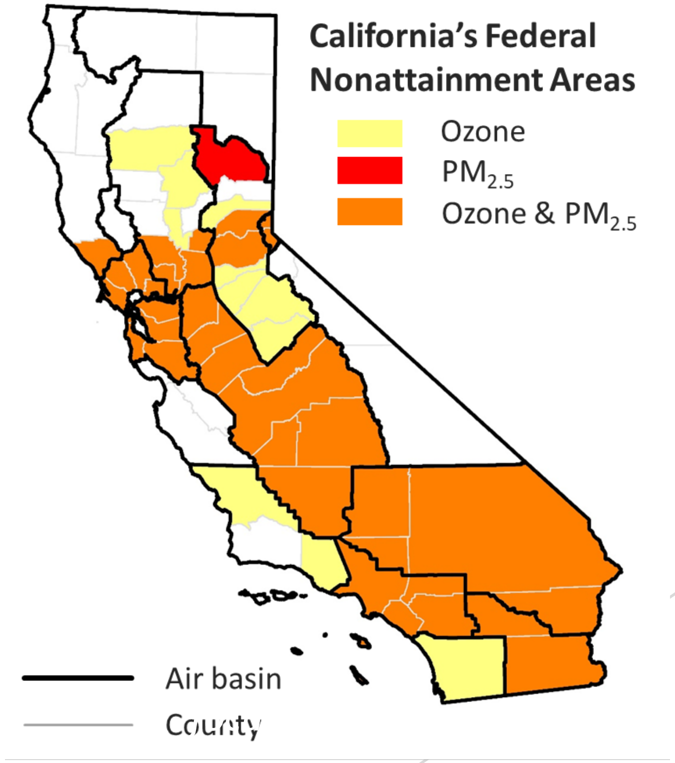
Carbon Pricing Watch. World Bank (2016)

Background

Why California?

- Strong climate ambition and environmental awareness
- Worst air quality in the United States





Method - Scenario Development

Two extreme deep decarbonization cases:

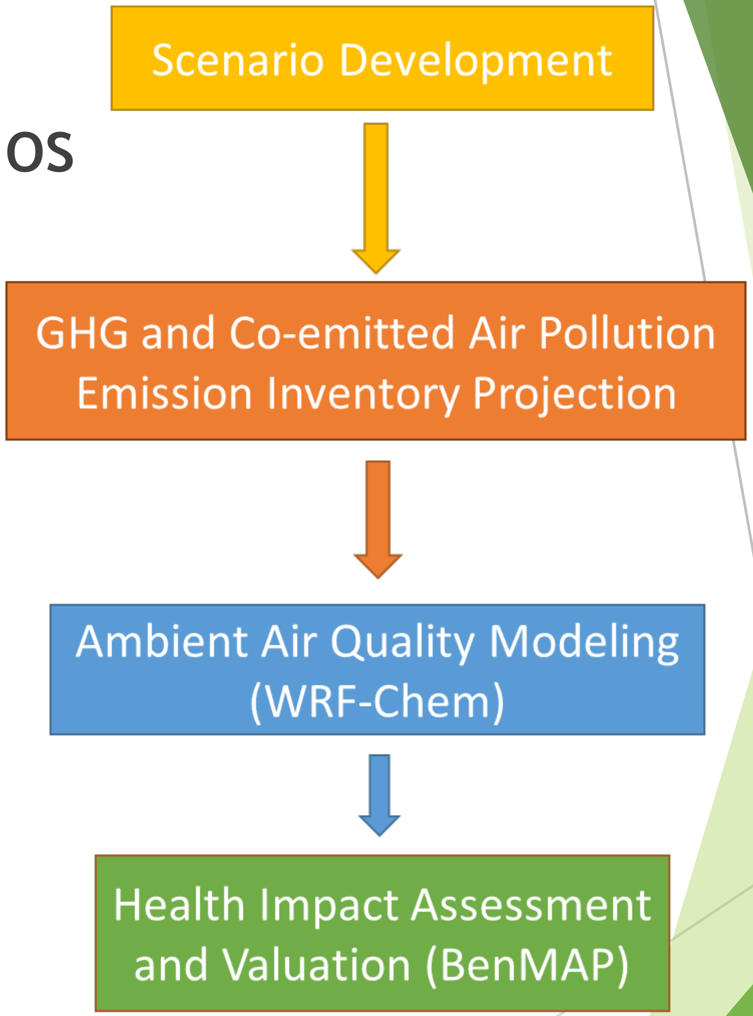
- Both meet the same GHG reduction target (80% below 1990 level in 2050)
- Different policy and technology pathways
  - DD1 Scenario will minimize co-emitted air pollutant emissions
  - DD2 Scenario will minimize implementation cost and energy system impacts

Method - Scenario Development

	BAU	DD1	DD2
Industry	• 10% electrification rate	• 65% electrification rate • 10% biofuel	• 55% electrification rate • 25% biofuel
Commercial & Residential	• 50% electrification rate	• 85% electrification rate • 10% biofuel	• 75% electrification rate • 35% biofuel
Transportation	• LDV: 99% ICE+1% EV • HDV: 100% Fossil Fuel	• **LDV: 30% ICE+70% EV** • **HDV: 20% NG+80% Diesel** • **50% biofuel**	• **LDV: 90% ICE+10% EV** • **HDV: 10% NG+90% Biodiesel** • **90% biofuel**
Agriculture	• 20% electrification rate	• 35% electrification rate • 50% biofuel	• 20% electrification rate • 95% biofuel
Electricity Generation	• 30% renewables	• **80% renewables (3% from biofuel)**	• **80% renewables (25% from biofuel)**
Implementation Cost (Billion USD)	0	**53 (23-81)**	**28 (0-55)**

Method

- Design of decarbonization scenarios
- Emission inventory projection
- Ambient air quality modelling
- Health impact assessment

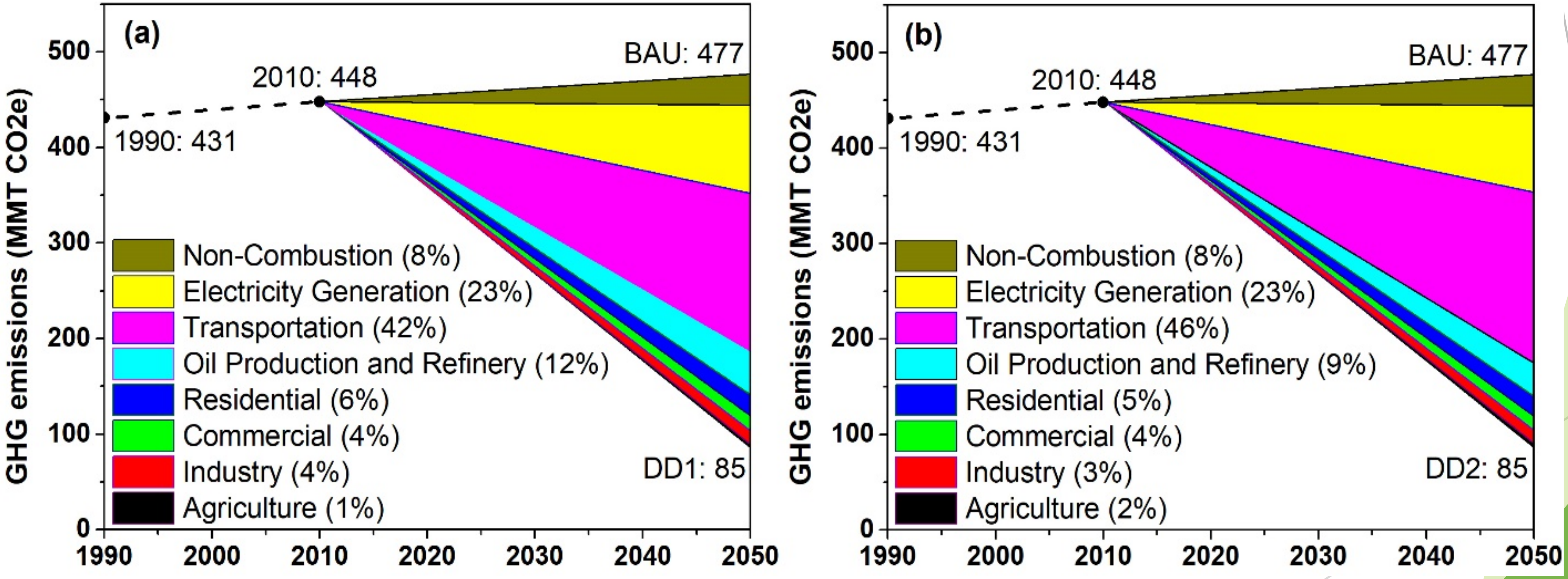


Results

- GHG emission projections

  Similar reduction patterns in the two scenarios

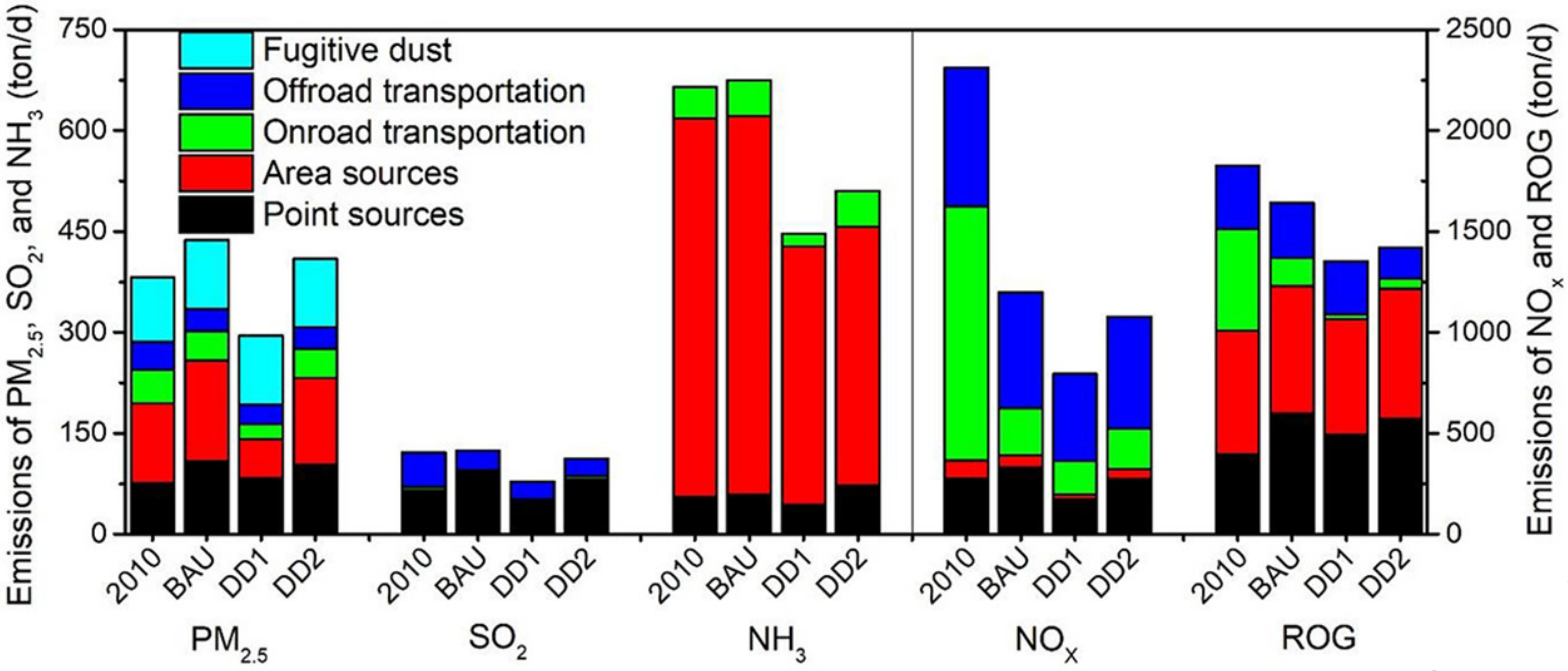
  80% lower than the 1990 levels



Results

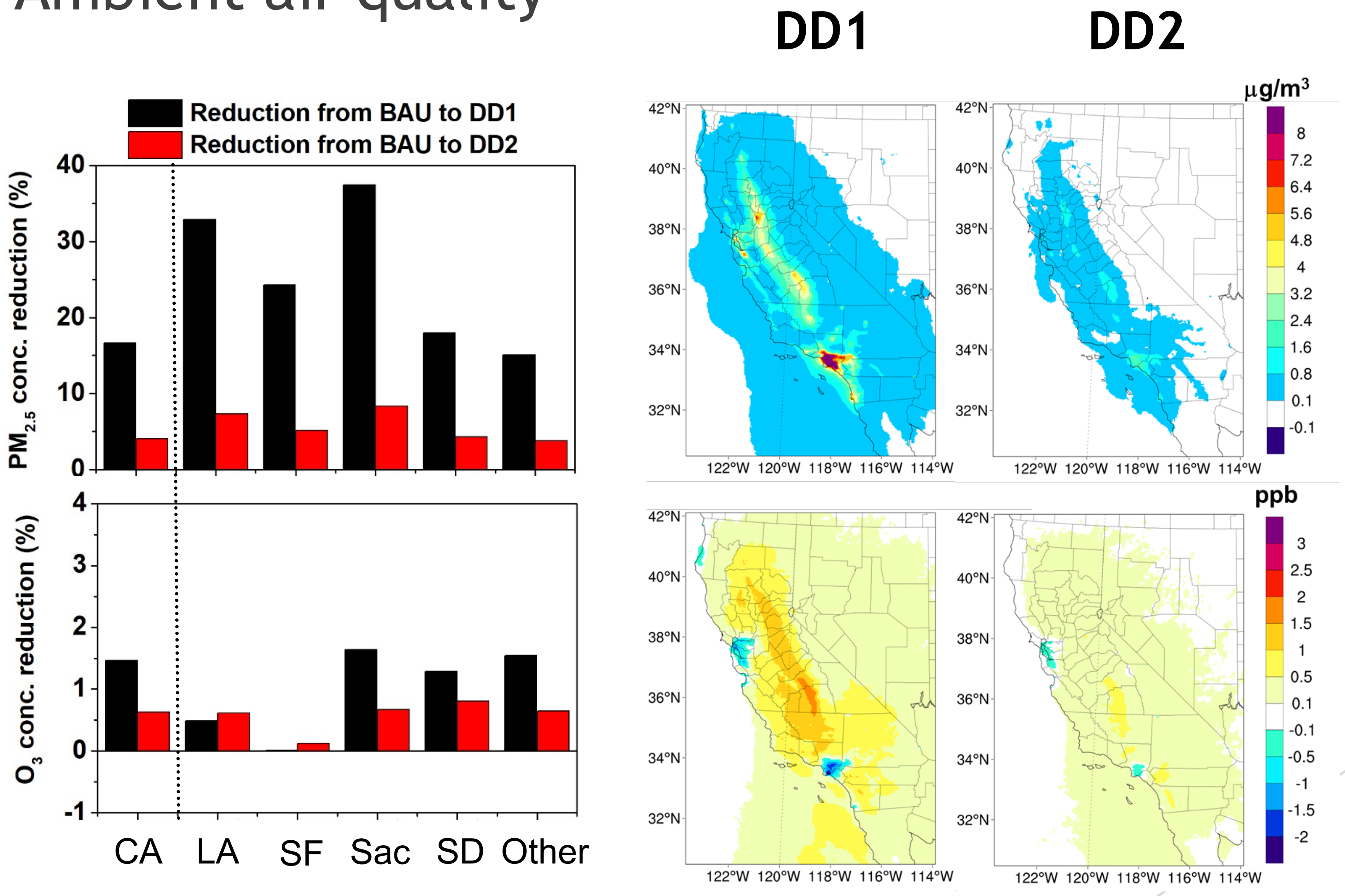
- Co-emitted air pollutant emissions

  Different emission patterns in the two scenarios



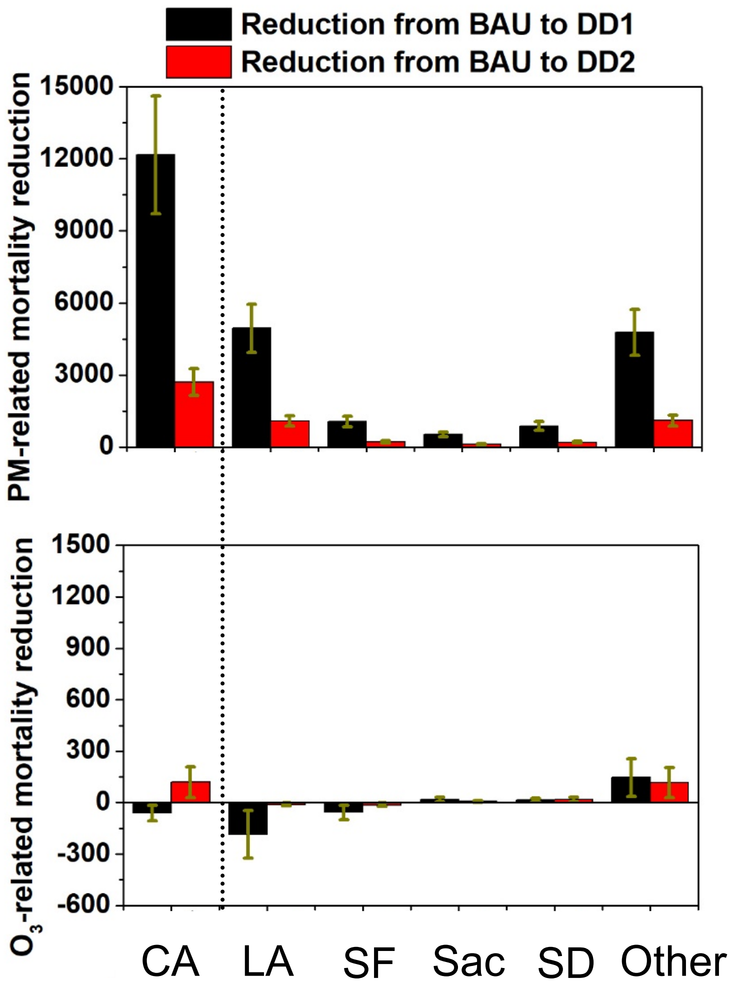
Results

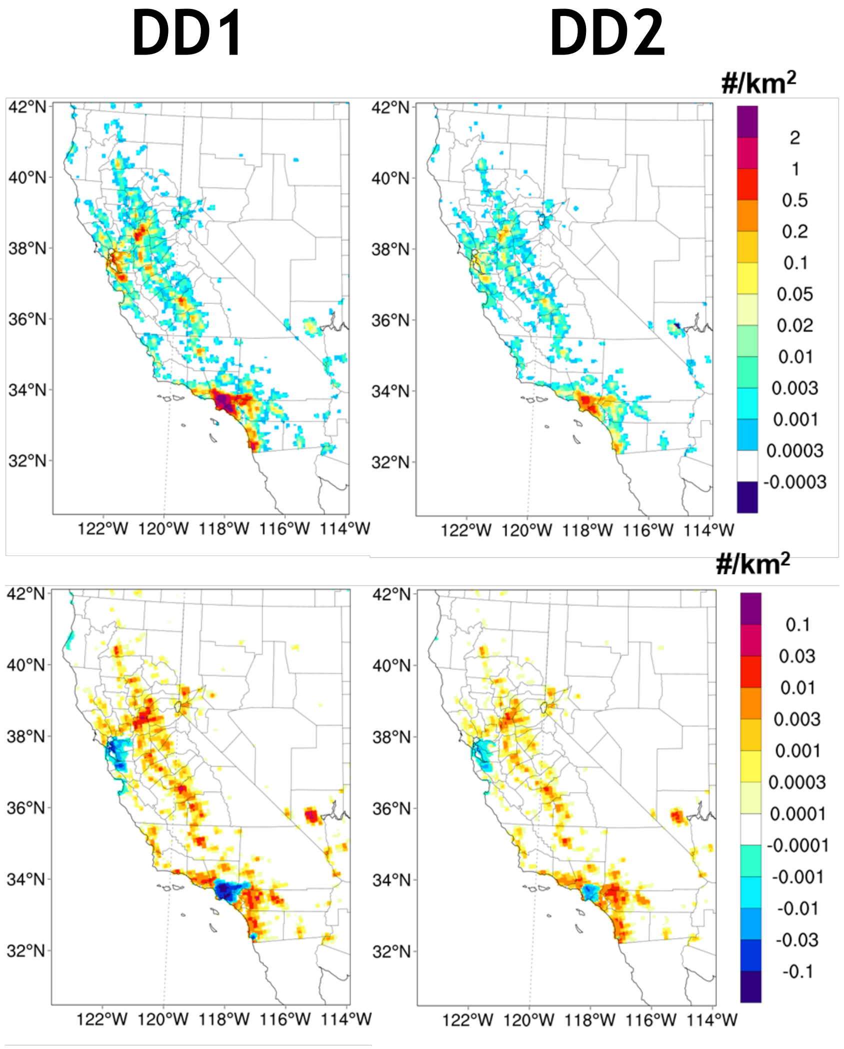
- Ambient air quality



Results

- Health Impact





Results

- Direct cost vs. long-term co-benefits

	GHG Abatement Cost in 2050 (billion of 2017 US$)	Mortality Avoidance in 2050	Monetized Health Co-benefit in 2050 (billion of 2017 US$)
DD 1	53	12,100	109
	(22-83)	(9,600–14,600)	(87–131)
DD 2	28	2,800	25
	(0-55)	(2,300-3,400)	(20–30)
Difference	25	9,300	84
	(22-28)	(7,500–11,100)	(67–100)

Conclusion

- GHG mitigation generally companies with improved air quality and health co-benefits in California
- However, the level of co-benefits largely depends on the choice of GHG mitigation strategies
- Policy makers may need to analyze the long-term air quality and health impacts when developing future climate policies to ensure maximizing benefits

Thanks!

Article info:

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