



Energy+Environmental Economics

+ California PATHWAYS: Long-Term Greenhouse Gas Reduction Scenarios for California

Advanced Energy Economy: Pathway to 2050

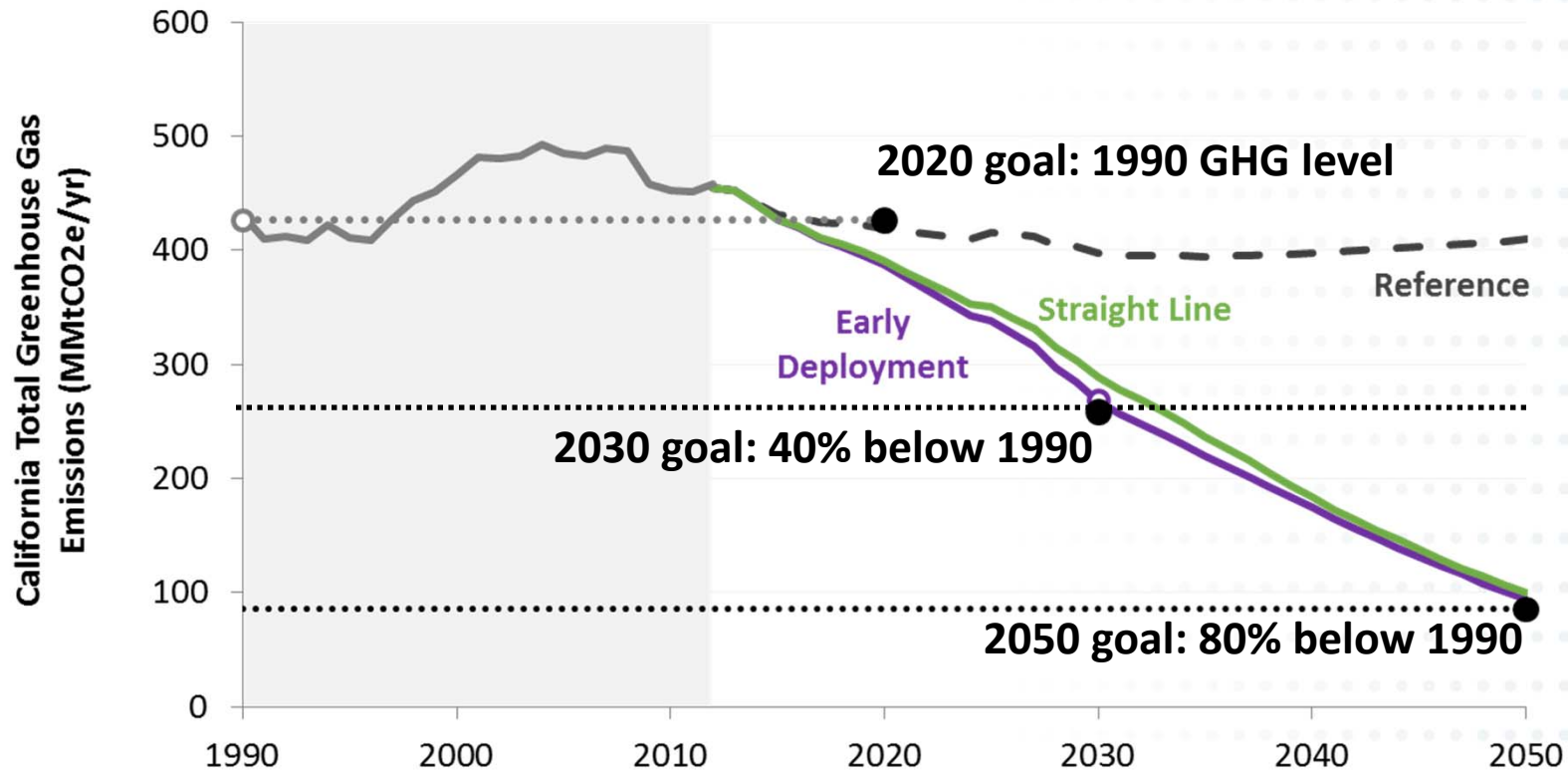
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New policies will be needed to achieve California's 2030 GHG goal



- + **Current policies** are expected to achieve 2020 goal but fall far short of 2030 goal (Reference scenario)
- + **Aggressive policies** will be needed to achieve 2030 and 2050 goals (Early Deployment, Straight Line scenarios)

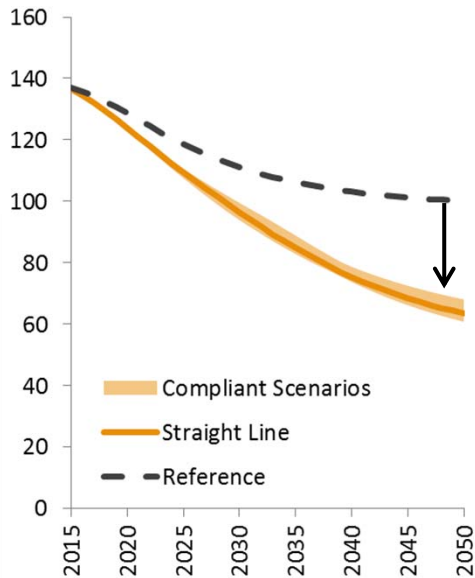


Decarbonizing CA's economy depends on four energy transitions

1. Efficiency and Conservation



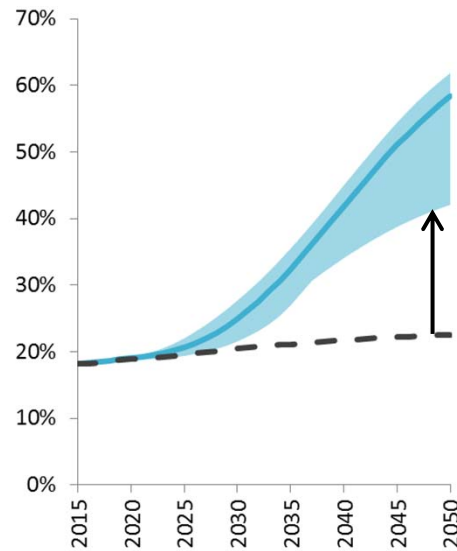
Energy use per capita (MMBtu/person)



2. Fuel Switching



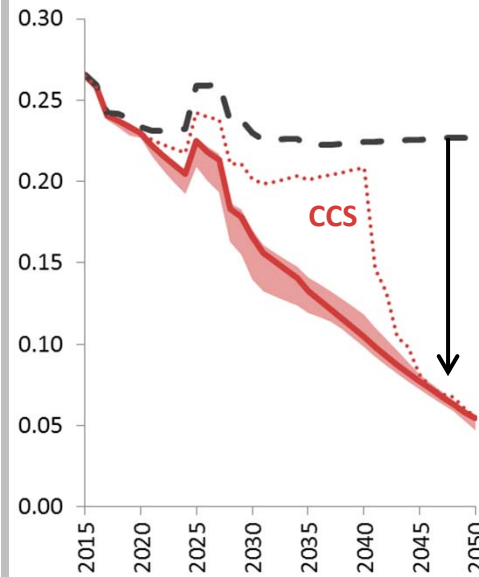
Share of electricity & H₂ in total final energy (%)



3. Decarbonize electricity



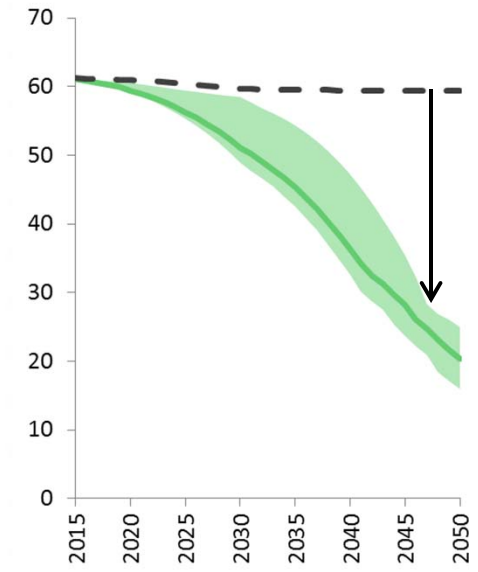
Emissions intensity (tCO₂e/MWh)



4. Decarbonize fuels (liquid & gas)



Emissions intensity (tCO₂/EJ)





Transitions require large scale deployment of clean technologies

1. Efficiency and Conservation



By 2030:

- 8% reduction in vehicle miles traveled (smart growth)
- Continued vehicle fuel economy improvements
- Approximate doubling of current building efficiency savings goals

2. Fuel Switching



By 2030:

- 6-9 million light duty zero emission vehicles
- Trucking & freight strategy, i.e. CNG, hybrid, elec.
- 10 - 40% electric space heating & 5 - 70% electric water heating (depends on use of biogas)

3. Decarbonize electricity



By 2030:

- 50 – 60% renewable electricity
- Renewable integration solutions

4. Decarbonize fuels (liquid & gas)



By 2030:

- 29 – 55% reduction in petroleum use in vehicles, relative to 2015
- Biofuels: Nearly all diesel use replaced with net-zero emissions biofuels, OR Nearly 50% biogas in the gas distribution pipeline



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Thank You!

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For more information:

https://ethree.com/public_projects/energy_principals_study.php