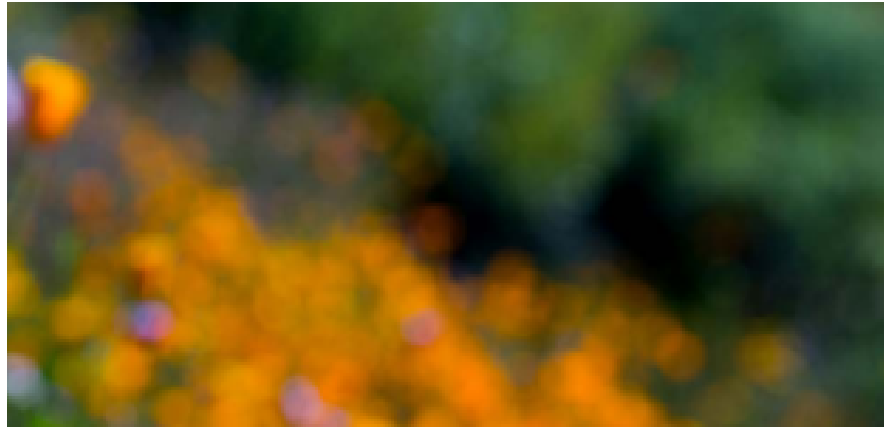


Senate Bill (SB) 1075: Joint Agency Kickoff Workshop

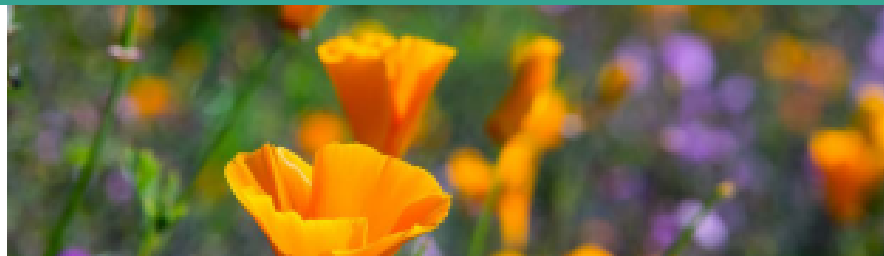


CAREY BYLIN
INDUSTRIAL STRATEGIES DIVISION
CALIFORNIA AIR RESOURCES BOARD

SEPTEMBER 5, 2023



2022 Scoping Plan for Achieving
Carbon Neutrality



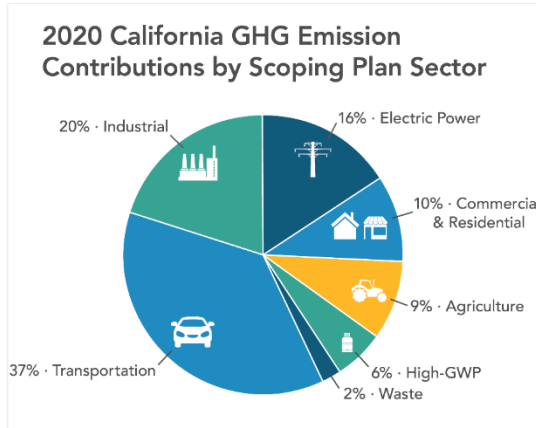
Scoping Plan Overview

California's Climate Policy Framework



GHG Targets & Goals

Legislation & Executive Orders: Total GHGs (AB 32/SB 32/AB 1279) or sector targets (SB 1383/SB 100), etc.



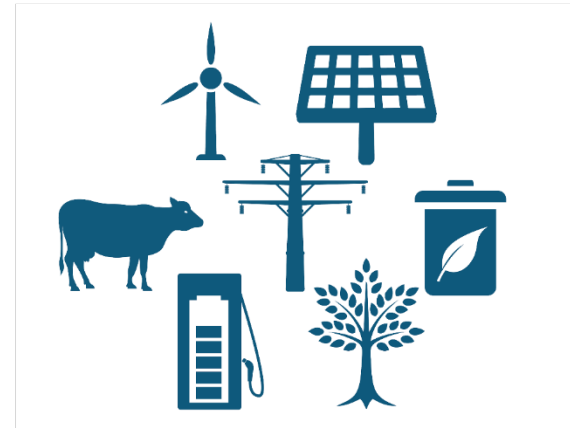
Scoping Plan

Actionable plan across all sectors



Action

Regulations & Incentives: Advanced Clean Cars, climate change investments, etc.

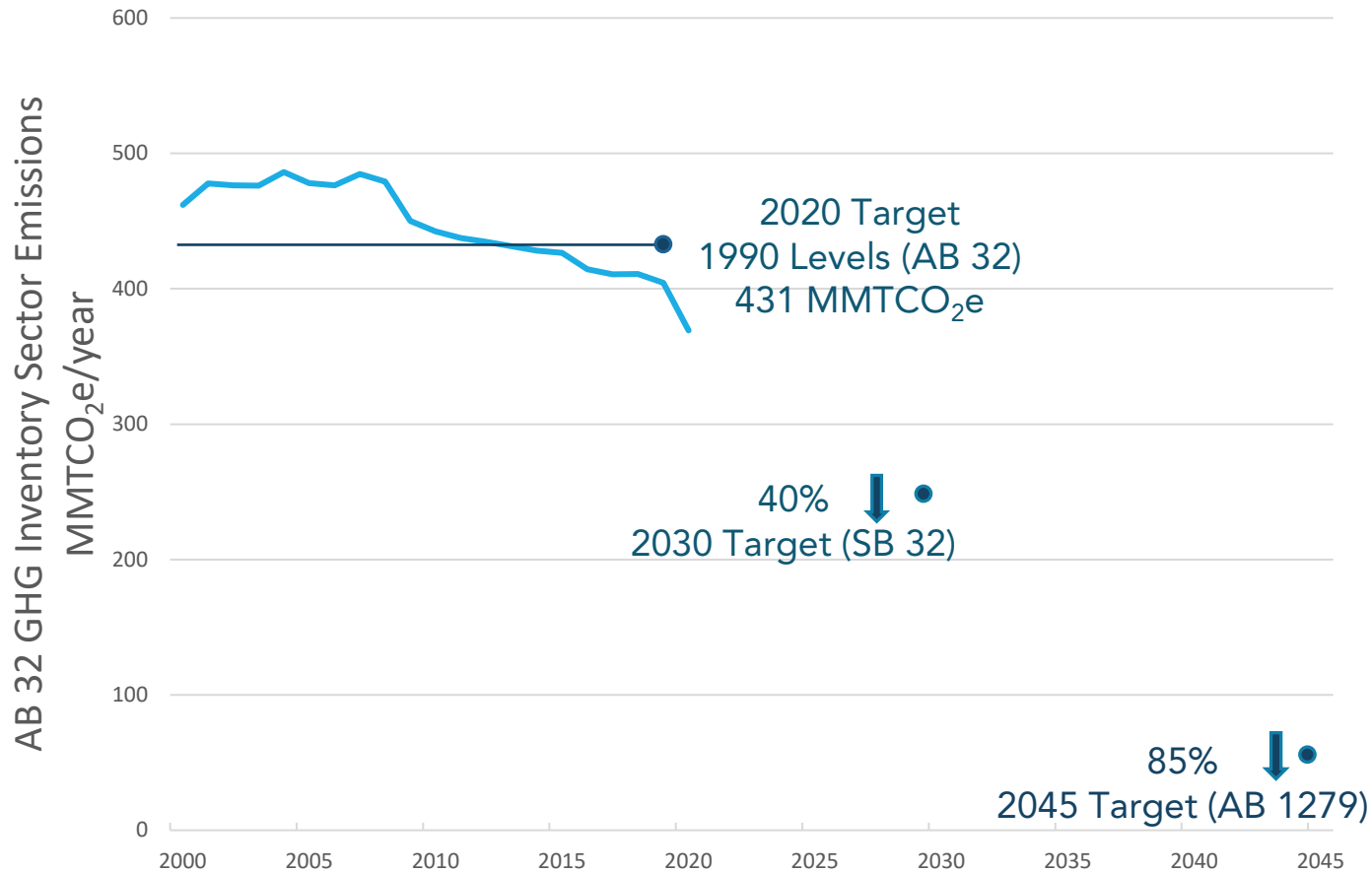


Projects

Examples: Zero-emission trucks, energy infrastructure and renewables, compost facilities, digesters, etc.

GHG Reduction Targets

Achieved AB 32 Target in 2014



ACHIEVING
CARBON
NEUTRALITY
BY **2045**

GHGs included in statute: Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF₆), Nitrogen trifluoride (NF₃)

2022 Scoping Plan Update

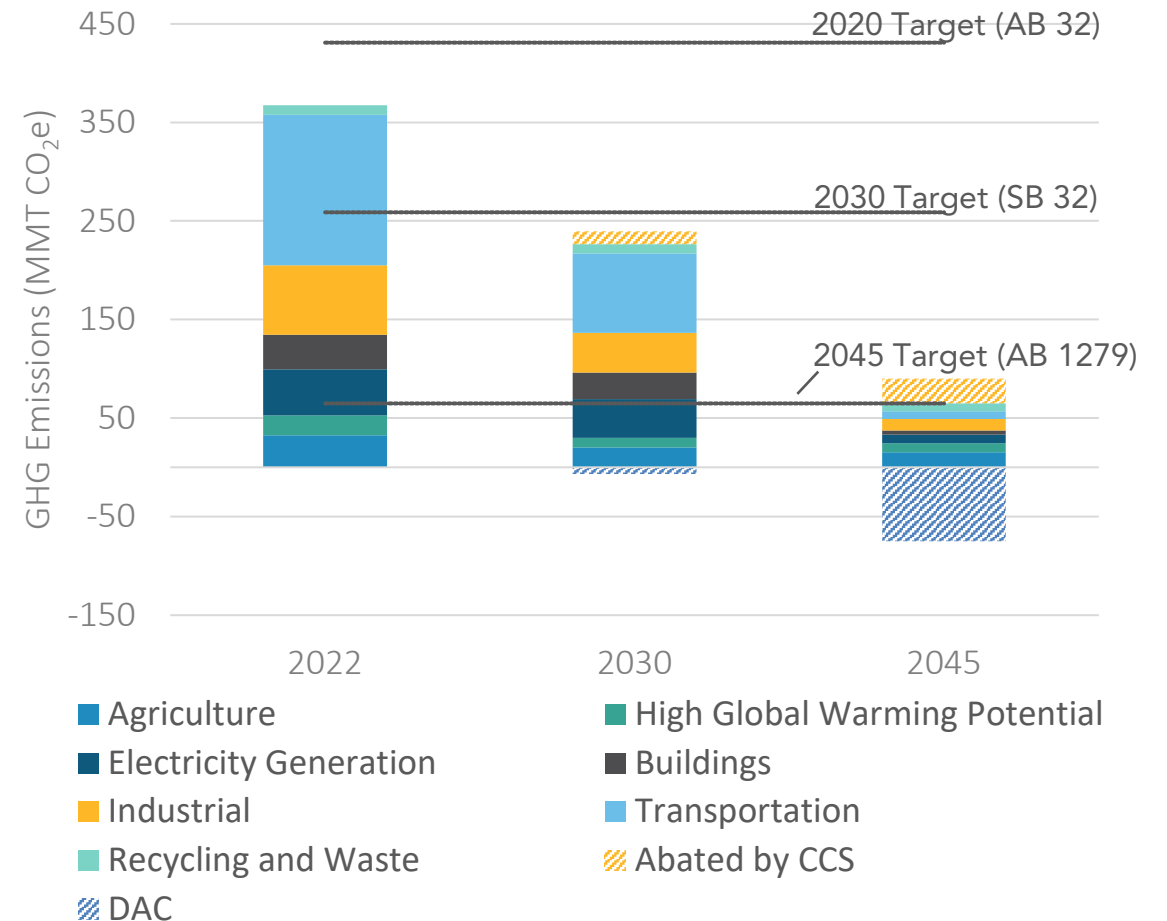
A Plan for Science-Driven Climate Action

2030: 48% reduction below 1990

- Increased ambition from SB 32 40% target
- SP scenario incorporates 20 MMTCO₂e of mechanical carbon dioxide removal (CCUS/DAC) in 2030
- 462x increase in renewable hydrogen

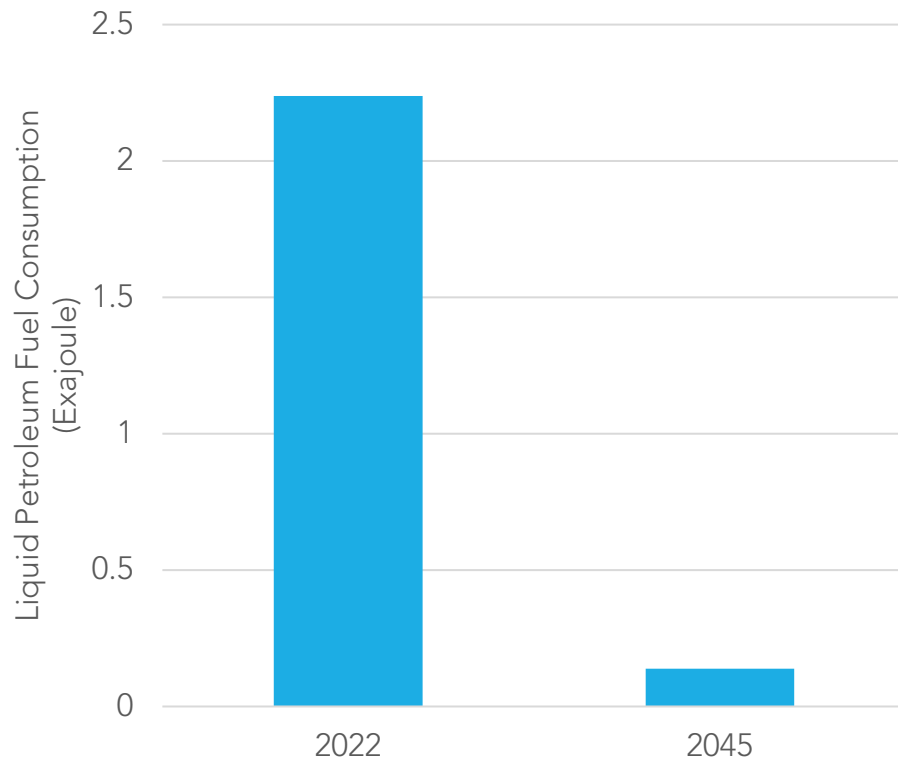
2045: 85% reduction below 1990

- Need CCUS and carbon dioxide removal to compensate for residual emissions to achieve carbon neutrality

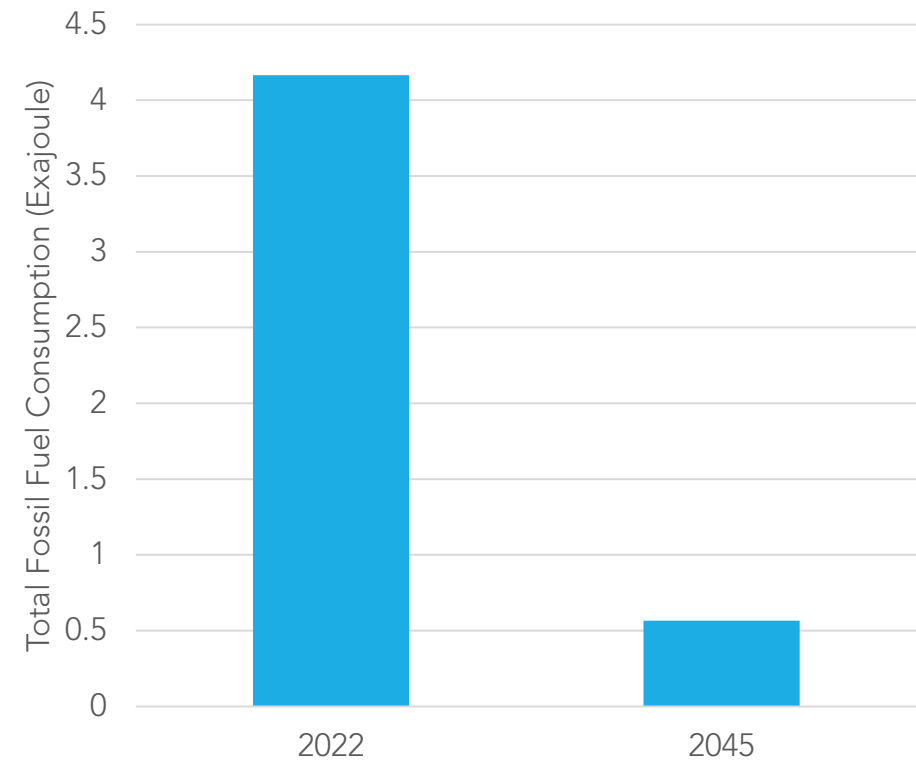


Dramatic Reductions in Fossil Fuel Demand

94% reduction in liquid petroleum



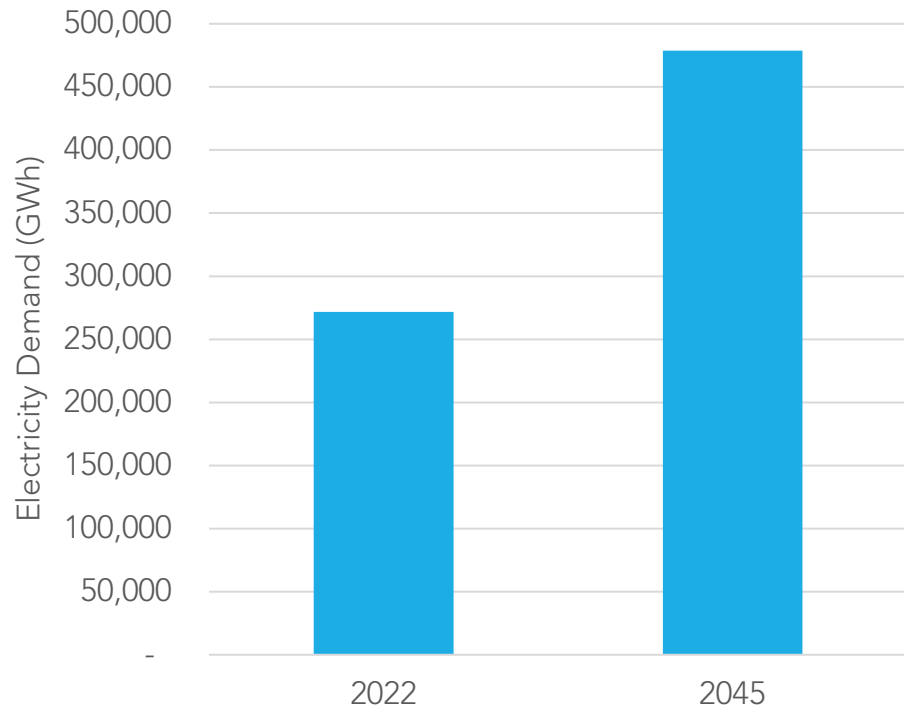
86% reduction in total fossil fuel



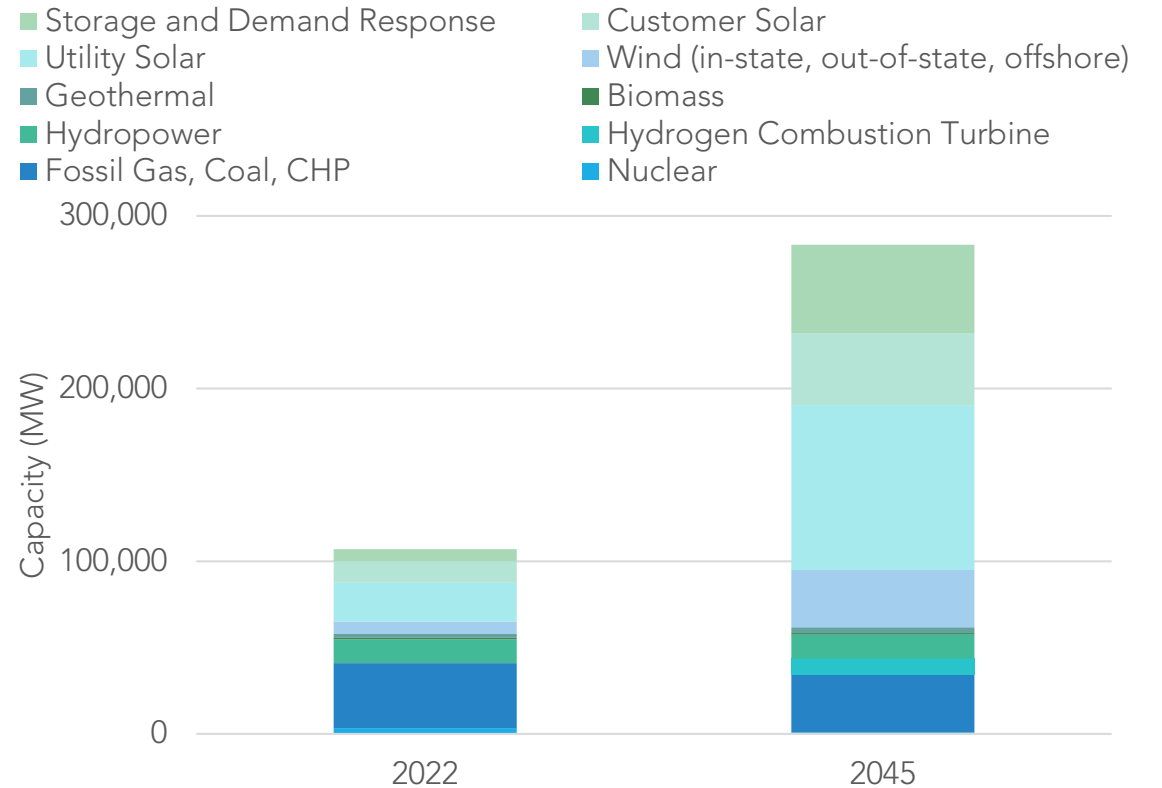
In 2045 relative to 2022

Building a Clean, Affordable, Reliable Grid

2x existing electricity generation



4x existing wind and solar capacity in 2045



Fossil gas use by electric sector decreases by 47% in 2045 compared to today

Hydrogen in CA's Climate Plan



Blending in Pipelines



Aviation Fuel



Ocean-Going Vessel Fuel



Industrial High Heat Uses



Transportation Fueling



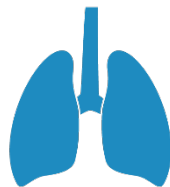
Focus on Low-carbon Sources, e.g. Biomass or Electrolytic



Capitalizing on Federal Funding for Hydrogen Hubs and Low-CI Hydrogen

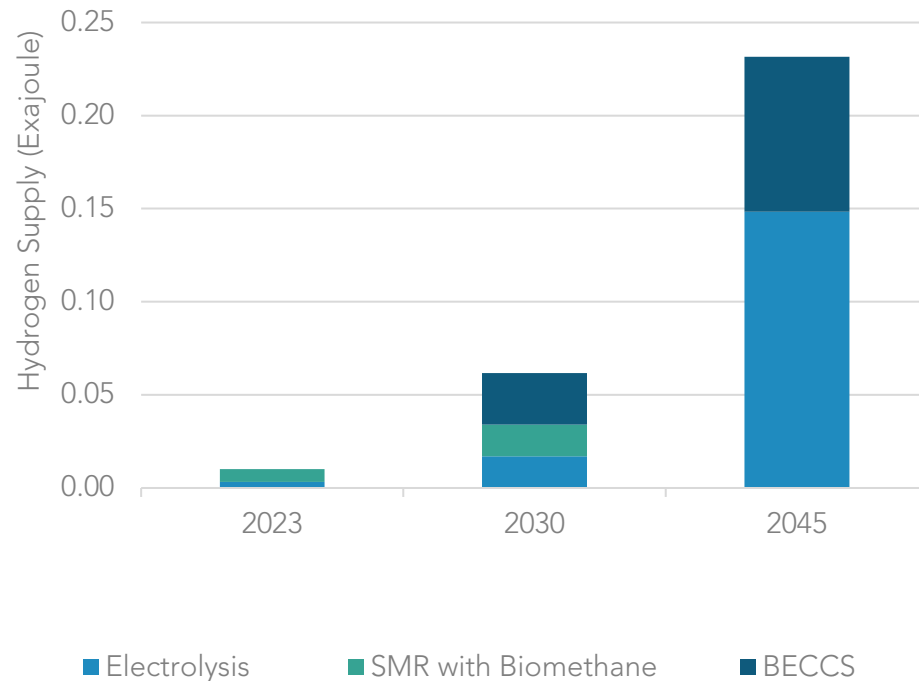


Significant Reduction in Overall GHG Emissions by Replacing Methane End-Uses with Hydrogen



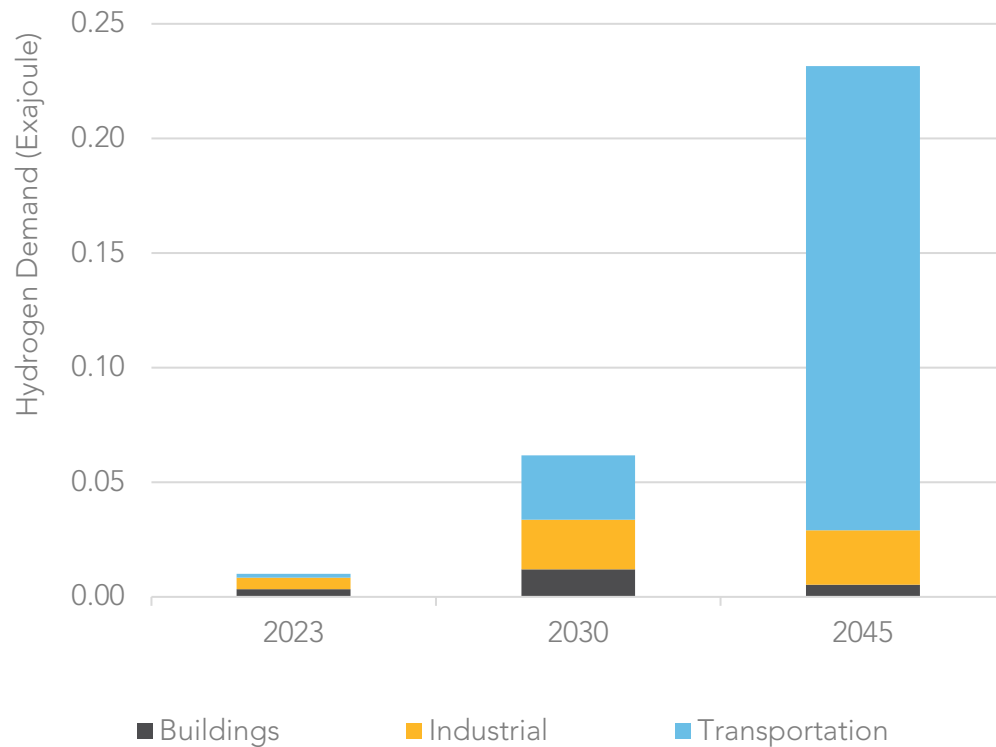
Prioritize non-combustion options

Hydrogen Supply in the Scoping Plan



- Hydrogen identified as important tool to displace fossil fuel use
- Scoping Plan assumed hydrogen is supplied by 3 methods: electrolysis powered from zero-carbon electricity, steam methane reformation (SMR) of biomethane, and biomass gasification with CCS (BECCS)
- Electrolytic hydrogen demand requires ~ an additional 10 GW of off-grid solar capacity in 2045

Hydrogen Use by Sector in the Scoping Plan



Hydrogen demand largely driven by non-combustion uses in transport sector:

- Fuel cells for light-, medium-, and heavy-duty vehicles, aviation, ocean-going vessels, freight and passenger rail

Other end-uses with relatively smaller volumes:

- Blended in pipeline to reduce GHG emissions from fossil gas use in buildings
- Blended in natural gas pipeline and in dedicated hydrogen pipelines in industrial manufacturing
- Hydrogen combustion turbines for resource adequacy

Achieving Carbon Neutrality Requires Dramatic Reductions in Fossil Fuel Demand

Unprecedented Deployment of Clean Technology and Nature-Based Climate Solutions



37x total on-road ZEVs



6x electric appliances in residences



1700x hydrogen supply



4x installed wind/solar generation capacity



> 2.5 Million acres of NWL climate action per year

Significant GHG Reductions



94% decrease in liquid petroleum fuel demand



91% decrease in fossil gas used in buildings



66% decrease in methane emissions from agriculture



10% reduction in wildfire emissions

In 2045 relative to 2022

CALIFORNIA'S CLIMATE PLAN LAYS THE ROADMAP TO 2045



CUT AIR POLLUTION **71%**



SLASH GREENHOUSE GAS
EMISSIONS **85%**



DROP GAS CONSUMPTION **94%**



CREATE **4 MILLION** NEW JOBS



SAVE CALIFORNIANS **\$200 BILLION**
IN HEALTH COSTS DUE TO
POLLUTION



Future of Hydrogen and SB 1075



Hydrogen Policy Landscape



Federal funding opportunities expanding

- DOE Regional Clean Hydrogen Hubs Program
- Inflation Reduction Act 45V Hydrogen Production Tax Credit



California pursuing complimentary state actions

- Hydrogen Market Development Strategy
- ARCHES public-private hydrogen hub consortium
- Regulations (i.e LCFS, ACF/ACT) to increase ZEV and hydrogen deployment
- Additional analysis and recommendations under SB 1075



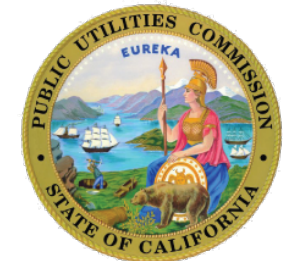
Other regional/local initiatives happening (e.g. Angeles Link, Lancaster Hydrogen City)

Additional Work Ahead

- Alignment of local actions to support state and federal air quality and climate goals and take advantage of State and Federal funding opportunities
- Need for permitting and the building of infrastructure to support climate and air quality goals, including low-carbon hydrogen production facilities
- Need for expansion of low-carbon hydrogen supply and non-combustion uses via funding and regulatory programs and from the private sector
- Need for further policy and technical evaluations under SB 1075 to support deployment, including water and air quality implications of production/use

Legislative Direction: SB 1075 Analysis

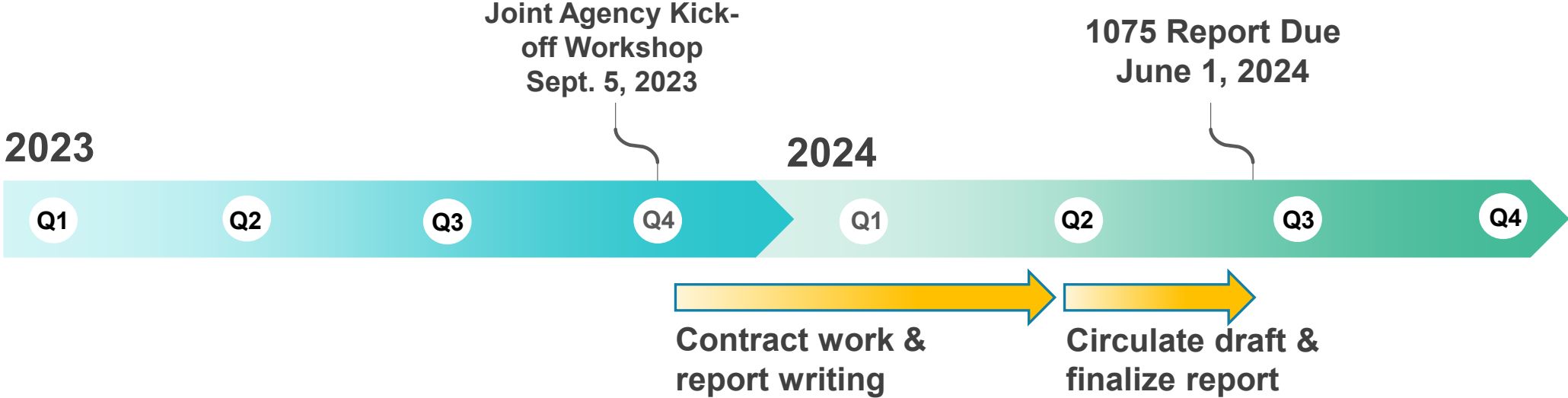
- Requires CARB, in consultation with California Energy Commission, the California Public Utilities Commission, and the California Workforce and Development Board to produce a comprehensive report on hydrogen, to be posted on CARB website by June 1, 2024



Legislative Direction: SB 1075 Analysis



SB 1075 Process and Timeline



Next Steps

- Staff welcomes your input as we begin this analysis
 - Written feedback is requested by September 19, 2023 (11:59pm)
 - Submit feedback: <https://ww2.arb.ca.gov/our-work/programs/sb-1075-hydrogen/meetings>
- For additional information, visit: <https://ww2.arb.ca.gov/our-work/programs/sb-1075-hydrogen>
- Contact us at: hydrogen@arb.ca.gov