

Draft Scenarios for Achieving Carbon Neutrality in the 2022 Scoping Plan Update

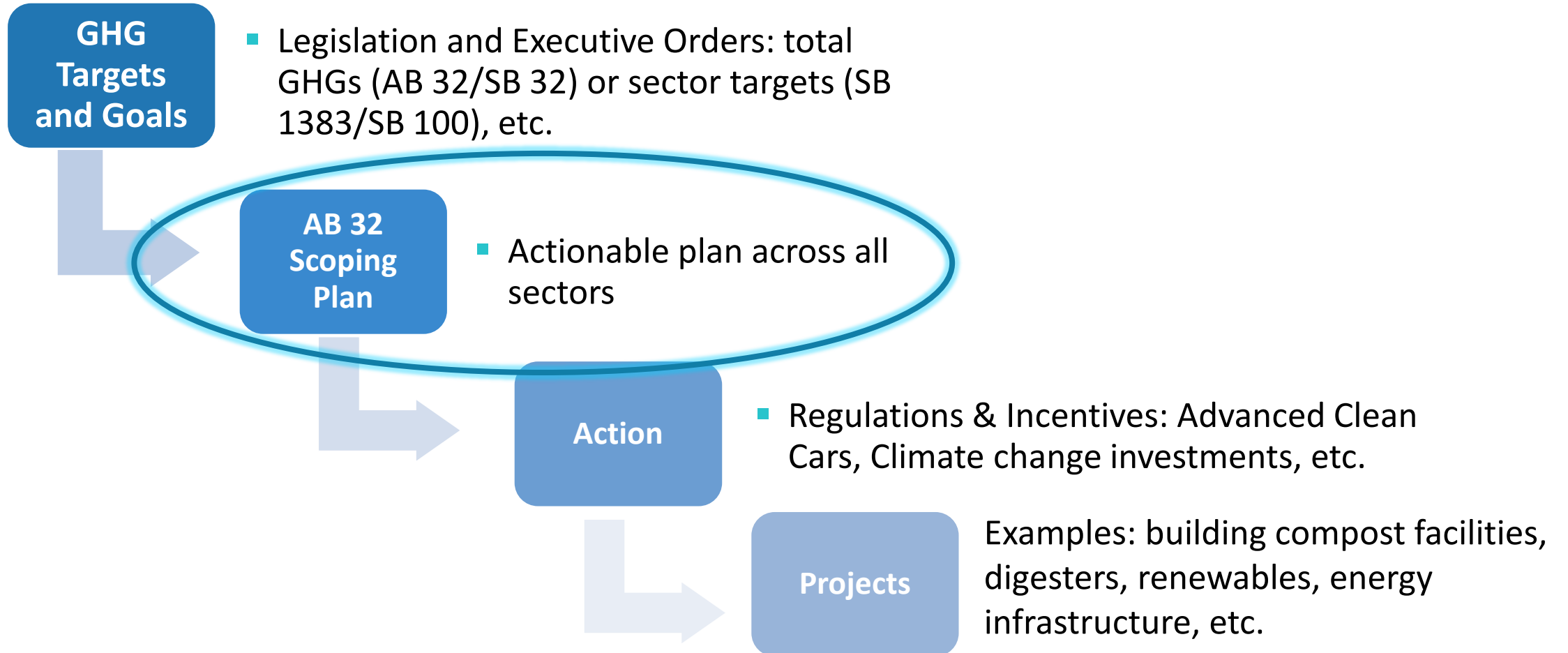


MARCH 24, 2022

AB 32 Climate Change Scoping Plan Statutory Requirements

- Scoping Plan(s) are action plans for CA to meet statewide GHG reduction targets
 - Scoping Plan(s) outline a suite of climate policies to address emissions across all sectors
 - Required to be updated at least every 5 years
 - 2017 SP (most recent) – cost-effective and technologically feasible path to achieve the 2030 target
- Provide direct GHG emissions reductions and air quality benefits
- Minimize emissions “leakage” – increase to non-CA GHG emissions
 - Ensure high-road jobs remain
- Facilitate sub-national and national collaboration
 - Develop exportable programs for partners to adopt
- Support cost-effective and flexible compliance

California's Climate Policy Framework



Input Received for Scenario Design

- More than 90 comments from industry, EJ organizations, and individuals on AB 32 Source scenarios
- Comments from EJ Advisory Committee
 - https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Final%20Responses%20to%20CARB%20Scenario%20Inputs_12_2_21.pdf
 - [https://ww2.arb.ca.gov/sites/default/files/2022-01/Scenario Slides for Jan25 EJAC Mtg_01242022.pdf](https://ww2.arb.ca.gov/sites/default/files/2022-01/Scenario_Slides_for_Jan25_EJAC_Mtg_01242022.pdf)
- More than 90 comments from topical experts, affected stakeholders, and EJ organizations on NWL scenarios
- Two EJ Advisory Committee Working Group meetings
 - <https://ww2.arb.ca.gov/sites/default/files/2022-02/Draft%20EJAC%20NWL%20Workgroup%20Notes.pdf>

What Carbon Neutrality Means



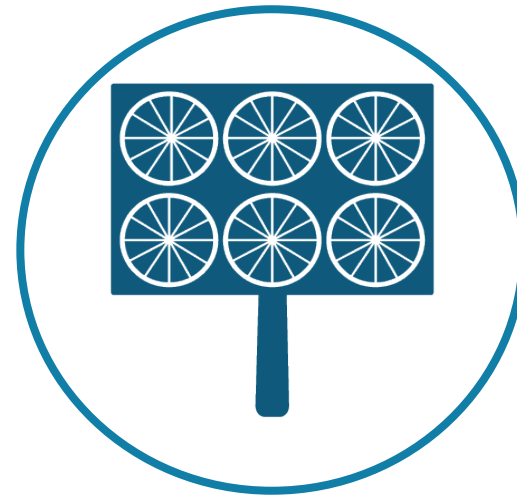
**Continue to reduce
emissions from
sources in the AB 32
GHG Inventory**

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**Emissions and
sequestration
from natural and
working lands**

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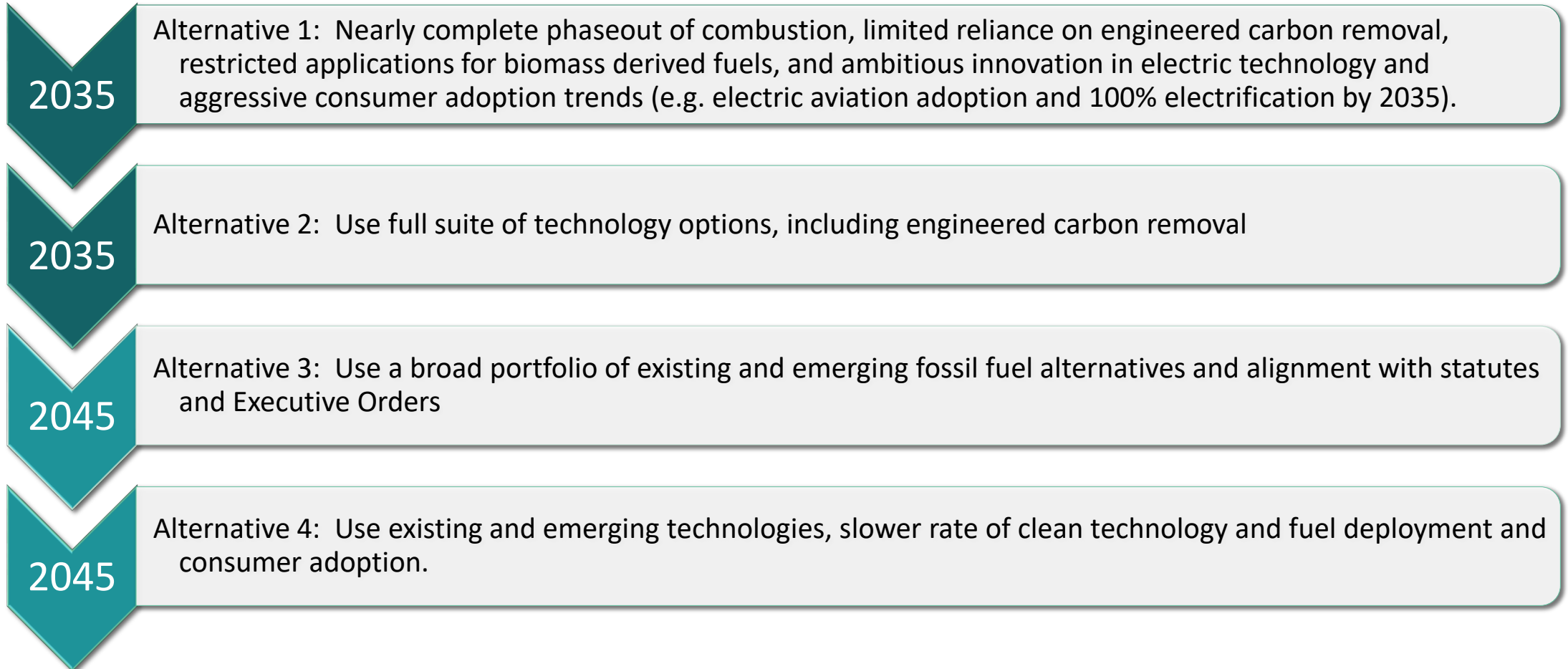


**Technological
Carbon Dioxide
Removal**

=

**Carbon
Neutral**

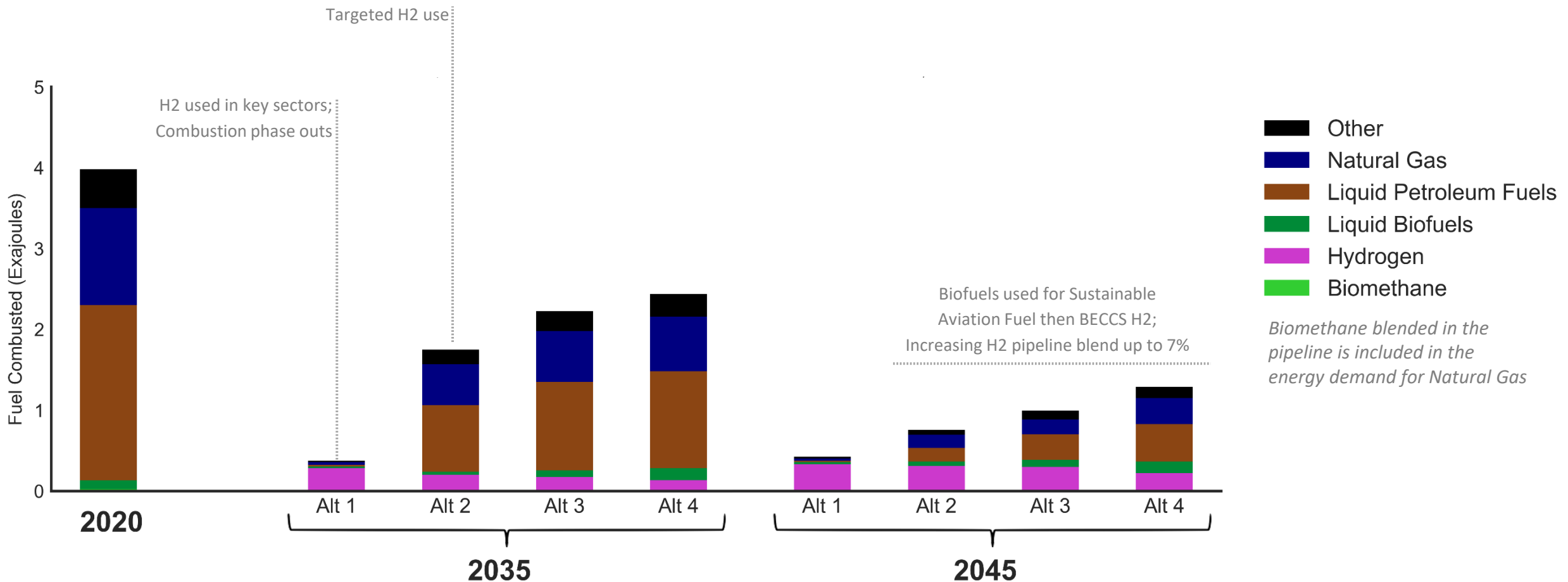
AB 32 Sources Scenarios Overview



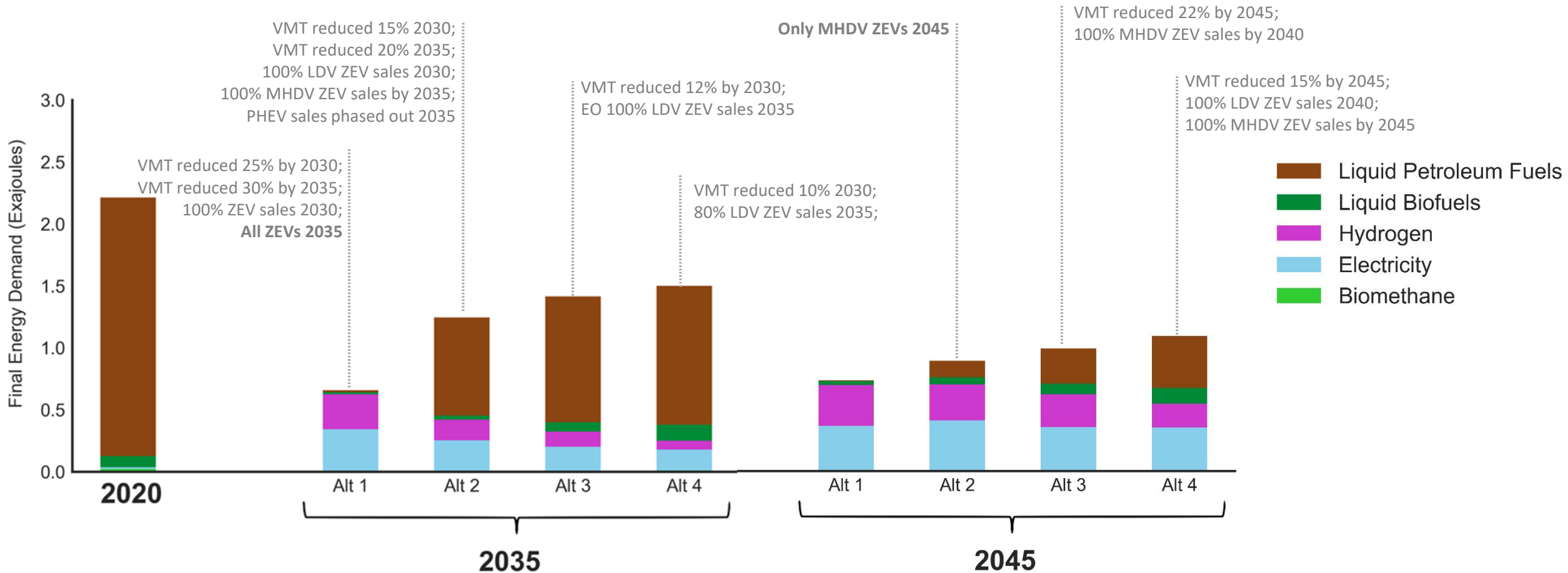
Key Metrics

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Annual Build Rates Historic Max Builds: Solar: 2.7GW Battery: 0.3GW	Solar: 10GW Battery: 5GW	Solar: 5GW Battery: 3GW	Solar: 7GW Battery: 2GW	Solar: 6GW Battery: 2GW
Vehicle Early Retirements US-wide Cash for Clunkers \$3B and 690k vehicles	LDV: 16M 5-16 yr. old MHDV: 1.4M 5-16 yr. old	LDV: 0 MHDV: 0.6M 10-20 yr. old		
Residential Early Retirements	7M electric homes. Appliances 5-16 yr old			
Hydrogen Demand & Electrolysis Need Total CA Capacity: 83GW	Percent 2020 US: 19% Solar: 47GW	Percent 2020 US: 18% Solar: 44GW	Percent 2020 US: 17% Solar: 41GW	Percent 2020 US: 13% Solar: 31GW
Petroleum Refining Remaining	2035: 0% 2045: 0%	2035: 25% 2045: 8%	2035: 33% 2045: 13%	2035: 39% 2045: 18%
Total CCS Needs Industrial & Refining	2035: <1MMT 2045: <1MMT	2035: 8MMT 2045: 2.4MMT	2035: 10MMT 2045: 4MMT	2035: 11MMT 2045: 5MMT
Residual Emissions Current global DAC 0.01 MT/year	2035: 48MMT 2045: 37MMT	2035: 154MMT 2045: 76MMT	2035: 0MMT 2045: 100MMT	2035: 0MMT 2045: 120MMT

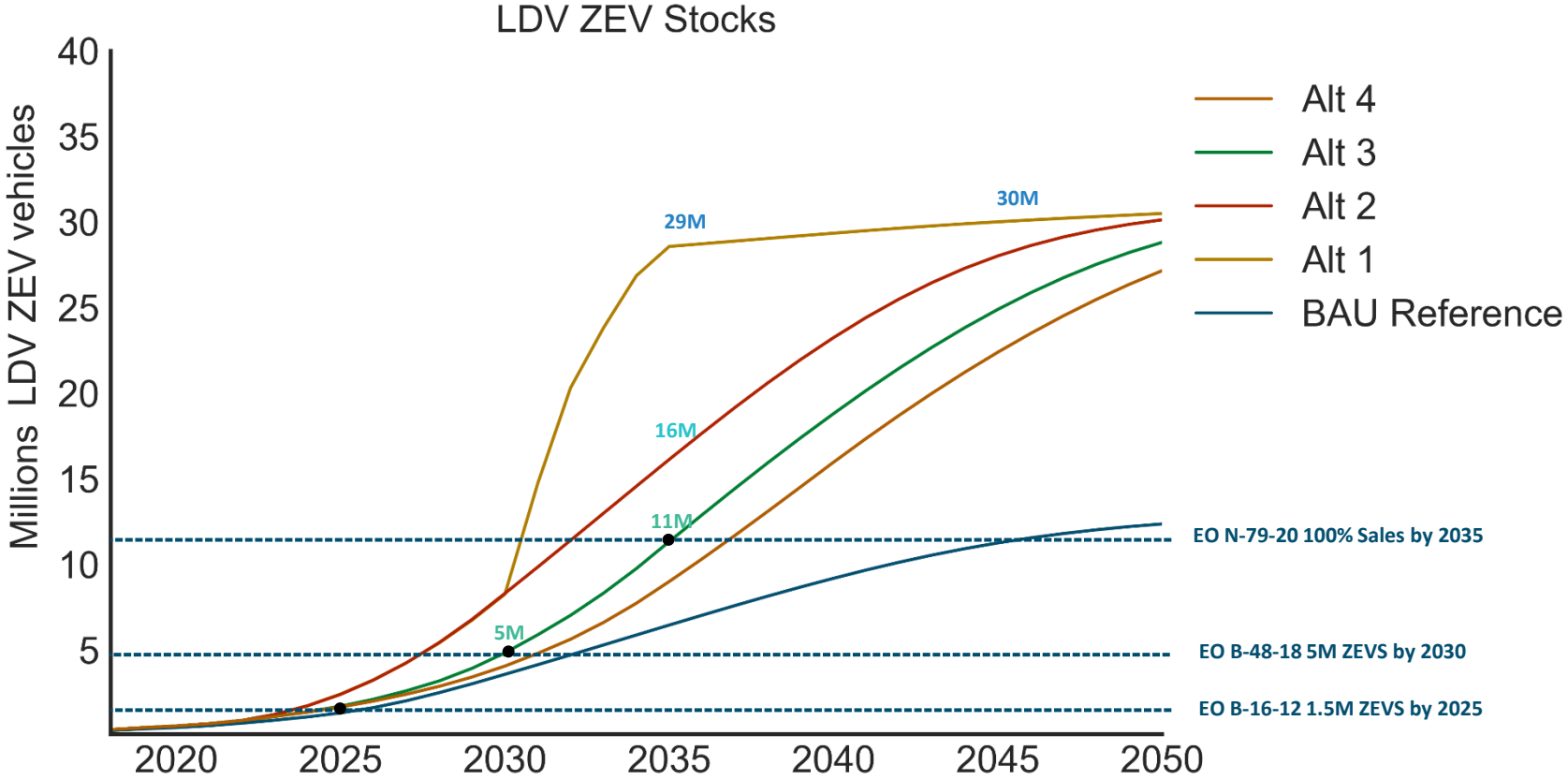
Phase Down Reliance on Fossil Fuels



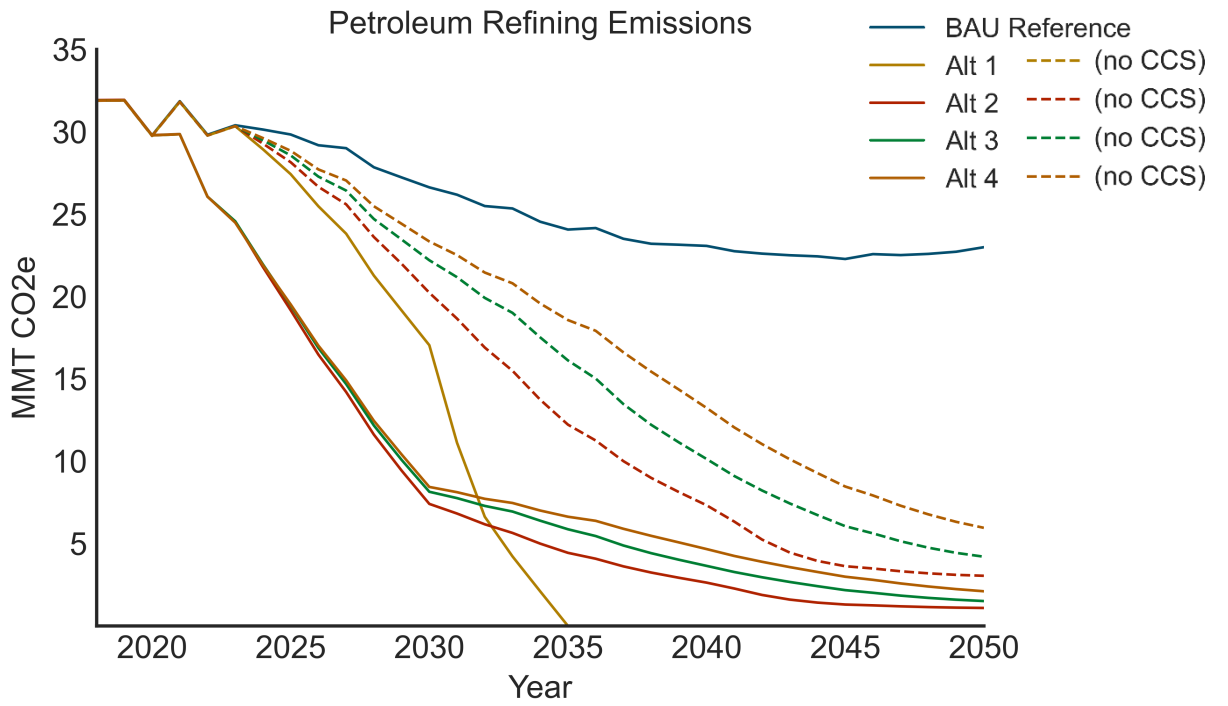
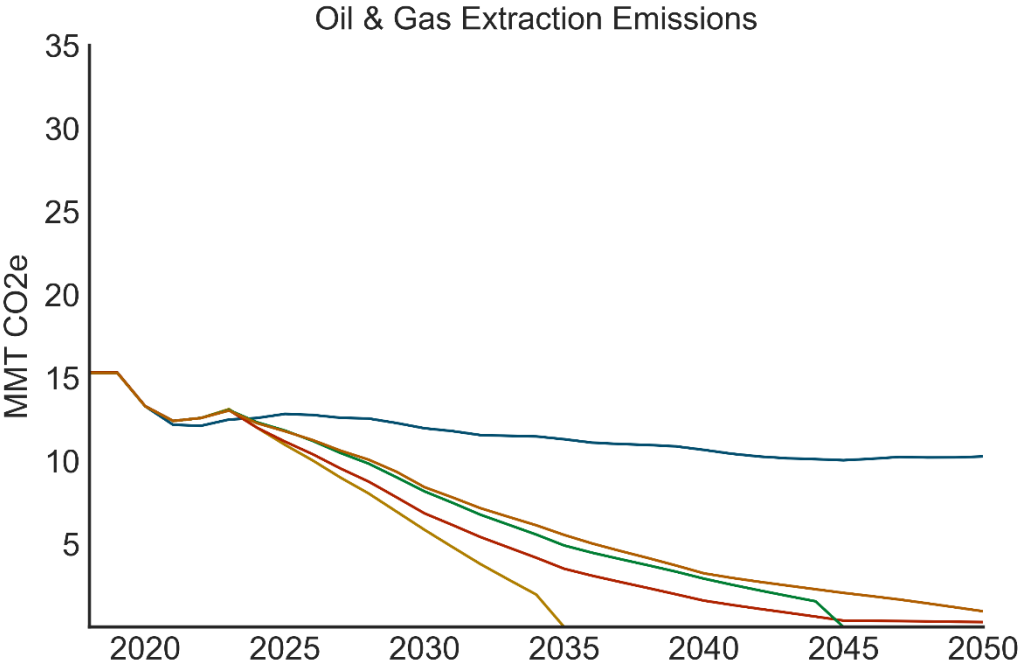
Transportation Sector Transition



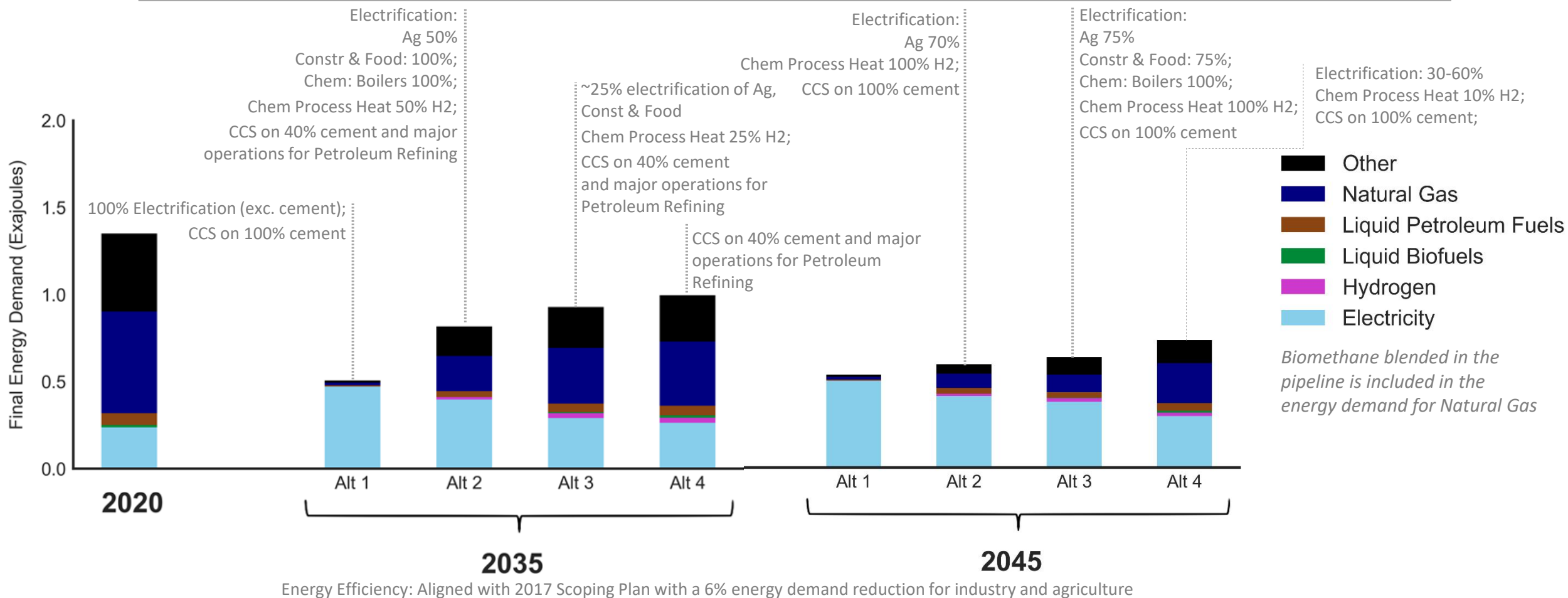
California Vehicle Stock Transition



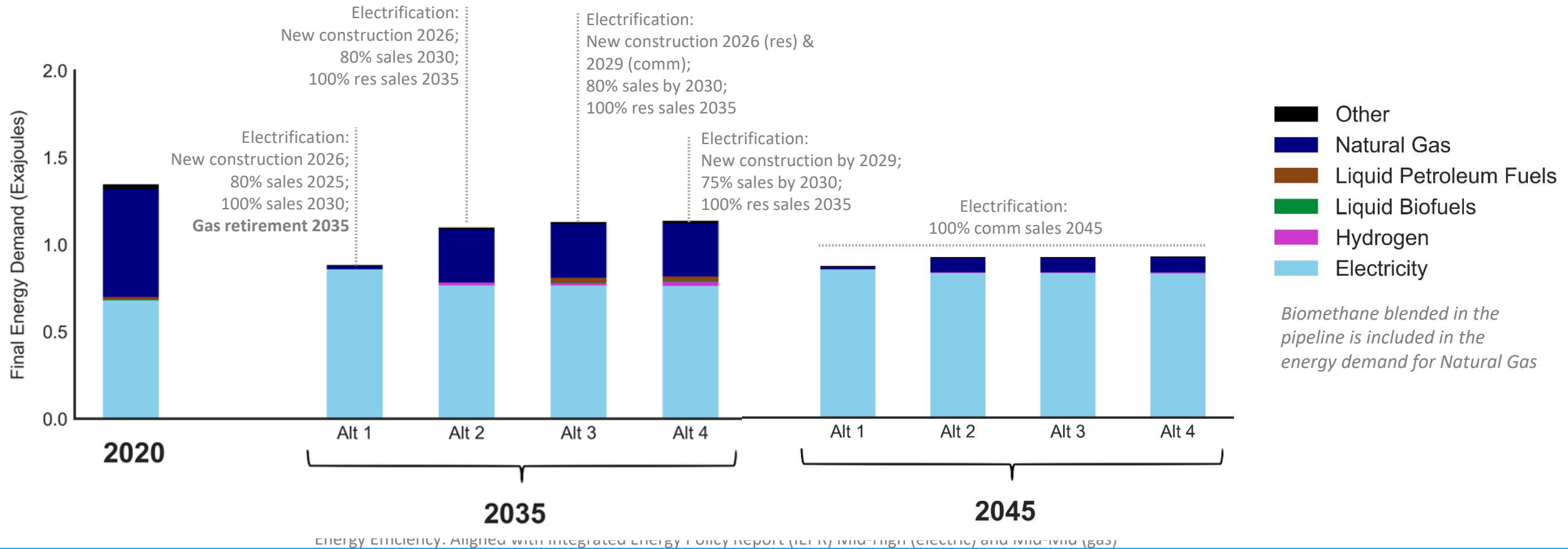
Petroleum Supply



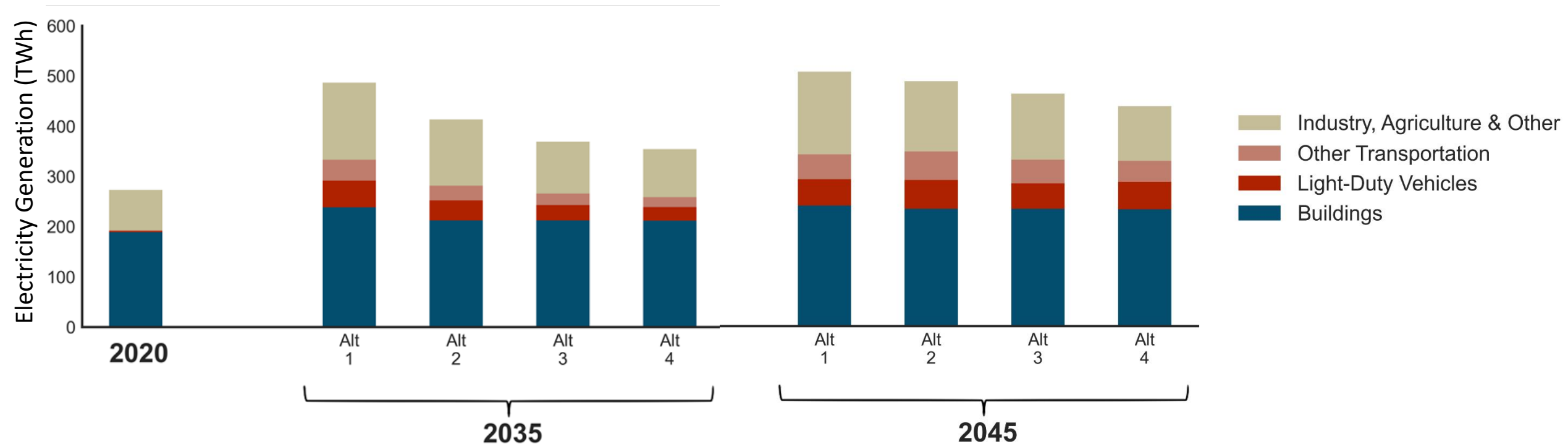
Industrial Sector Transition



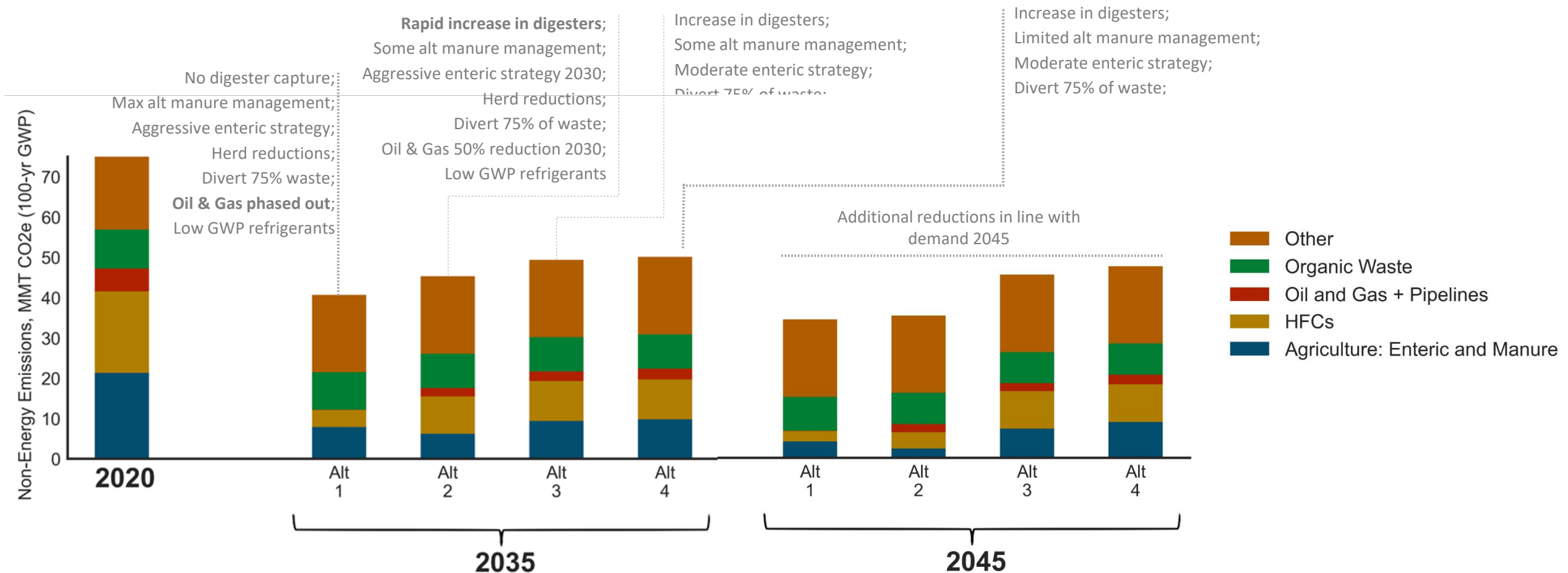
Building Sector Transition



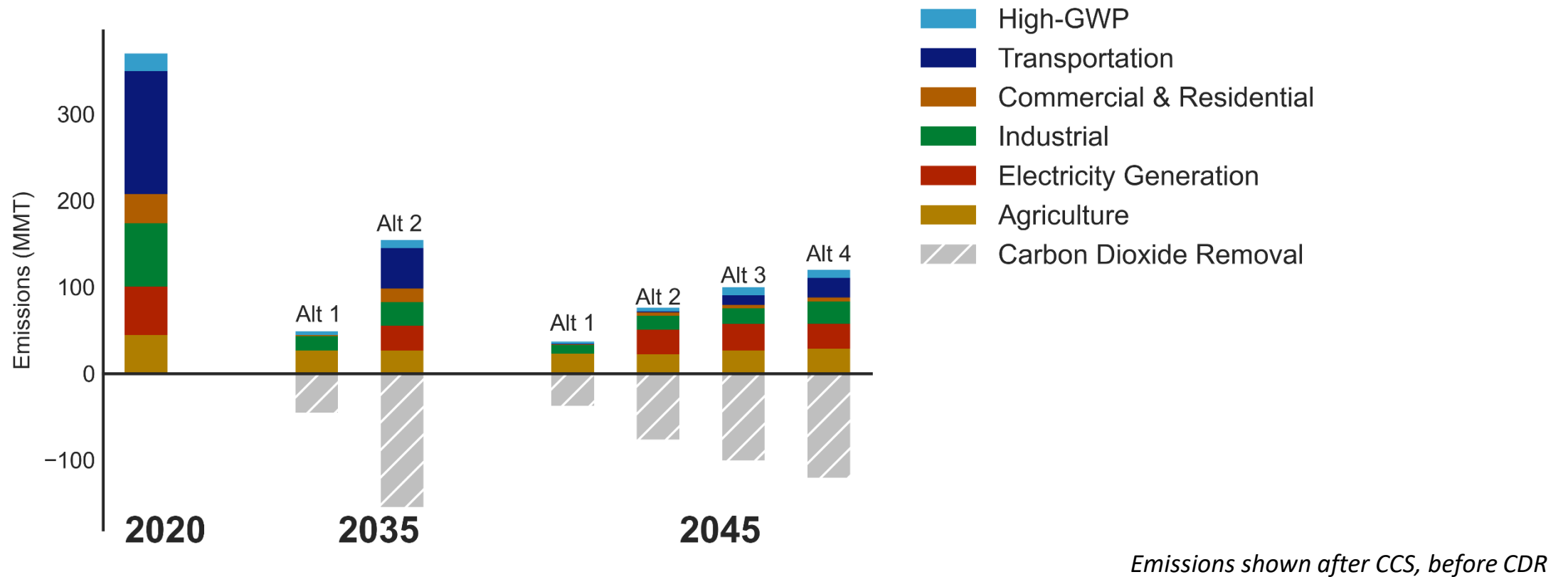
Electric Sector Transition



Non-Combustion Emissions

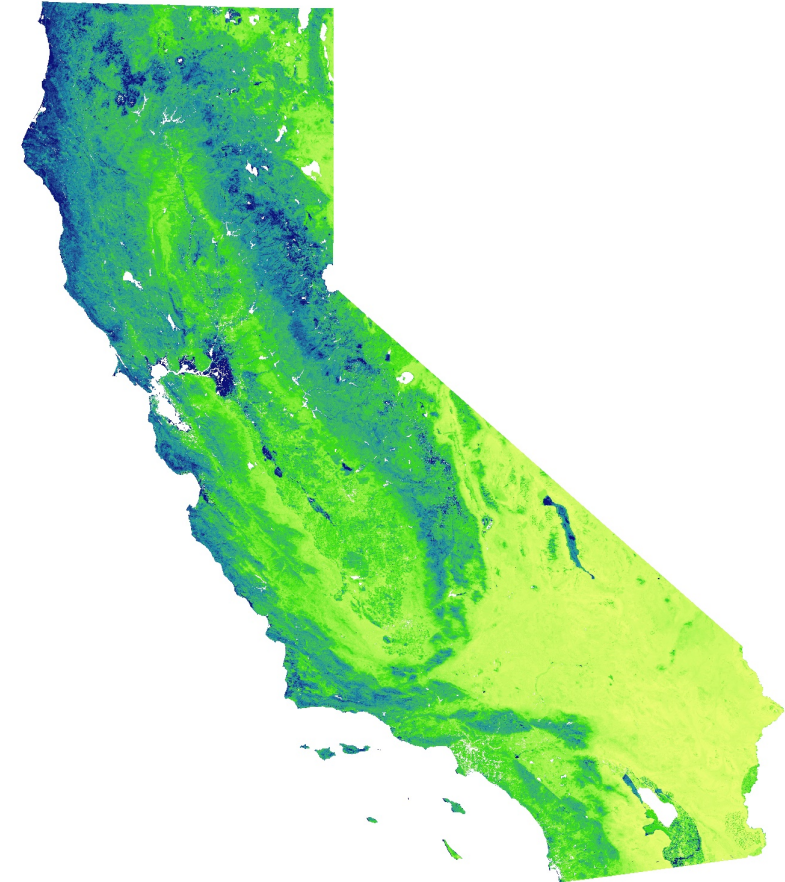


Potential Role of Carbon Dioxide Removal to Achieve Carbon Neutrality



NWL in Previous Scoping Plans

- Executive Orders
- Extensive planning, technical work, and coordination
- 2008 Scoping Plan
 - Forests only
 - 5MMT sequestration by 2030
- 2013 Scoping Plan
 - Natural and Working Lands
 - Forest Carbon Plan
- 2017 Scoping Plan
 - Preliminary target
 - Reduce NWL emissions 15-20 MMT
 - Natural and Working Lands Climate Change Implementation Plan
- 2022 Scoping Plan
 - Most advanced modeling and target development effort to-date



Natural and Working Lands Carbon Alternatives



NWL Alternative 1: Prioritize maximizing short term carbon stock at 2045



NWL Alternative 2: Balanced mix of strategies from current commitments/plans



NWL Alternative 3: Prioritize restoration and climate resilience



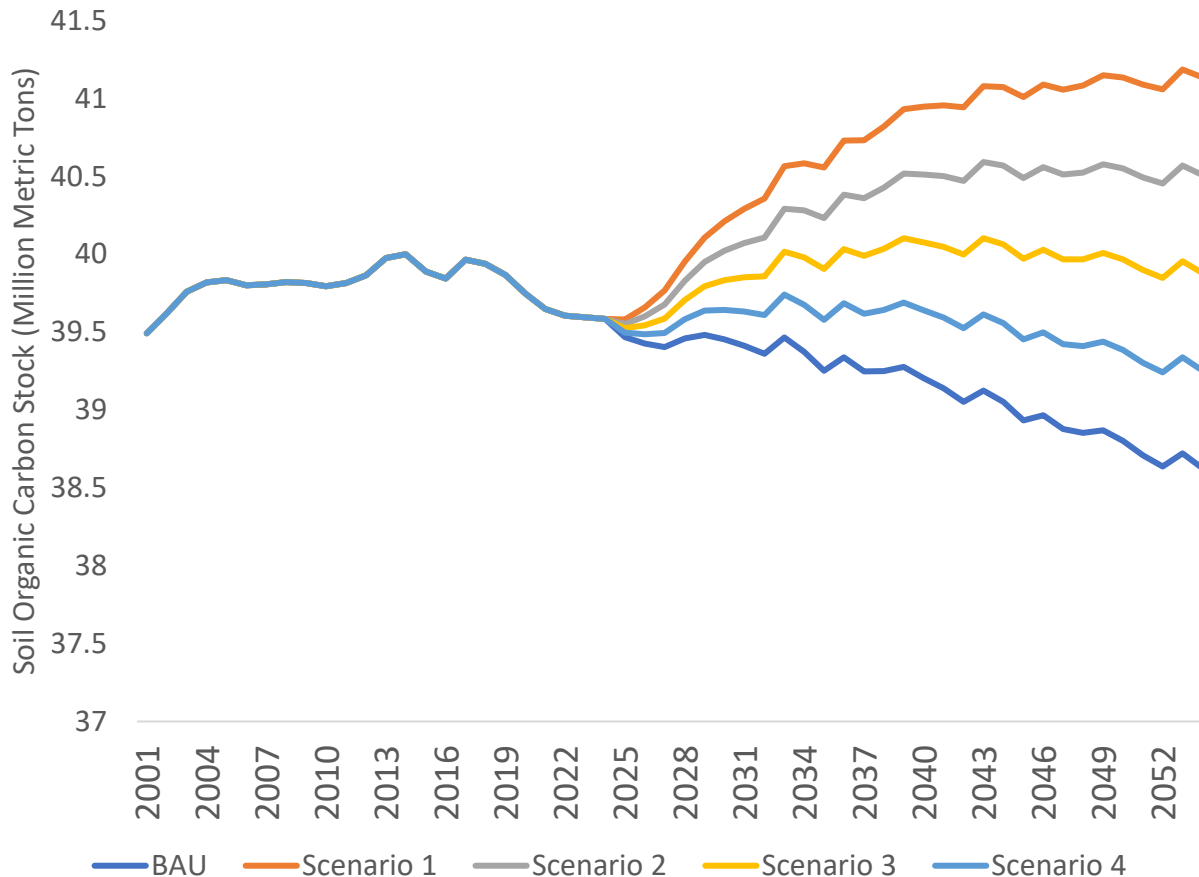
NWL Alternative 4: Prioritize forest wildfire and other fuel reduction efforts

Landscapes Modelled for 2022 Scoping Plan Update

Landscape	Model
Forests	RHESSys
Shrublands	RHESSys
Grasslands	RHESSys
Sacramento-San Joaquin Delta	SUBCALC/Literature
Urban Forests	CARB Urban Forest Carbon Model
Wildland Urban Interface	California Forest Observatory/CARB NWL Inventory
Annual Croplands	Daycent/LUCAS/Literature
Perennial Croplands	CARB Orchard Carbon Model/LUCAS
Deserts	CARB NWL Inventory/LUCAS

Results Example – Croplands Carbon

Annual Agriculture Carbon Stock

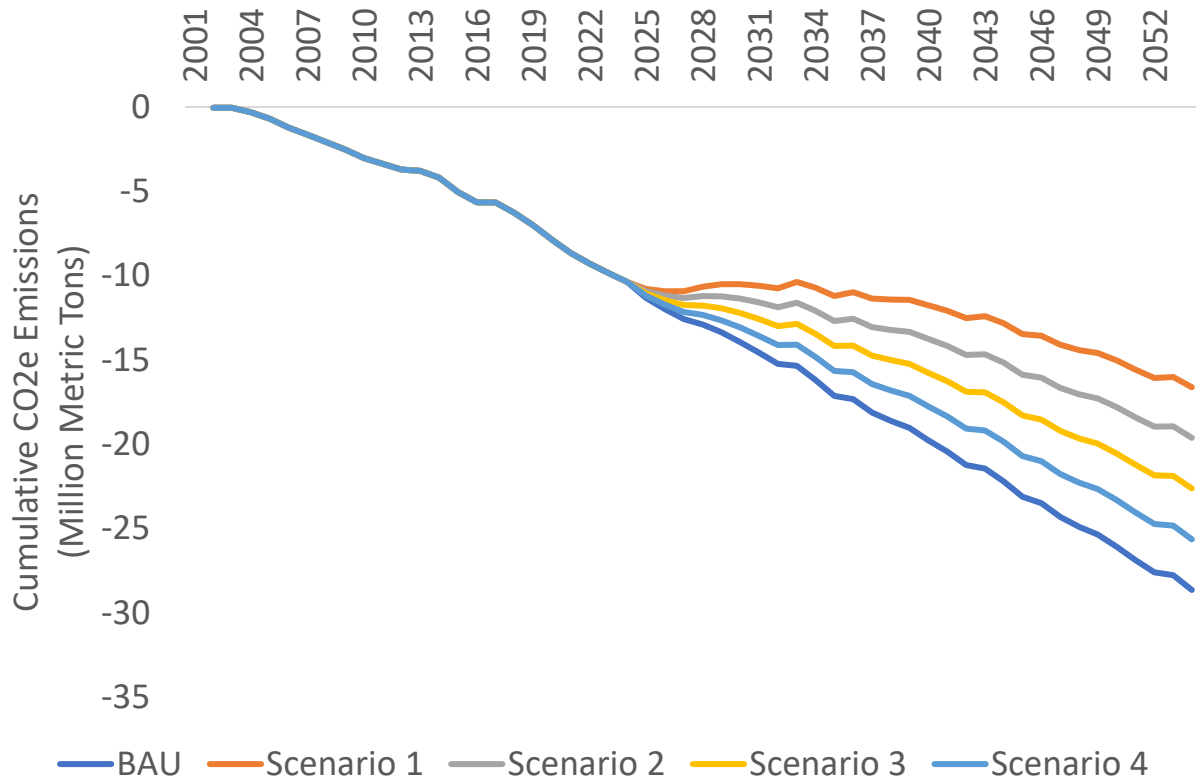


- BAU = no healthy soils practices and some conversion
- BAU = loss of soil organic carbon stocks*
- Scenario 1 = greatest increase in carbon stocks
- Scenarios 2, 3, 4 = levels of action between BAU and Scenario 1

*Loss of carbon stock = increase in CO₂ emissions

Results Example – Croplands Emissions

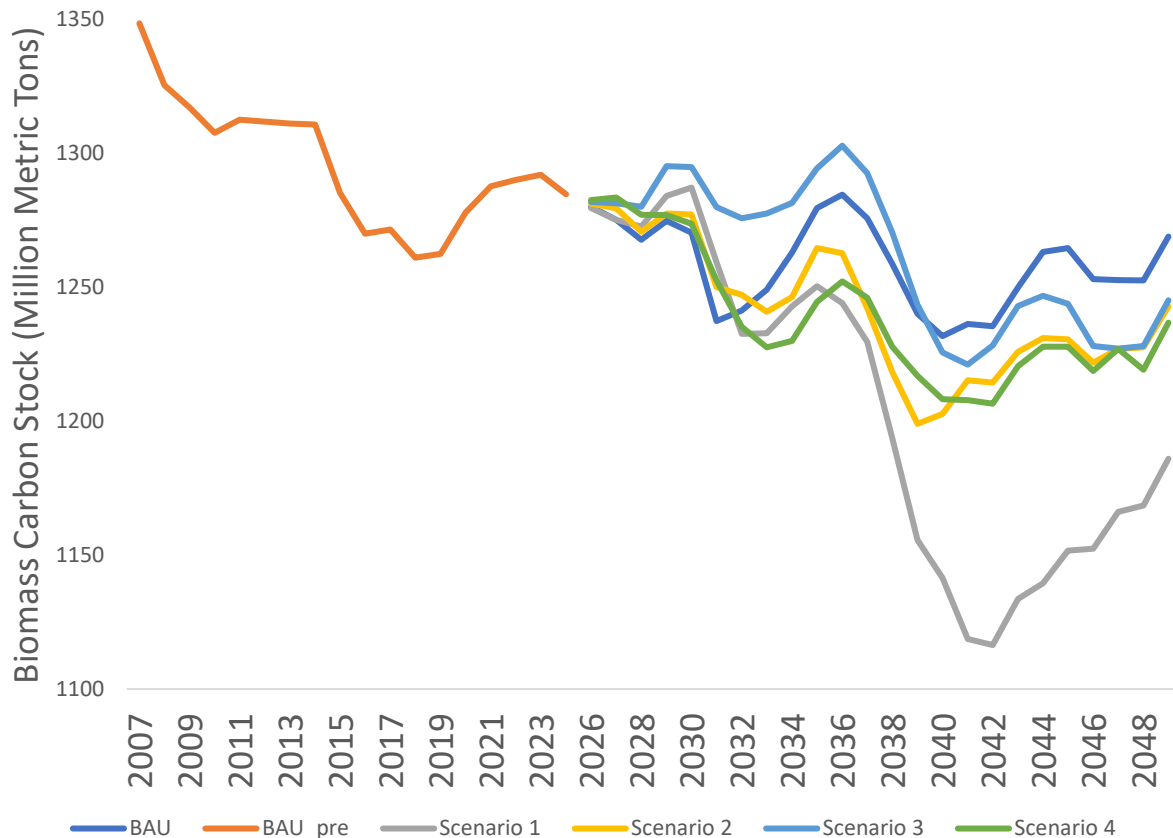
Annual Agriculture cumulative CO2e emissions



- In the graph, negative values are emissions.
- Some scenarios sequester carbon
- Because of N2O emissions, all scenarios are net emitters, BUT
- All scenarios show annual climate smart management reduces future cropland emissions
- Scoping Plan will qualitatively discuss additional actions not modeled that could reduce N emissions

Results Example – Forest Carbon

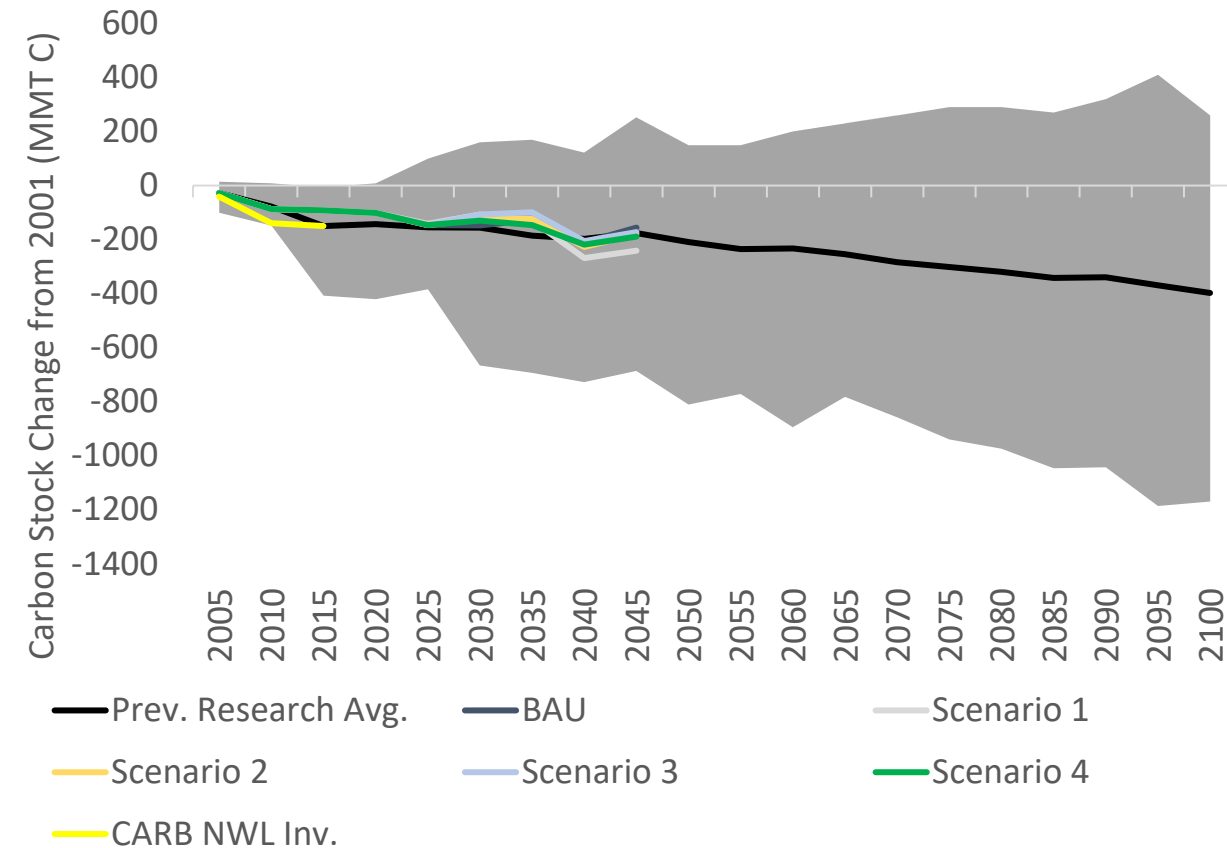
Above and Below Ground Biomass and Harvested Wood Product
Carbon Stock (MMT C)



- Forests are largest carbon stock pool in the State
- Modeling included wildfire impacts on carbon stocks
- Scenario 2,3,4 = significant increase in management from BAU, which decreases severity of fires, while not negatively impacting overall forest carbon stock.
- Post-2050 modeling in progress given forest timelines
- Additional results forthcoming on reduced forest fire emissions, health, and economics to show overall effect of expanded forest management

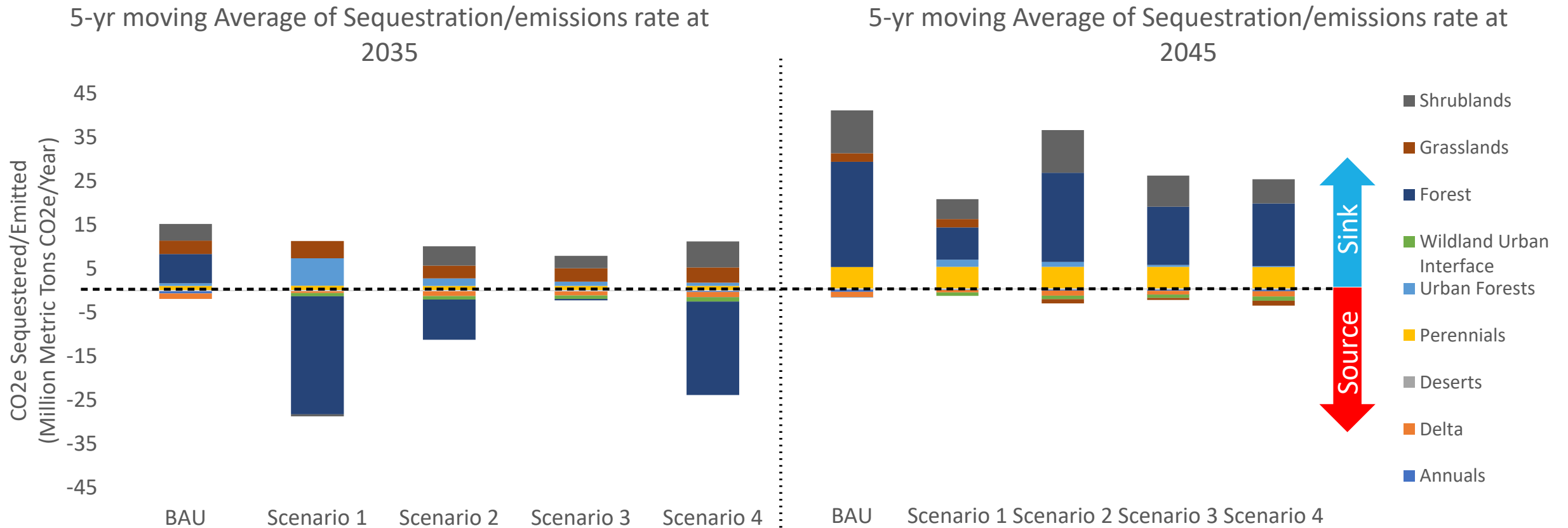
CARB NWL Modeling Compared With Previous Research

CARB Modeling and Independent modeling



- Shows all modeled NWL land type carbon stocks together
- CARB's modeling is in line with previous research
- Grey shadow = range of previous research carbon outcomes
- Prev. research and CARB modeling project decreasing carbon stocks, and that lands are affected by climate change and management decisions
- Management can reduce emissions and improve carbon stocks, ecosystem, and public health

All NWL Sequestration/emissions Rate at a Given Year



Summary

INDUSTRY AND ENERGY

- All scenarios achieve drastic reductions in fossil fuel combustion
 - Deliver air quality and GHG benefits
- There is no path to zero without carbon dioxide removal
 - Short-lived climate pollutants persist beyond combustion phase out
- Rates of clean technology and energy deployment are unprecedented
- Need to keep clean energy options open

NATURAL AND WORKING LANDS SCENARIOS

- Climate action needed to improve ecosystem climate resilience
 - Protect ecosystems against future climate change
 - Ensure provision of services to nature and society
 - Protect communities
- High-levels of action on forests can decrease wildfire risk and improve forest health without substantial carbon loss
- Increasing actions on other lands can improve carbon storage and reduce emissions from this sector
- Natural variability exists - the ability for NWL to contribute to CN is dependent on future climate change and varies from year to year

EJ Advisory Committee Activities

- Two EJ Advisory Committee (EJAC) meetings per month or two-day EJAC meetings per month through the end of the Scoping Plan process to advise CARB on the development of the draft Scoping Plan
- Two Joint EJAC-CARB Board meetings to discuss EJAC recommendations on the Scoping Plan
 - March 10th, 2022
 - September 1st, 2022
- Deep dive informational meetings for EJAC meetings to provide EJAC members in-depth information and technical support on Scoping Plan policies and sectors.

EJ Advisory Committee Activities

- EJAC sub-quorum workgroup meetings on topics such as fuel, industry, manufacturing, natural and working lands, etc. to assist EJAC members in the development of EJAC recommendations
- Scoping Plan Board meetings and workshops:
 - EJAC is welcome to do a presentation to share their expertise and recommendations with the Board after the staff presentation on Scoping Plan items.
 - EJAC is invited to be on a panel for Scoping Plan workshops to share their expertise and recommendations.

EJ Advisory Committee Activities

- Community engagement events hosted by EJAC members and supported by CARB.
- EJAC member organizations work directly with communities to host and facilitate community engagement workshops to inform EJAC recommendations
- CARB provides ongoing funding and logistical support to assist EJAC member organizations to conduct community engagement workshops

EJ Advisory Committee Community Engagement Events

- San Joaquin Valley EJAC members hosted a successful Scoping Plan workshop on February 22.
 - Over 100 participants from the San Joaquin Valley shared ideas and their priorities.
- Next EJAC-led community engagement events planned for May.

Additional Analyses for 2022 Scoping Plan Update

- Health and Economic Analyses
 - AB 197 social cost of carbon, cost per ton of measure, estimated air quality
 - Economic (health, macro, household, jobs)
- Public Health
- Environmental (CEQA)

Next Steps – Prior to Release of the Draft 2022 Scoping Plan Update



Workshops

Modeling results workshops
(March/April)
Transportation sector workshop (April)



Board Engagement

1st Board meeting
(June)



Environmental Justice Advisory Committee

2 standing meetings per month
Topical Workgroup meetings as needed



Community Meetings

EJAC-led community meetings with CARB staff assistance

2022 Scoping Plan Update Schedule

