BAY AREA AIR QUALITY MANAGEMENT DISTRICT

AGENDA: 4

Proposed Updates to the Transportation Fund for Clean Air (TFCA) 40% Fund Policies

Policy, Grants, and Technology Committee Meeting

October 16, 2024

Linda Hui
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Action Item

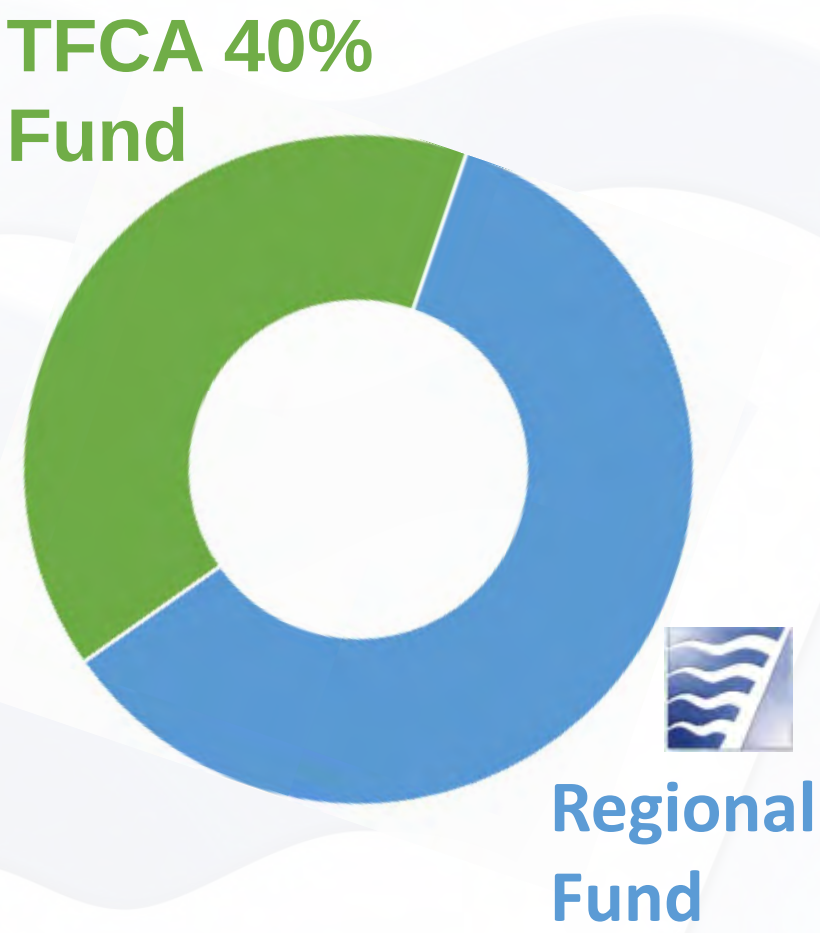
Action item for the Committee to consider recommending to the Board of Directors:

Approve proposed updates to the Transportation Fund for Clean Air (TFCA) 40% Fund Policies Commencing Fiscal Year Ending 2026 as shown in Attachment 1.

Outline

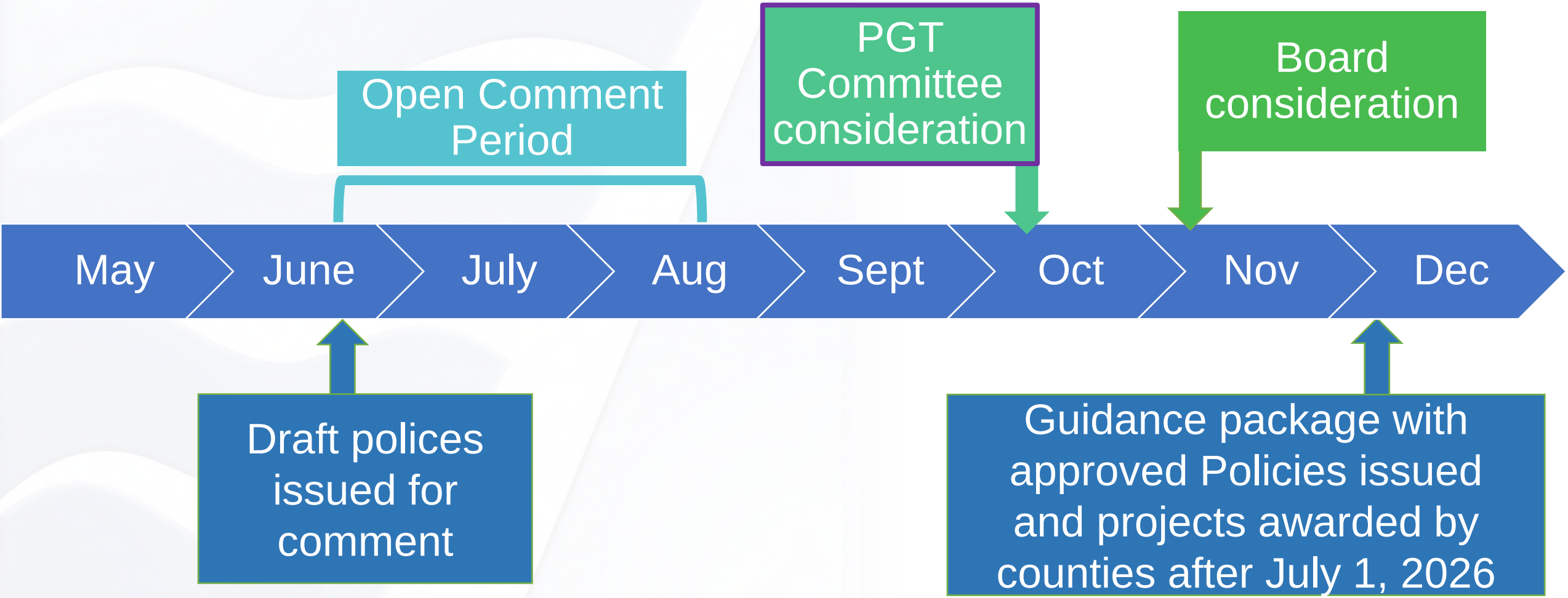
- Background
- Proposed updates to TFCA 40% Fund Policies
    - Process and timeline
    - Proposed updates
    - Next steps
- Recommendation

Background



- TFCA authorized in 1991 by State Legislature to help air districts reduce on-road mobile source emissions
- $4 motor vehicle registration surcharge fee with 40% of funds distributed to the nine Bay Area congestion management agencies
- Staff brings recommended updates to TFCA 40% Fund policies to Air District Board of Directors for consideration

Timeline for Policy Updates



Summary of Proposed Updates

- Increase the maximum cost-effectiveness for alternative fuel vehicles to $522,000/ton (policy #2)
- Remove the Air District's Community Air Risk Evaluation (CARE) areas from the definition of Priority Areas
- Revert the amount of time in which a grantee is required to commence a project from 24 to 12 months (policy #6)
- Update language so that zero-emission replacement vehicles do not need to stay in the same weight class as the original vehicles due to additional weight of batteries (policies #22 and #24)
- Allow for upgrades from bike racks to e-lockers or to bicycle storage facilities (policy #30.a.)

Community Process

- In 2023, there were meetings between the Air District's Community Advisory Committee (CAC) and several of the administering agencies
- Each agency shared their approaches on community-input and direction for project identification and selection
- Each agency has its own local process for community-direction, outreach and communication including, in many cases, their own local advisory committees
- Administering agencies will start sharing their community process in their reporting to the Air District

Next Steps for Future Cycles

Continue coordinating with administering agencies on program refinements:

- Add new reporting requirements for greater transparency on process for awarding funds, community-input process on identifying and selecting projects, and other opportunities for community participation and direction
- Work with administering agencies to see if additional adjustments to Cost Effectiveness (CE) are warranted given recent inflation

Recommendation

Action item for the Committee to consider recommending to the Board of Directors:

Approve proposed updates to the Transportation Fund for Clean Air (TFCA) 40% Fund Policies Commencing Fiscal Year Ending 2026 as shown in Attachment 1.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

AGENDA: 5

State Legislative Update (Special Session)

Policy, Grants, and Technology Committee Meeting
October 16, 2024

Alan Abbs

Legislative Officer

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Action Requested

None; the Committee will discuss this item, but no action is requested at this time.

Presentation Summary

Updates will be provided for the following:

- Special Session Summary of Events
- ABX2-1 (Hart and Aguiar-Curry) – Energy: transportation fuels: inventories: turnaround and maintenance
- ABX2-9 (Petrie-Norris) – Transportation fuels: specifications: production enhancement strategies

Abbreviations: Special Session Assembly Bill (ABX)

Special Session Summary (to date)

- On August 31, 2024, the Governor called for a Special Session to address California's gasoline supply and price spikes
- The Assembly convened for the Special Session that same day
- A total of nine Assembly bills were introduced in the month of September for this Special Session
- Two bills passed the Assembly favorably and were ordered to the Senate:
  - ABX2-1 (Hart and Aguiar-Curry)
  - ABX2-9 (Petrie-Norris)

Special Session Summary (to date) (cont.)

- On October 7, 2024, the Senate convened for the Special Session, to hear and vote on ABX2-1 and ABX2-9
- Senate Special Session Schedule:
  - October 7, 2024 – Senate Special Committee on Fuel Supply and Price Spikes
  - October 8 ,2024 – Senate Appropriations Committee
  - October 11, 2024 – Senate Floor Session*

* If substantive amendments have been made to a bill in the Senate and that bill passes the Senate Floor favorably, the bill will need to go back to the Assembly Floor for concurrence of those amendments before the bill can be sent on to the Governor.

Special Session Bill Updates

- ABX2-1 (Hart and Aguiar-Curry) – Energy: transportation fuels: inventories: turnaround and maintenance

- ABX2-9 (Petrie-Norris) – Transportation fuels: specifications: production enhancement strategies

For additional information on any bills, including bill text, analysis, votes, etc., visit the California Legislative Information website.

Questions / Discussion

AGENDA: 6

Hydrogen Policy Considerations

Policy, Grants, and Technology Committee Meeting
October 16, 2024

Idania Zamora, Ph.D.
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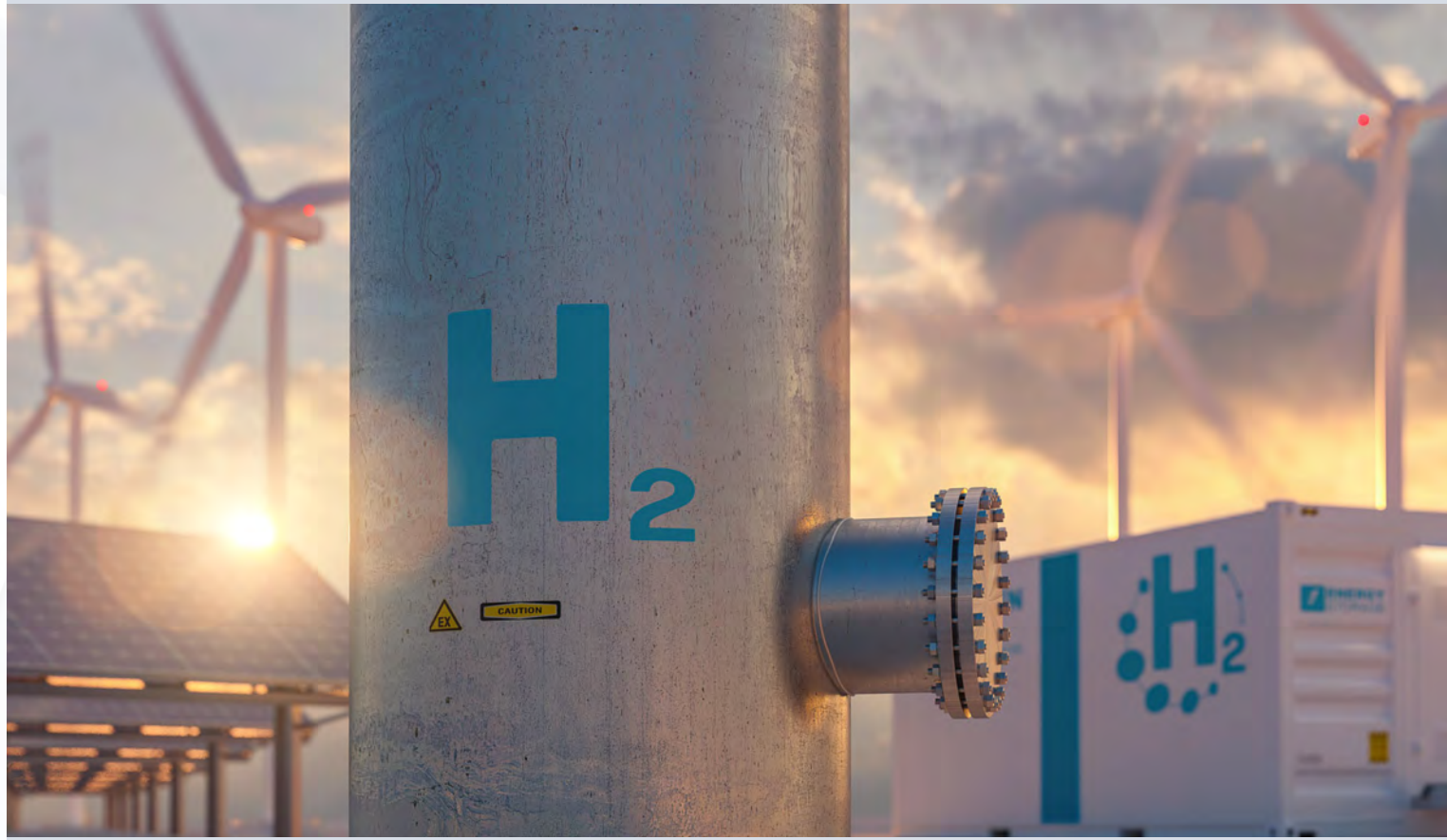
Outline

- Introduction
- Benefits and Challenges
- California Policy
- Summary



Source: 2023 The Climate Center. Hydrogen Policy Brief.

Hydrogen as an Energy Solution

What is Hydrogen (H_2)?

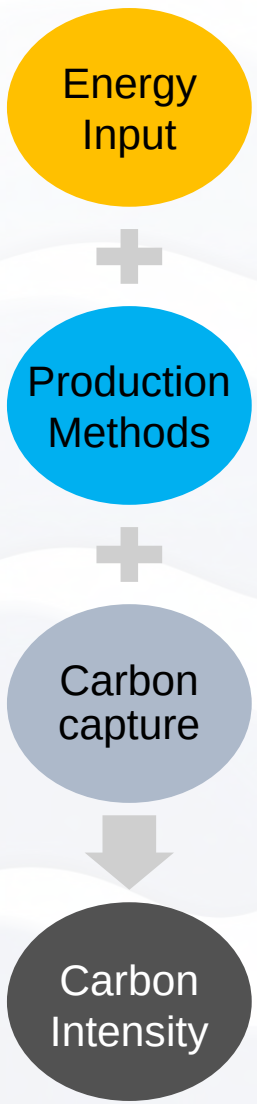
- Colorless, odorless, non-toxic, and highly combustible gas
- Can serve as a good storage medium for energy
- Can be used directly as fuel in an internal combustion engine or in a fuel cell that produces electricity
- Could be helpful for hard-to-electrify industries

Source: Gemini-generated photo; 2024-09-25.

Hydrogen need

State's 2022 Scoping Plan indicates that ~10% of California's energy demand cannot be electrified by 2045 and will need to be met by low-carbon fuels, including hydrogen

Hydrogen Process and Air Emissions



Hydrogen colors convey how it was created

Unique combinations of these three aspects of the hydrogen production process are assigned a **color**

Carbon intensity (CI) is a more precise way to measure climate impact

Amount of greenhouse gas emissions emitted (in kg of carbon dioxide equivalent, or kg CO_2eq) per amount of hydrogen (in kg of H_2) on a well-to-wheels basis

CI Units: kg CO_2 eq/ kg H_2

Hydrogen Production

Energy Input

+

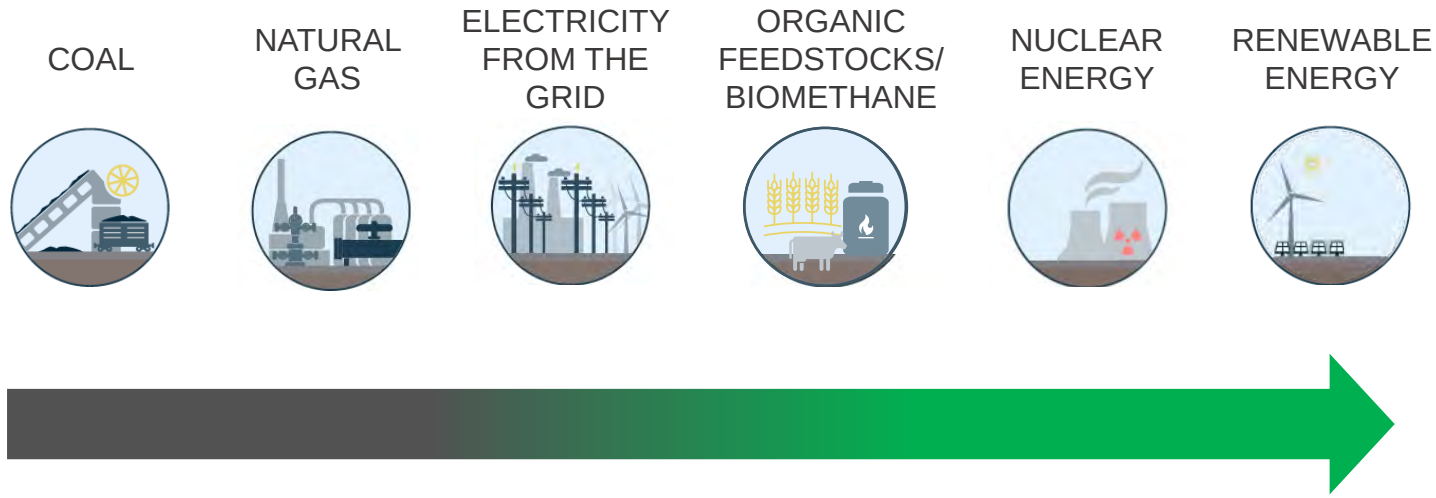
Production Methods

+

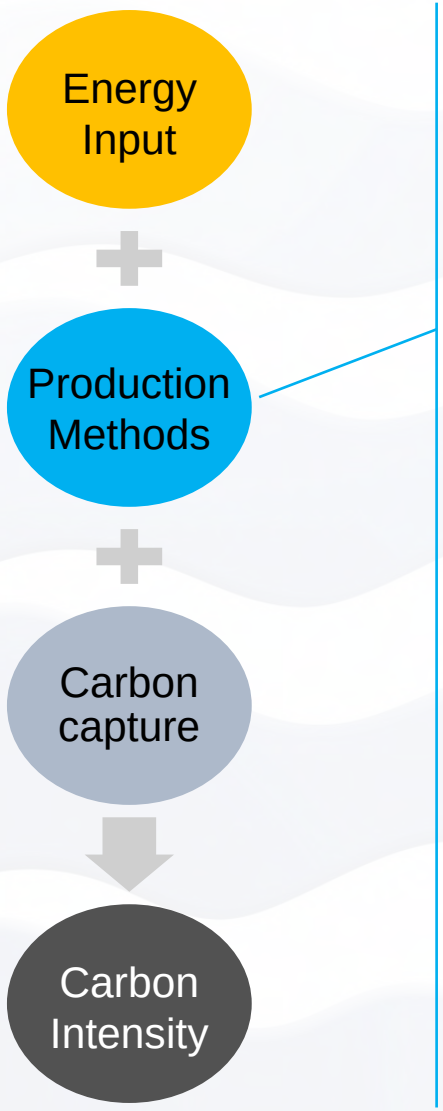
Carbon capture

Carbon Intensity

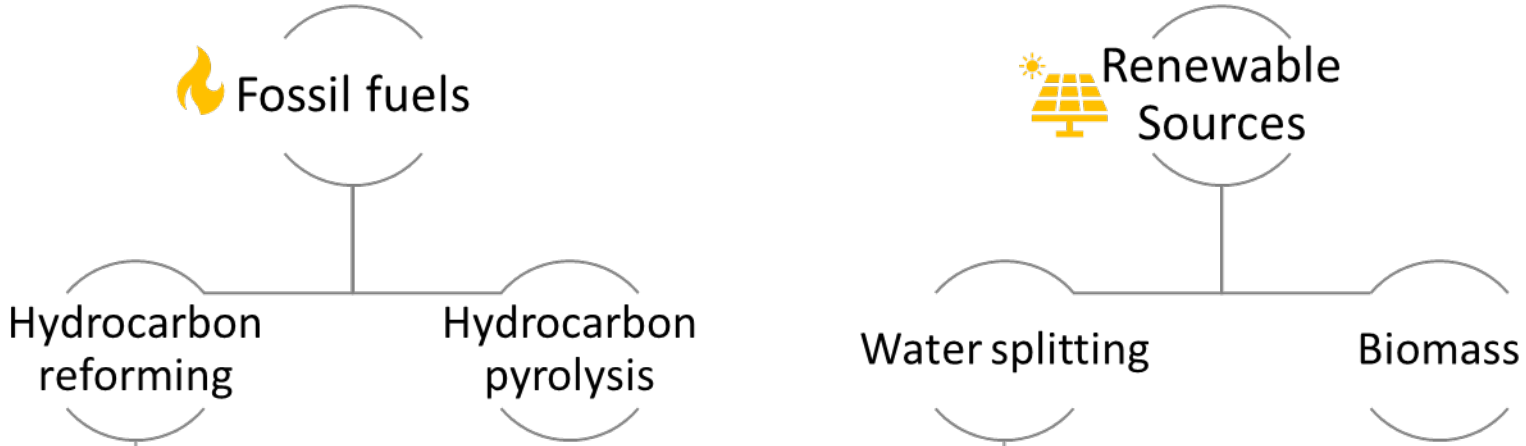
Emissions result from obtaining the **energy input/feedstock** for the production process (e.g., natural gas extraction).



Hydrogen Production



Emissions also result from the **process used to produce hydrogen**. These processes can be grouped based on the energy input.



Steam reforming

Natural gas is heated to 700-1100°C with steam and a catalyst, breaking up methane into carbon monoxide (CO) and hydrogen (H_2)

Electrolysis

An *electrolyzer* uses electricity to split water into oxygen (O_2) and hydrogen (H_2)

Hydrogen Production: Fossil fuel pathway

Energy Input

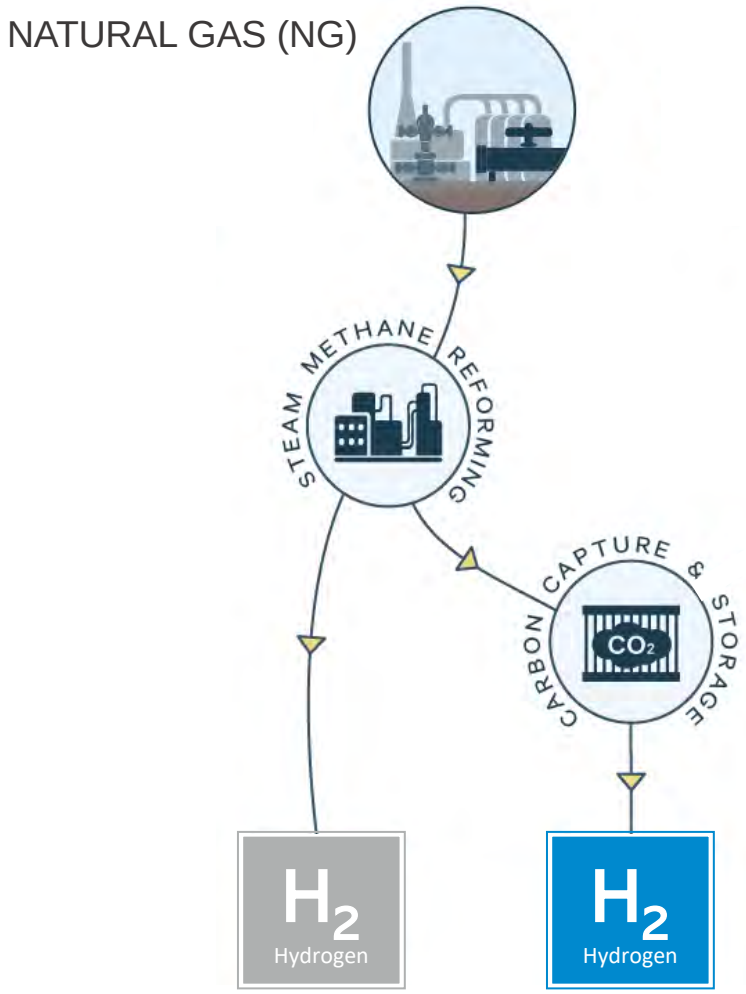
+

Production Methods

+

Carbon capture

Carbon Intensity



Emissions from NG extraction and transport:
Air toxics and greenhouse gases (CO_2, methane)

Emissions from steam methane reforming:

Criteria air pollutants: carbon monoxide (CO), nitrous oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOC), and particulate matter ($PM_{2.5}$)

Greenhouse gases: CO_2, methane

Emissions avoided with carbon capture:

Carbon dioxide (CO_2) removed only

CI Range: 8 – 12 kg CO_2 eq per kg H_2

Hydrogen Production: Biogas pathway

Energy Input

+

Production Methods

+

Carbon capture

Carbon Intensity

Emissions from sourcing the biomethane: Depends on biomethane source (e.g., anaerobic digesters) but generally considered lower greenhouses gas emissions than natural gas

Emissions from steam methane reforming:

Criteria air pollutants: carbon monoxide (CO), nitrous oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOC), and particulate matter ($PM_{2.5}$)

Greenhouse gases: CO_2, methane

CI Range: depends on feedstock

Hydrogen Production: Renewable pathway

Energy Input

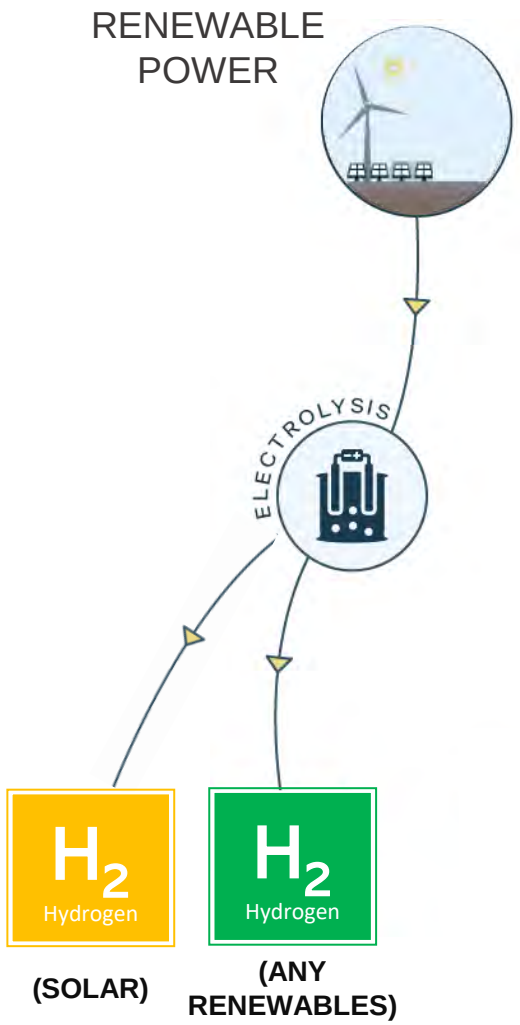
+

Production Methods

+

Carbon capture

Carbon Intensity

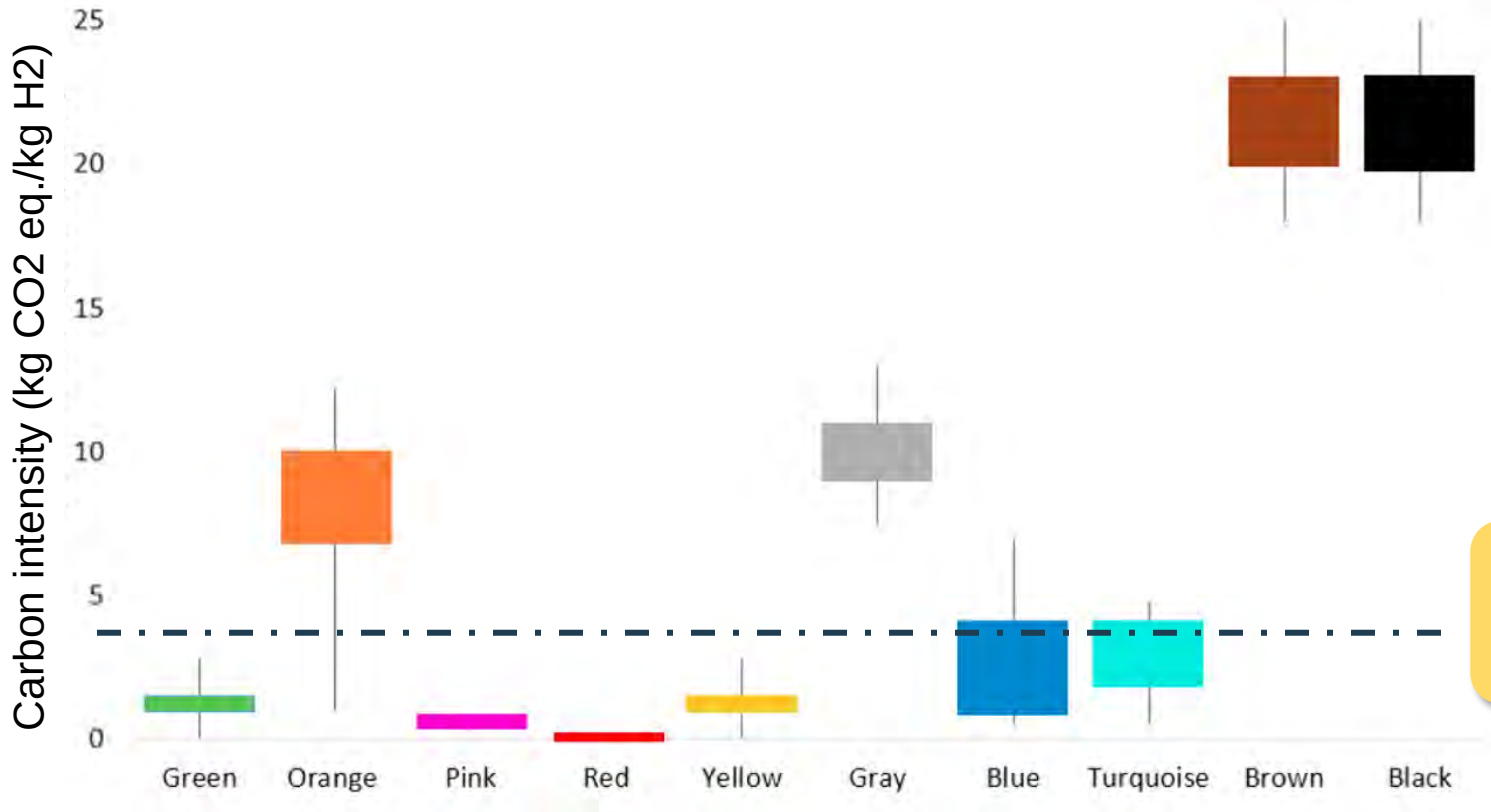


Emissions from renewable power:
No emissions of air pollutants

Emissions from electrolysis:
No emissions of air pollutants

CI Range: 0 – 4 CO_2 eq per kg H_2

Hydrogen Production

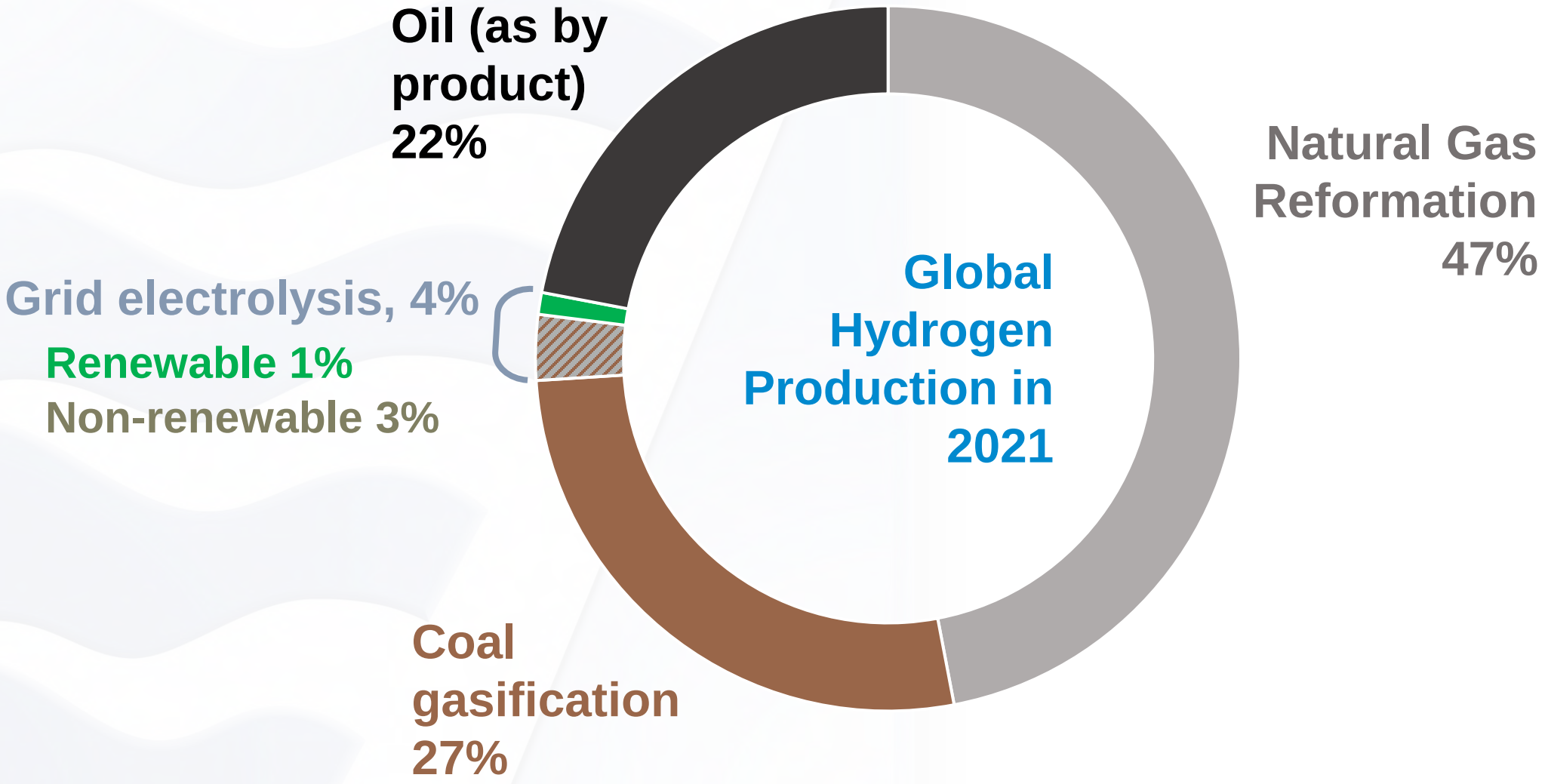


BIL/IRA standard: 4 $kgCO_2eq/kgH_2$

Source: Incer-Valverde et al., 2023. Colors of Hydrogen: Definitions and carbon intensity. Energy Convers. Management 291.

Bipartisan Infrastructure Law (BIL); Inflation Reduction Act (IRA)

Global Hydrogen Production



Source: International Renewable Energy Agency.

California Hydrogen Production

At present, virtually all of US and California's hydrogen production comes from **natural gas reformation.**

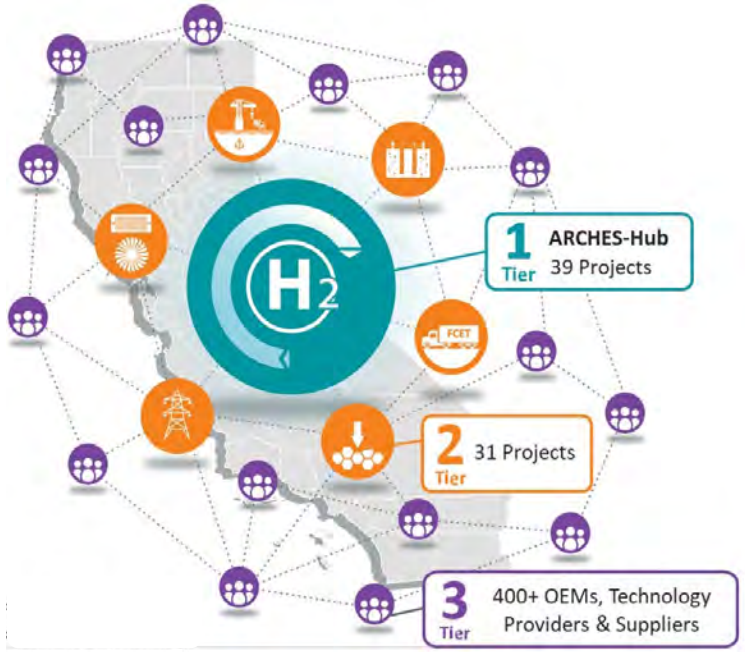
However, California Energy Commission (CEC) has a Renewable Hydrogen Roadmap that includes policy and funding to **green** the State's H_2 production.

$242Million+

CEC INVESTMENT FOR RESEARCH AND DEPLOYMENT PROJECTS (SINCE 2008)

$12.9Billion

PUBLIC AND PRIVATE INVESTMENT ON ARCHES HYDROGEN HUB (2024)



Source: Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES)

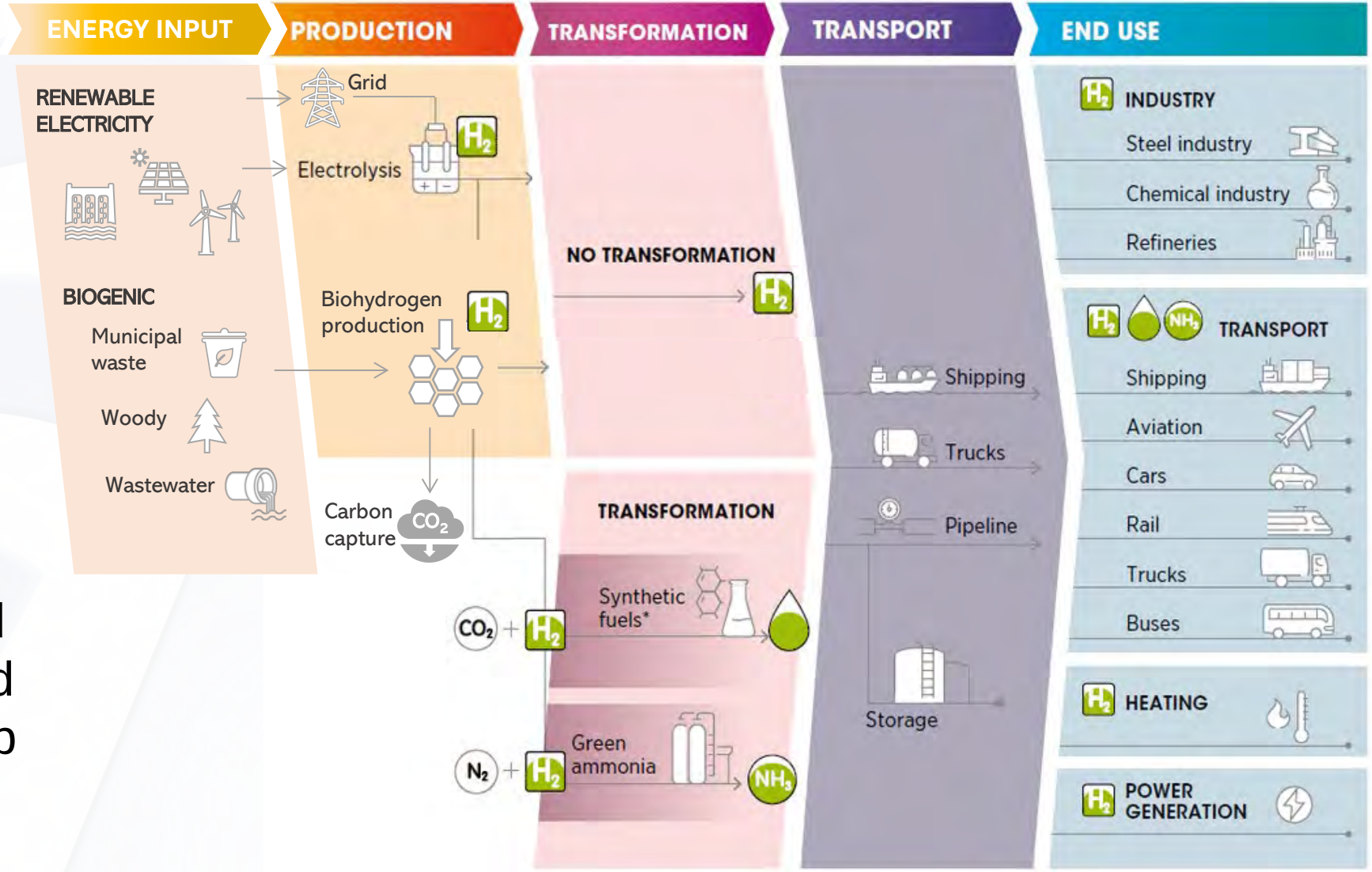
Clean Hydrogen End-uses

Direct end-uses

- Hard-to-electrify industries
- Decarbonize transport and ports
- Power generation and heating

Indirect uses

- H_2 can be transformed into synthetic fuels and green ammonia to help decarbonize aviation



Source: IRENA; Modified by Air District

Hydrogen end-uses

Key considerations for assessing best uses

- **Efficiency:** Only 30% of initial renewable energy input for *electrolytic* hydrogen makes it to the end-use
- **Cost:** Clean hydrogen costs 3 – 6 times as much as fossil fuel-based hydrogen; need technology to decrease cost
- **Local Air Quality Benefits:** Fuel cell vehicles eliminate local air pollutant emissions when replacing diesel/gasoline combustion

H_2 Renewable electrolysis

2022 levelized costs
$5 – 7 per kg

Source: 2024 Department of Energy Hydrogen Program Record

H_2 Natural gas reforming

2022 levelized costs
$1 – 1.5 per kg

Source: 2023 US National Clean Hydrogen Strategy and Roadmap

Other practical considerations

- Time to stand-up charging infrastructure/access to charging
- Fueling time vs. e-charging (e.g., buses)

Potential Benefits

Source: SWITCH Maritime.

Community health benefits

- Reduce diesel particulate matter from heavy-duty vehicle and marine vessels

Carbon Neutrality

- Decarbonize hard-to-electrify industries

Job creation

- Create high-road jobs in green economy
- Help transition fossil fuel workers

Potential Challenges to Address

Safety

- Flammability/ Explosivity
- Prone to leaks due to molecule size
- Burns at high-temperature

Efficiency

- Diverts renewable energy from other end-uses (replacement issue)
- Energy losses at each transportation and conversion steps

Climate

- Indirect greenhouse gas (12 times more powerful than CO_2)
- Substantial water use for electrolysis (9-25 kg fresh water per kg H_2)

End-uses

- Many considerations to determine best end-uses for H_2
- Spatial and temporal proximity to end-use

Economics

- Clean H_2 costs 3-6X as much as fossil fuel-based H_2
- Expensive new infrastructure (e.g., pipes)

Environmental Justice (EJ) Considerations

Concerns expressed by CARB's Environmental Justice Advisory Committee (EJAC) and other EJ groups*

- Safety (explosions)
- Local impacts of air pollution from hydrogen production
- Prolonging fossil fuel use through investment (steam methane reforming, gasification)

Communities support green hydrogen and want

- Local benefits from hydrogen projects, including jobs
- Robust community engagement from project inception

**Carbon 180 and other EJ groups at California H_2 Leadership Summit 2023 and 2024*

California Policies and Programs Relevant to Hydrogen

- Low Carbon Fuel Standard (LCFS)
- Renewable Portfolio Standard (RPS)
- California's Cap-and-Trade Program
- Zero-Emissions Vehicle (ZEV) Requirements
- Zero-Emissions Vehicles and Infrastructure Incentives
- Senate Bill 1075: Comprehensive Report on Hydrogen

California Policies and Programs

Low Carbon Fuel Standard (LCFS)

How does this program work?

Incentivizes use of cleaner, low-carbon transportation fuels by comparing carbon intensity of each fuel against a declining benchmark

How does it affect hydrogen production?

- Identifies and assigns carbon intensity to six H_2 production pathways
- Incentivizes fueling stations with 30% renewable or low-carbon H_2 (fuel distributor credit)

California Policies and Programs

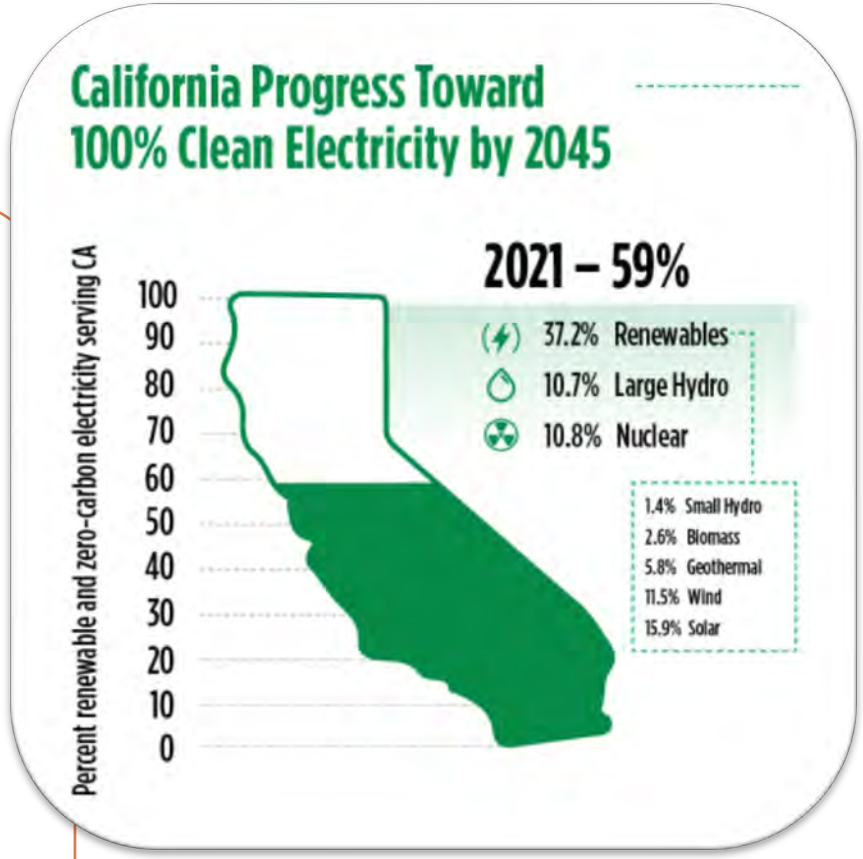
Renewable Portfolio Standard (RPS)

How does this program work?

Requires electricity providers in California to procure a percentage of their electricity from renewable energy sources

How does it affect hydrogen production?

- Fuel cells using renewable hydrogen are considered RPS-eligible energy resources
- Could drive H_2 production to become cleaner



Source: California Energy Commission.

California Policies and Programs

California's Cap-and-Trade Program

How does it work?

Market-based system that limits the yearly amount of greenhouse gas (GHG) emissions from regulated entities. It establishes a price signal to drive long-term investment in cleaner fuels and more efficient energy use.

How does it affect hydrogen production?

- Covers entities that produce hydrogen such as hydrogen plants
- Could drive hydrogen production to become cleaner

California Policies and Programs

Zero-Emissions Vehicle (ZEV) Requirements

How do they work?

California Air Resources Board (CARB) regulations that set increasing sales targets for ZEVs from 2024 to 2035, in the following categories:

- Light-duty passenger car, pickup trucks and SUV (Advanced Clean Cars II)
- Truck classes 2b-8 (Advanced Clean Trucks)
- Drayage trucks (Advanced Clean Fleets)
- Offroad mobile sources (e.g., forklifts)

How do these affect hydrogen demand?

- Increase demand since ZEVs include hydrogen fuel cell electric vehicles

California Policies and Programs

Zero-Emissions Vehicles and Infrastructure Incentives

What are these incentives?

Funding programs aimed at zero-emissions vehicles and equipment, as well as associated charging and alternative fueling infrastructure, including:

- Clean Vehicle Rebate Project (CVRP)
- Clean Truck & Bus Voucher Incentive Project (HVIP) and Carl Moyer Program
- Funding Agricultural Replacement Measures for Emission Reductions (FARMER)
- Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles Project (EnergIIZE)

How do these affect hydrogen demand?

- Increase demand through funding for H_2 vehicles and fueling infrastructure

California Policies and Programs

Senate Bill 1075: Comprehensive Report on Hydrogen

What does the bill mandate?

Requires CARB to post a comprehensive report on H_2 deployment, development, and use across all sectors.

How does it affect hydrogen?

- Report must include policy recommendations, strategies, and analyses related to using H_2 to help achieve state goals and overcome market barriers
- CARB must also include findings on role of H_2 in decarbonizing the electric and transportation sectors in its 2023 and 2025 Energy Policy Reports

Summary

- **Impacts:** The climate and air quality impacts of hydrogen depend on its production method, energy input, carbon capture, and transportation emissions
- **Supply:** Virtually all hydrogen produced globally comes from fossil fuels. While clean hydrogen is increasingly being incentivized, it currently represents about 1% of all production and costs 3 – 6 times as much as natural gas reforming H_2
- **Potential Benefits:** Clean hydrogen can help California achieve its 2045 carbon neutrality goals, bring community health benefits, and support a green economy with high-road jobs
- **End-uses:** As a high-density energy carrier, clean hydrogen can be used to decarbonize a variety of end-uses including hard-to-electrify industries, ports, transportation, and power generation, as well as seasonal energy storage

Summary

- **Challenges:** There are many potential challenges that need to be addressed to use clean hydrogen including safety, efficiency losses, climate implications, ensuring best end-uses are prioritized, and cost
- **Environmental Justice:** Communities have expressed concerns about hydrogen's safety, local air pollution impacts, and impact on fossil fuel infrastructure; they want to be engaged since project inception
- **Policy Landscape:** California's policies are currently incentivizing increased *supply* of clean hydrogen (LCFS, Cap-and-Trade) and expanding *demand* for clean hydrogen (ZEV requirements, ZEV and other incentives)

Next Steps

- Discuss information presented and answer questions
- Deliberate the need for a Board-approved Air District Hydrogen Policy to guide staff
- Consider additional committee presentations on hydrogen including presentations from outside experts