



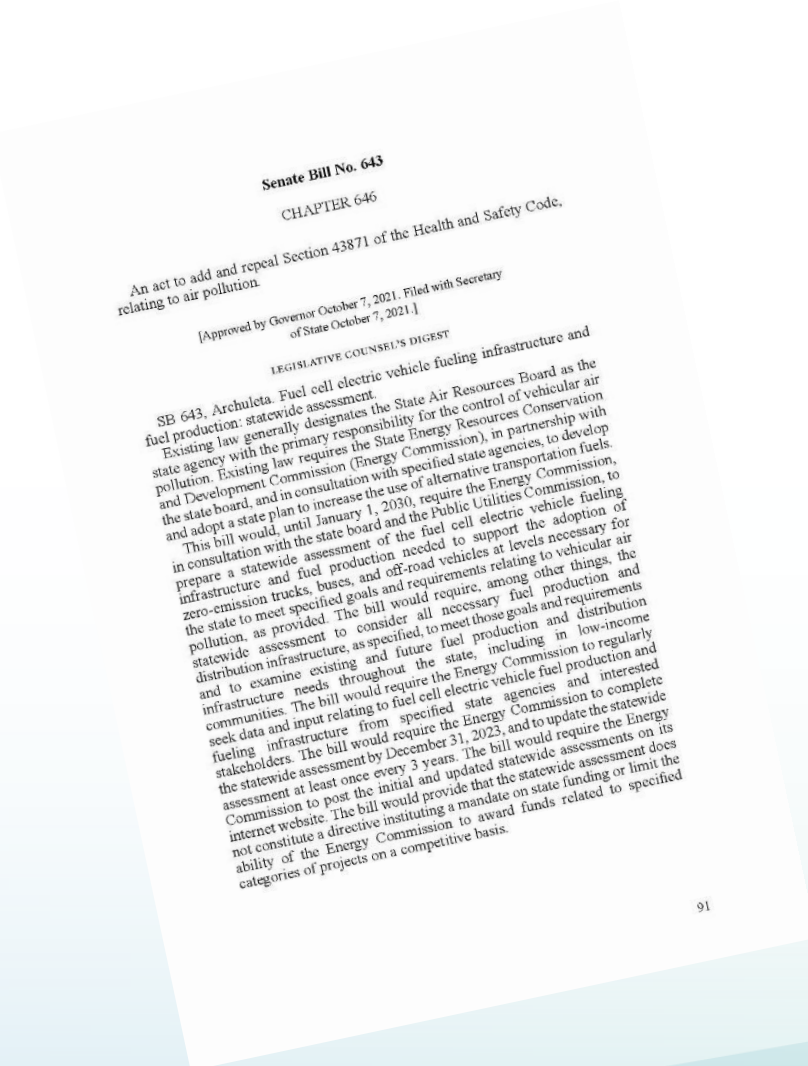
Item 7: Information Item – 2023 Final Staff Report on Senate Bill 643

March 13, 2024 Business Meeting

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Fuels and Transportation Division



SB 643 Inaugural Report



- Established by Senate Bill 643 (Archuleta, 2021)
- Statewide assessment of medium- and heavy-duty fuel cell electric vehicle infrastructure requirements to meet California's air pollution reduction goals
- Clean hydrogen production and off-road/nonroad applications



Goals Used for SB 643 Assessment



Source: Hyundai



Source: AC Transit

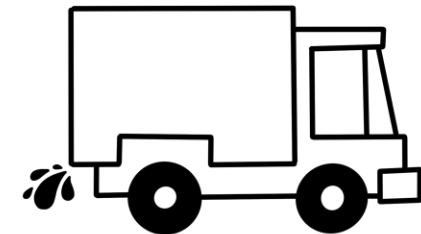
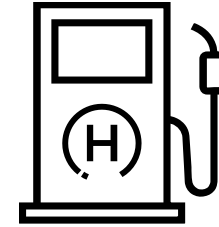
Executive Order N-79-20

- 2035: 100% ZEV operations for drayage trucks
- 2035: 100% ZEV off-road vehicles and equipment, where feasible
- 2045: 100% transition to ZEV operations for medium- and heavy-duty vehicles, where feasible.



Inaugural Assessment Focus Areas

- Four (4) MDHD infrastructure scenarios
- Success of fuel cell electric buses
- Clean hydrogen production
- Developments in off-road/ nonroad sectors
- Synergies between sectors
- Clean hydrogen to support the grid





Four MDHD Infrastructure Scenarios

- Three scenarios used similar assumptions
 - 2022 Scoping Plan
 - ARCHES
 - AATE3 Scenario
- SB 671 scenario (CTC)
- FCEBs excluded from scenarios, discussed separately in report



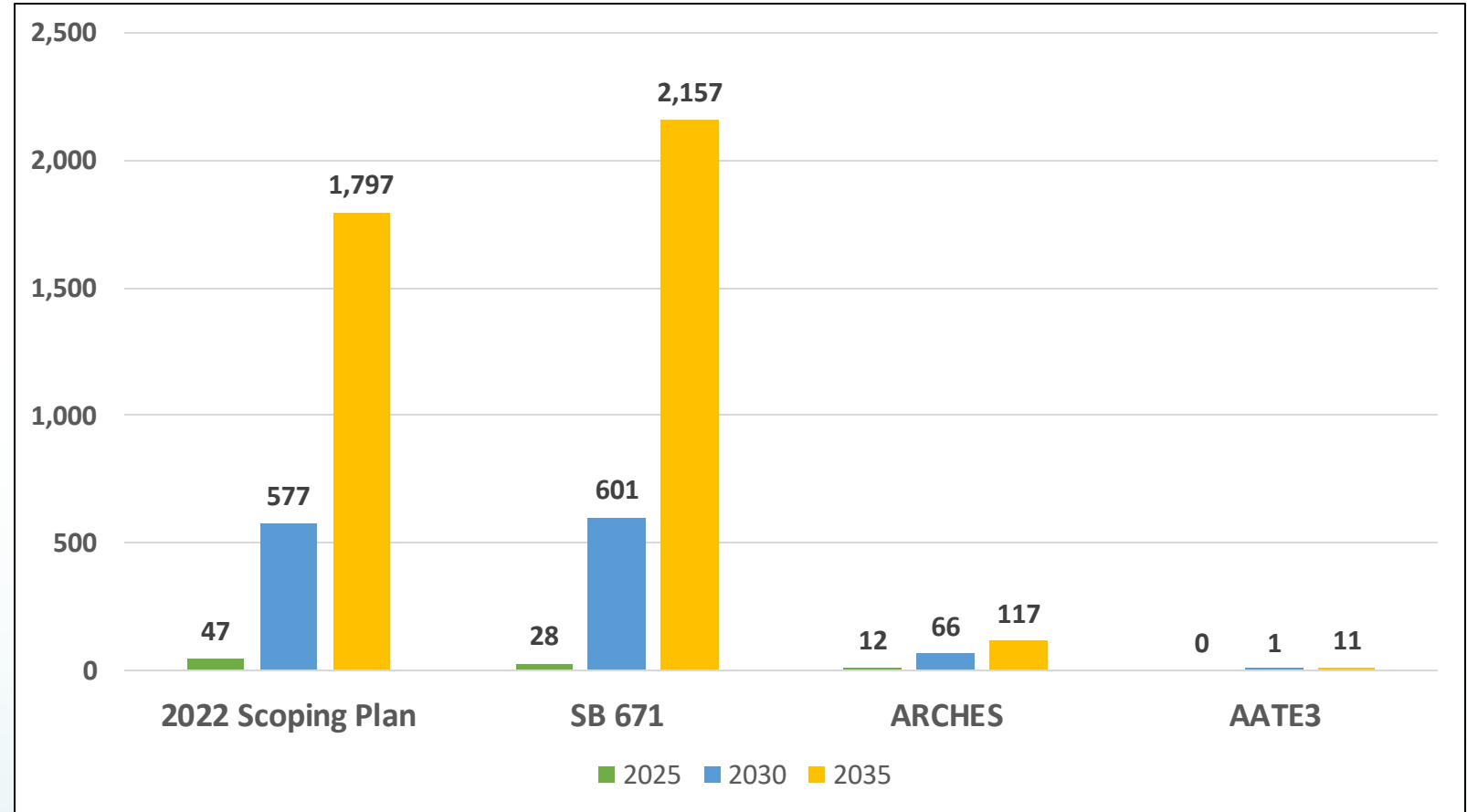
Source: Center for the Environment (CTE)



MDHD Infrastructure Scenario Comparison

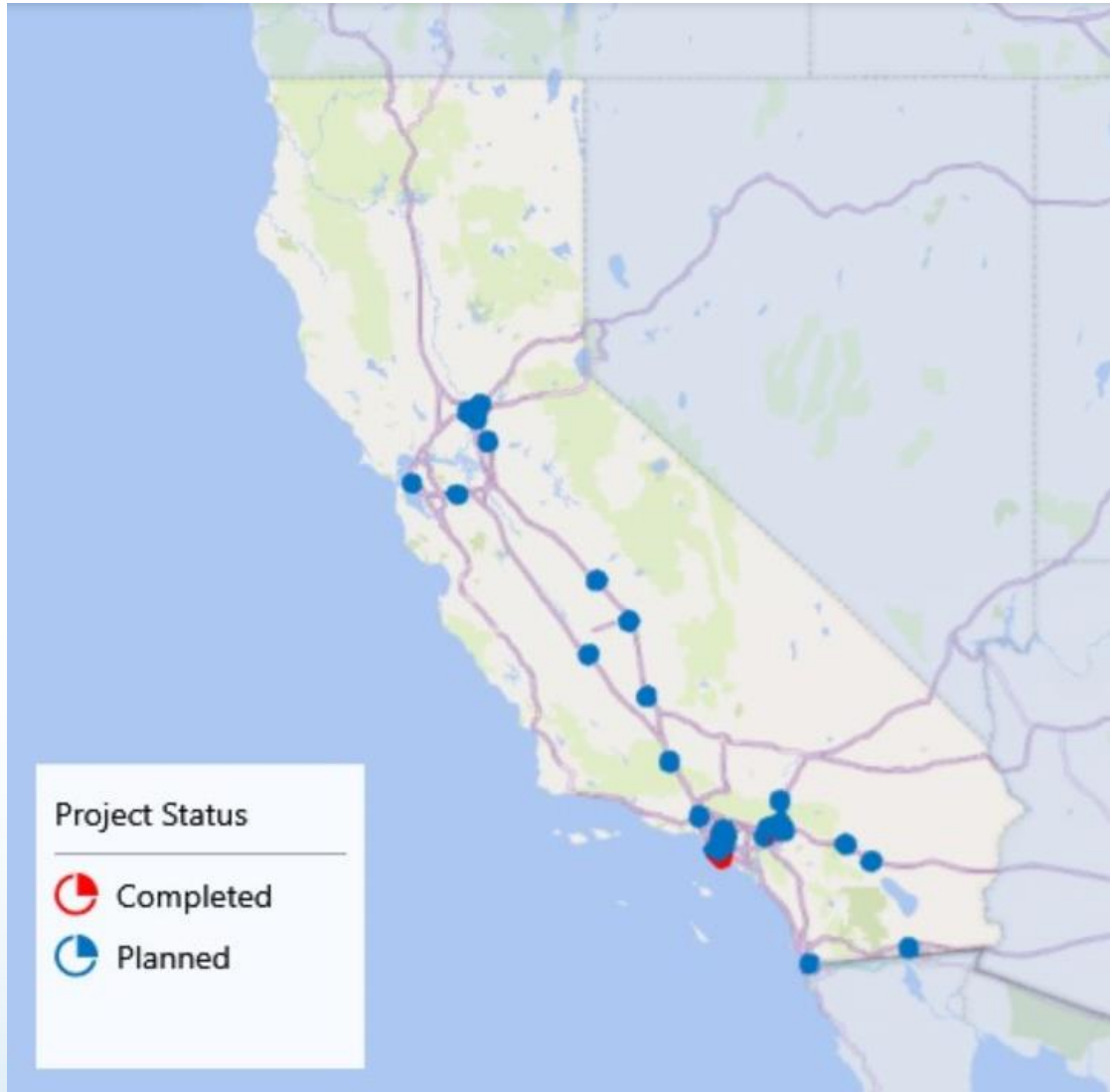
- Variance between scenarios demonstrates level of uncertainty
- Future SB 643 assessments will use HEVI-LOAD results

Station Requirements by Scenario and Year

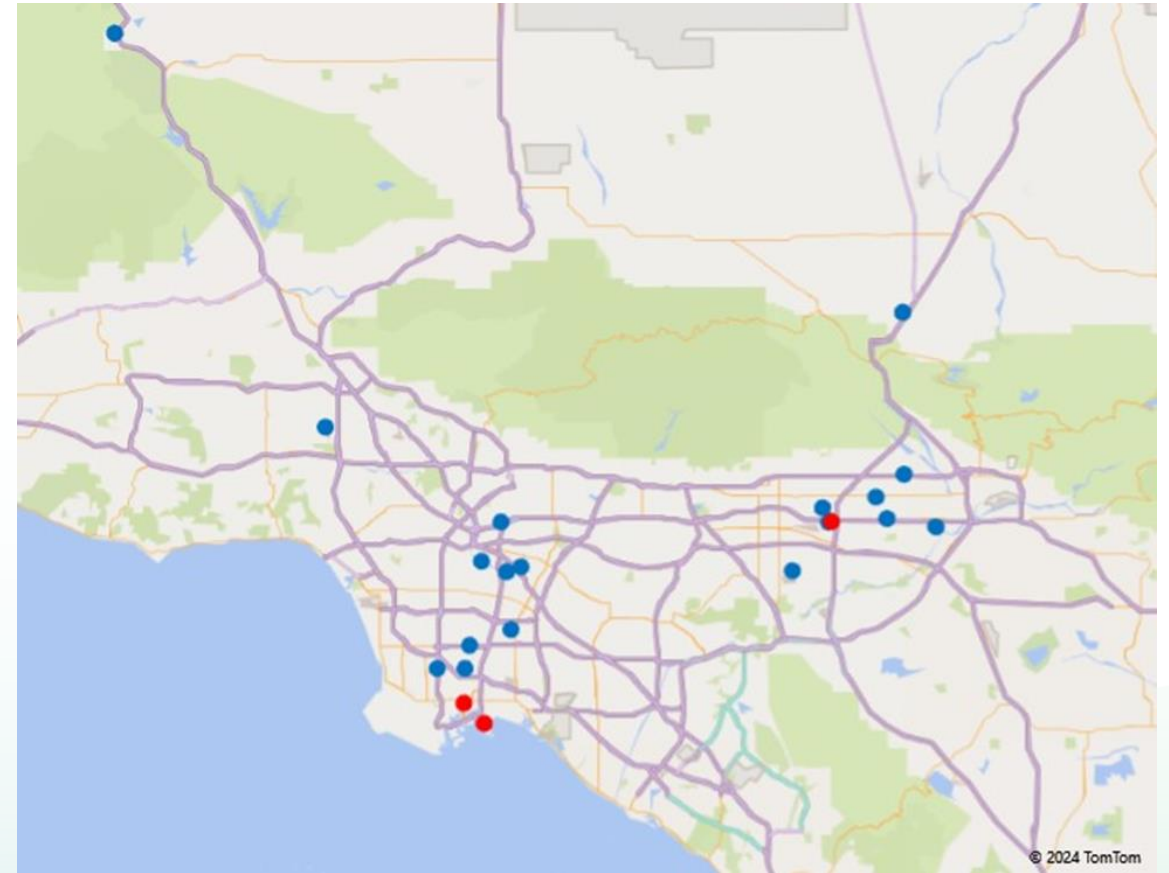




MDHD Public Refueling Stations



Zoom-in of Southern California





Fuel Cell Electric Buses

- 5 large transit agencies in total have more than 100 FCEBs operating
- FCEBs have predictable supply requirements, onsite technicians
- Price and availability of fuel are ongoing issues



Source: Hydrogen Fuel Cell Partnership



Clean Hydrogen Production

- California clean hydrogen production nearly non-existent
- CTP has awarded \$22 million to 6 clean hydrogen projects to increase production by ~ 40,000 kg/day
- 4 projects will use electrolysis; 2 will produce hydrogen through gasification.



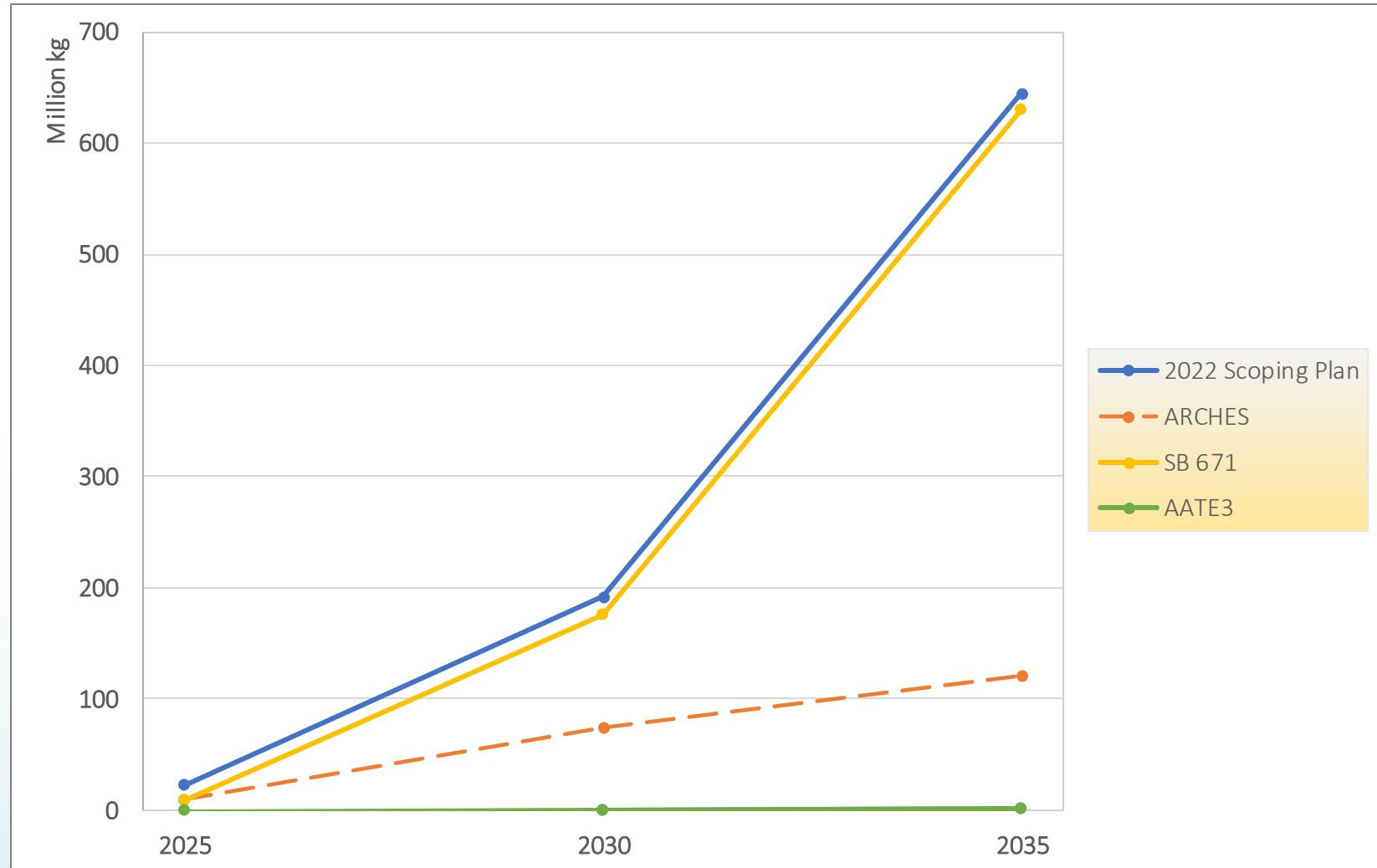
Source: H2B2 USA



Hydrogen Demand by Scenario

- 2022 Scoping Plan and SB 671 scenarios yielded similar results with annual demand near 650M kg
- ARCHES scenario is project-based, yielding lower demand
- AATE3 scenario resulted in lowest demand

Hydrogen Demand by Scenario and Year





Off-Road Applications

- Off-road and nonroad applications are mostly demonstrations
- Small forklifts are exception



Source: Hyster



Source: Anglo-American



Aviation, Maritime, and Rail

Primarily limited to demonstrations



Source: Universal Hydrogen



Source: All Marine



Source: Stadler



Key Takeaways from Inaugural Assessment

- Variance between MDHD infrastructure scenarios demonstrates current level of uncertainty
- Fuel cell electric buses are no longer demonstrating, they are part of transit fleets
- Off-road/nonroad fuel cell electric applications are predominately demonstrations
- Clean hydrogen production needs to ramp up to meet anticipated demand