Transforming Transit and Beyond

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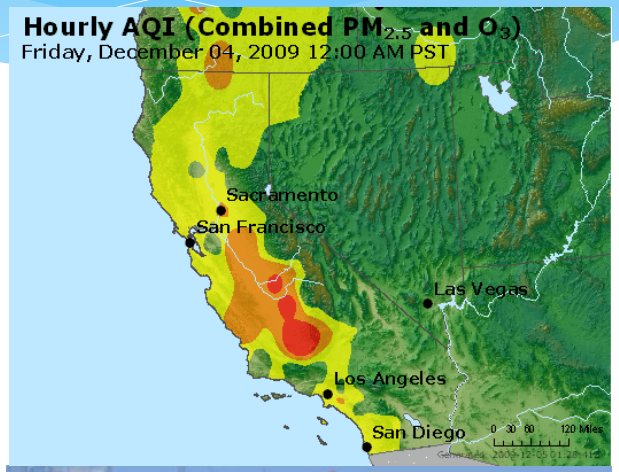
Missions of the California Air Resources Board

- Established in 1968 to promote and protect public health, welfare and ecological resources through the effective and efficient reduction of air pollutants, while recognizing and considering the effects on the state's economy
- Major achievements in vehicle emissions control
  - Most stringent vehicle tailpipe emission standards in the U.S.
  - Diesel particulate matter emission control
  - Cleaner fuels with less lead, sulfur, benzene, and zero MTBE in gasoline
  - Zero emission bus demonstration

Driving Change (1)

- Meet federal health-based ambient air quality standards
  - 2023 and 2031 targets
  - New federal ozone standard (0.070 ppm)
- Reduce local exposure to toxic air contaminants
  - Updated risk assessment health values place higher impact on childhood exposure
  - Disadvantaged community impact



Driving Change (2)

- Climate policy and GHG reductions
  - Reduce GHGs to 1990 level by 2020
  - 40% reduction in GHGs by 2030
  - 80% reduction in GHGs by 2050
  - 33% renewable electricity by 2020
  - 50% renewable electricity by 2030
  - 33% renewable H2 at public funded stations by 2020
  - 50% petroleum use reduction in transportation by 2030
  - Reduce short-lived climate pollutants

Approaches for Mobile Sources

- Maximize renewable energy production and use
- Increase efficiency to reduce energy consumption
- Reduce in-use emissions
- Achieving goals will require a transformational change in all sectors
  - Key role for zero and near zero-emission on-road technologies

Implementing an Advanced Technology Policy Framework

- Planning—Coordination of statewide efforts between regions and agencies
  - State Implementation Plan (Mobile Source Strategy)
  - Scoping plan update
  - Goods Movement (Sustainable Freight)
- Regulations—Coordinated multi-pollutant approaches
  - Advanced Clean Transit
- Investments—Enhance markets with strategic public incentive and investment programs
  - Significant funding prioritized for zero-emission transit, drayage trucks, and multisource facilities

Advanced Clean Transit: A New Approach

- Significant technology improvements over past 15 years
- Amending existing rule
  - Planned schedule: late 2016
  - Collaboration with MPOs and transit fleets
  - Achieve additional NOx and GHG emission reductions
  - Encourage zero-emission bus purchases
- Future efforts to focus on broader coordination with regional transportation planning
  - Opportunity to recognize greater efficiencies and zero-emission modes of moving passengers

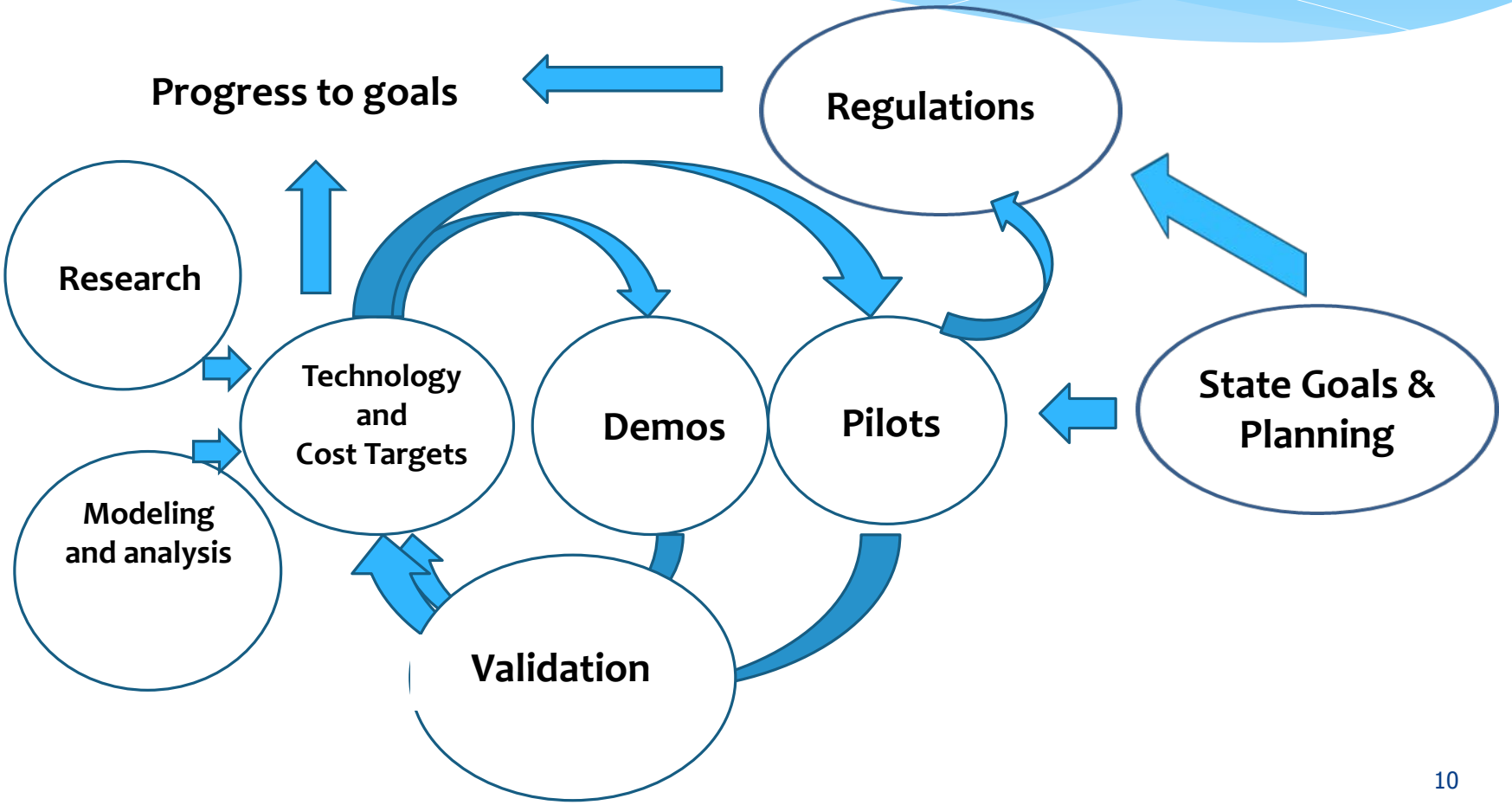
Fuel Cell Electric Buses (FCEB): Leading the Way

- 19 FCEBs in CA
- Worldwide large deployment in Asia and Europe
- Highly suitable for transit buses
  - Operate in congested areas where pollution is a problem
  - Centrally located and fueled
  - Government support
- Experiences aid other fleets in deploying heavy-duty ZEVs

Beyond Buses: Expanding Fuel Cell Applications

- Fuel cell technology in buses directly transferable
- FCEBs are on track to meeting DOE's 2016 technical targets
  - Establish a supply chain for other HD FCEVs and BEVs
  - Support BEVs as a range extender
  - Proving ground for HD FCEV H2 fueling
- Fuel cell technology as the potential zero-emission solution for long haul

DOE-ARB Collaboration Is Important



Moving Forward on Fuel Cell Technology

- Capital costs continue to decline as a result of larger deployment and technology maturity
- Fueling network establishment
  - Near-term—Community and stationary based (e.g., transit buses, delivery trucks, forklifts, etc.)
  - Mid-term—Intercity corridors (e.g., drayage trucks)
  - Long-term—Interstate/regional corridors (e.g., long haul applications)

Long-term Transformation for Mobile Sources

"Zero emission equipment everywhere feasible, and near-zero emission equipment powered by clean low-carbon renewable fuels everywhere else."

--Sustainable Freight: Pathways to Zero and Near-Zero Emissions (Discussion Draft, April 2015)

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