CEC Investment Plan Recommendations

Bill Van Amburg, Senior Vice President

Advisory Comm Meeting
Feb 10, 2014

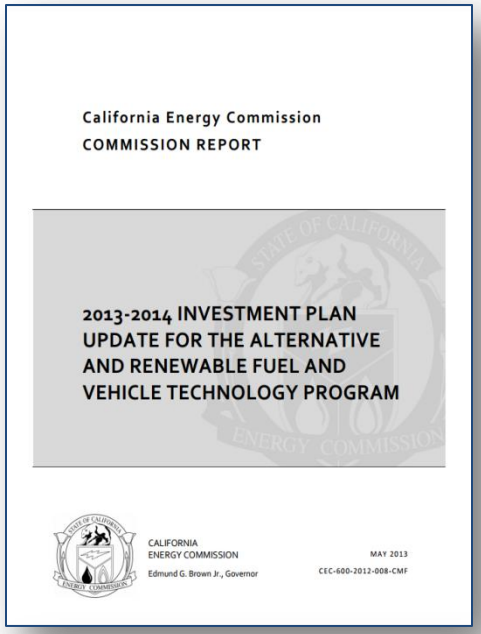
Areas of Need

- **LD vehicles** – ZE technology deployment, infrastructure
- **Medium and HD vehicles** – near and zero emission technology (AB 32/regional air needs)
  - + **Accelerated Transit Bus** – ZE technology (Zero Emission Bus Rule)
  - + **Accelerated Goods Movement** – near and zero emission, particularly in environmental justice (EJ) regions (I-710 ZE Drayage)

Context for Commercial Vehicles

- For trucks, California's needs will require reducing NOx an additional 80+% in the next 18 years, on top of a 90% reduction already made which took 18 years (and used up the cheaper technologies)
- While - concurrently reducing carbon 20% per decade for the next four decades
- While – not facing the same urgency on federal air quality regulations
- California cannot assume the market or federal regulations will drive the change needed on the pace needed – it faces 40 years of market driving activity

Background Documents

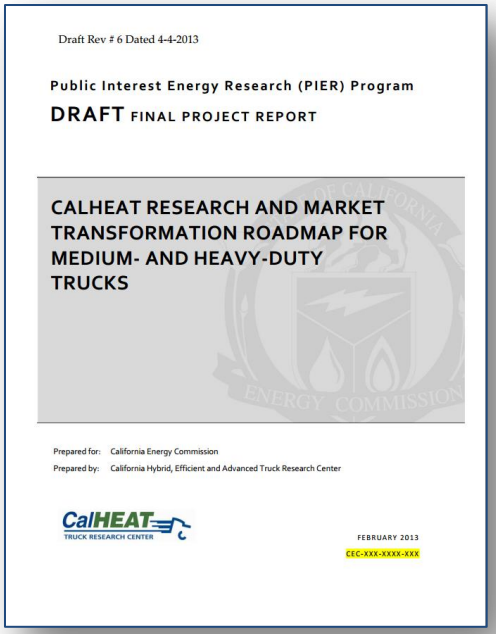

California Energy Commission
COMMISSION REPORT

2013-2014 INVESTMENT PLAN UPDATE FOR THE ALTERNATIVE AND RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM

CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor
MAY 2013
CEC-600-2012-008-CMF

CEC Investment Plan

www.energy.ca.gov/2012publications/CEC-600-2012-008/CEC-600-2012-008-CMF.pdf


Draft Rev # 6 Dated 4-4-2013

Public Interest Energy Research (PIER) Program
DRAFT FINAL PROJECT REPORT

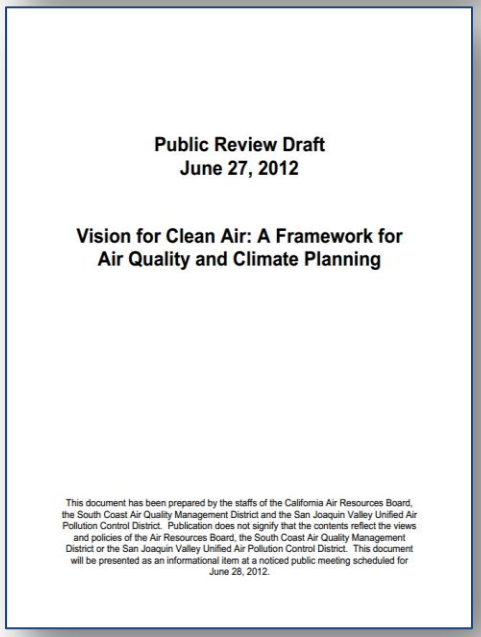
CALHEAT RESEARCH AND MARKET TRANSFORMATION ROADMAP FOR MEDIUM- AND HEAVY-DUTY TRUCKS

Prepared for: California Energy Commission
Prepared by: California Hybrid, Efficient and Advanced Truck Research Center

CalHEAT TRUCK RESEARCH CENTER
FEBRUARY 2013
CEC-XXX-XXXX-XXX

CalHEAT Roadmap

www.calstart.org/Projects/CalHEAT/Research-and-Market-Transformation-Roadmap.aspx

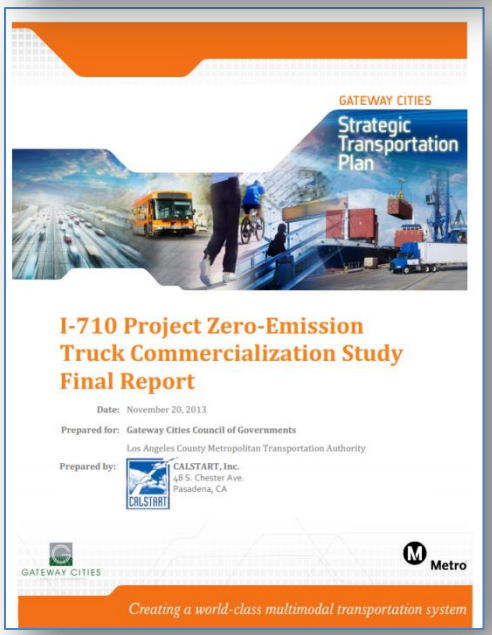

Public Review Draft
June 27, 2012

Vision for Clean Air: A Framework for Air Quality and Climate Planning

This document has been prepared by the staffs of the California Air Resources Board, the South Coast Air Quality Management District and the San Joaquin Valley Unified Air Pollution Control District. Publication does not signify that the contents reflect the views and policies of the Air Resources Board, the South Coast Air Quality Management District or the San Joaquin Valley Unified Air Pollution Control District. This document will be presented as an informational item at a noticed public meeting scheduled for June 28, 2012.

ARB Vision Plan

www.arb.ca.gov/planning/vision/vision.htm


GATEWAY CITIES
Strategic Transportation Plan

I-710 Project Zero-Emission Truck Commercialization Study Final Report

Date: November 20, 2013
Prepared for: Gateway Cities Council of Governments
Los Angeles County Metropolitan Transportation Authority
Prepared by: CALSTART, Inc.
48 S. Chester Ave.
Pasadena, CA

GATEWAY CITIES
Metro
Creating a world-class multimodal transportation system

710 Zero Emission Truck Report

www.calstart.org/Projects/I-710-Project.aspx

CalHEAT: 3 Next Key Steps

STEP 1 :Zero emissions goods movement in Los Angeles County and the South Coast Related to the Ports (CY2013 to 2016)

- **Expand Tech Capability Beyond Prototype**: building off the CalHEAT Roadmap Steps , implement a multi-year development plan with goals for technology stages and for entering pre-production; production intent and early production
- *Focus Areas.*
  - **ZE Drayage Demonstrations** (transition to multiple vehicles, not just single vehicle prototypes)
  - **ZE Yard Hostlers** Demonstrations
  - **Core Tech Enabling**/Supporting Projects
    - Electrified accessories, Optimized alt fuel and low NOx engines, Alt fuel hybrids, Battery pack modularity, lower cost hydrogen and natural gas storage

CalHEAT: 3 Next Key Steps

Step 2: Ultra Low Near Zero Emission Goods Movement thru the San Joaquin Valley (2013-2016)

- Expand capability beyond Laboratory: Building off the CalHEAT Roadmap implement plan with goals for technology stages and for entering pilot demonstration, pre-production and production intent
- Focus areas: Class 8 Tractors i.e. line haul and interregional/city deliveries (Represent 60% of CO2 and criteria emissions statewide
  - **Optimized engines for alternative fuel (AF)-** test and deploy NG low NOx engine technology
  - **Engine efficiency improvements-** Up to 2 time Fuel Economy with new improved engines light weighting and lower rolling resistance
  - **Energy recovery- Pilot testing of** Turbo compounding & Solid State heat recovery systems
  - **Alternative power plants and combustion cycles-** Purposefully designed Turbine power Camless Engines and Fuel Cells
  - **Enabling Technology-** nearer term Electrified Auxiliaries- longer Term Mild Hybridizations- Combined with Waste heat recovery

CalHEAT: 3 Next Key Steps

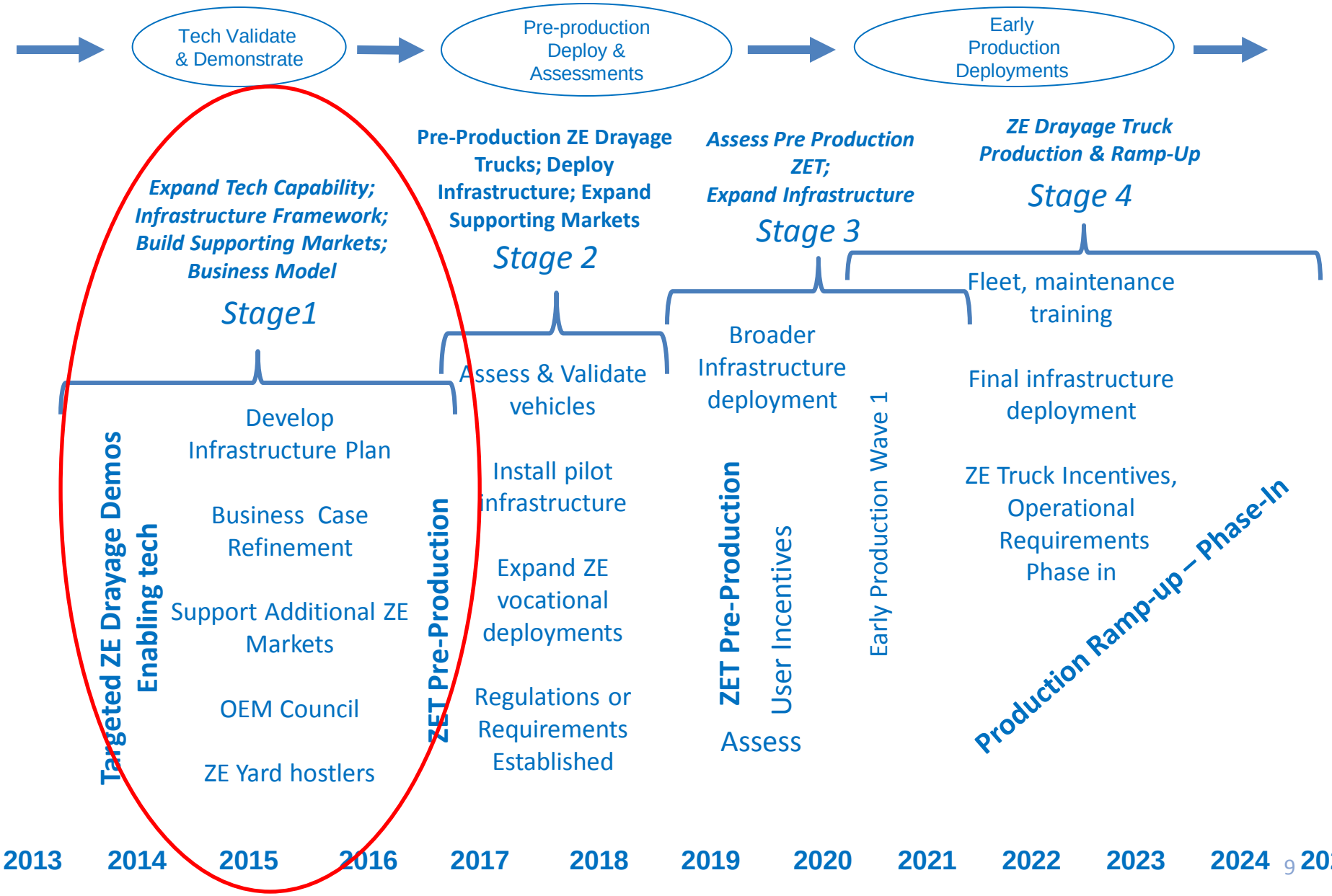
Step 3: Greater electrification of Goods Movement Vehicles Statewide (2013-2016)

- **Expand Tech Capability to Pilot Production and Preproduction and Reduce Costs**: building off the CalHEAT Roadmap Steps , implement a multi-year development plan with goals for technology stages and for entering pre-production; production intent and early production
- Focus area on Vocational Trucks: i.e Parcel Delivery, Beverage Delivery, Utility and Refuse Collection
  - Testing and deployment of third generation preproduction optimized hybrid electric technology meeting state On Board diagnostics regulations
  - Testing and deployment of second generation electrics trucks with modular battery pack for matching range requirements as well as smart charging systems e
  - Pilot demonstrations of hybrid refuse collection trucks
  - Development of an optimized alternatively fueled NG Hybrid drivetrain

Critical Demos Needed

- ZE drayage commercial path demos (from I-710 plan – 3 key architectures need focused demonstration/ validation to meet needs (EREV; BEV; PHEV – Goal: move to pre-production pilots by 2017)
- ZE yard hostlers – important early opportunity on a Class 8 platform but less demanding use cycle (in range, speed)
- Some players ready to go to 20+ trucks, most others still in 2-3 vehicle validation stages (all in EJ regions)
- Catenary demo support important; CEC already contributing; in road power and/or network-opportunity charging (fast charge, inductive) important

I-710 Zero-Emission Drayage Truck Commercialization & Phase-In Process



Important Supporting Demos/Pilots

- ZE Bus ready for larger pilots (80-150 buses in next 2-3 years)
- Targeted volumes at key sites rather than scattergun
- 40-80 fuel cell; 40-80 BEV (BEV includes remanufactured and new)
- Goal: 400 ZE buses in CA by 2020 – aligns with ZEB goal (800 nationally – FTA goal)
- Opportunity for strong match and alignment with federal activities

Zero Emission buses are in pre-production

Similar driveline size to HD drayage trucks

Provides pathway to ZE HD trucks

Line Haul/SJV Demos

- Go next step on SCAQMD low-NOx engine demonstration program – pilot/demo/validate multiple trucks using new engines (20-50), diverse applications for class 8 trucks
  - Buttress support for more HD NG engine offerings (competition; segments- industry may need 15L size)
- Develop & demonstrate additional low-NOx engines for line/haul regional class 8 applications
- Consider demos of:
  - limited corridor longer/heavier trucks (mirror tests in Sweden and elsewhere);
  - platooning;
  - Look-ahead power train management, other efficiency drivers that can reduce emissions

Technical Support to CEC Needed

- Because of the complexity of state needs and the growing impact of goods movement, recommend a new role to support and augment CEC staff
- Medium- and heavy-duty technical evaluation and support, industry connection and pathway assessment, stakeholder coordination

Workplace Charging – Key Enabler for ZEV Success

- » Regional planning important
- » However, there are high level issues that transcend regions – both statewide in nature and align with national efforts
- » Recommend a statewide coordination and planning effort in addition to local/regional

Infrastructure and Incentives

- E-trucks and buses need infrastructure support on deployment
- Ideal structure: “bundle” infrastructure with vouchers/incentives – one stop shopping for fleets (recommended by E-truck Task Force Report)
- Natural gas: key surveys and policy report recommend a more transparent voucher system – more accessible for fleets

CALSTART
Clean Transportation Technologies and Solutions