ARB VISION:
CTP 2040 SCENARIOS

CALTRANS CTP PAC MEETING

NOVEMBER 18, 2014

OVERVIEW

- Scenarios for SB 391 and CTP 2040
- Scenario Planning for Policy Development
  - ARB Vision Tool
  - CTP 2040 Model & data coordination
- Example Scenario Results

U.S. DOE Scenario Planning definition:

- "Identifying the range of possibilities of trends & policies"
- "Developing a shared understanding of a problem"

SCENARIO PLANNING FOR CTP 2040 DEVELOPMENT

Long-term scenarios show multiple strategy combinations exist to achieve goals, and:

- Identify trends of most promising (and risky) strategies
- Inform near term public policy decisions
- Increases awareness of transportation system
  - Fuel network (multiple fuels across sectors)
  - Alternative technologies (some common across sectors)
  - Activity changes including mode shifts

AGENCY PARTNERSHIP FOR CTP 2040

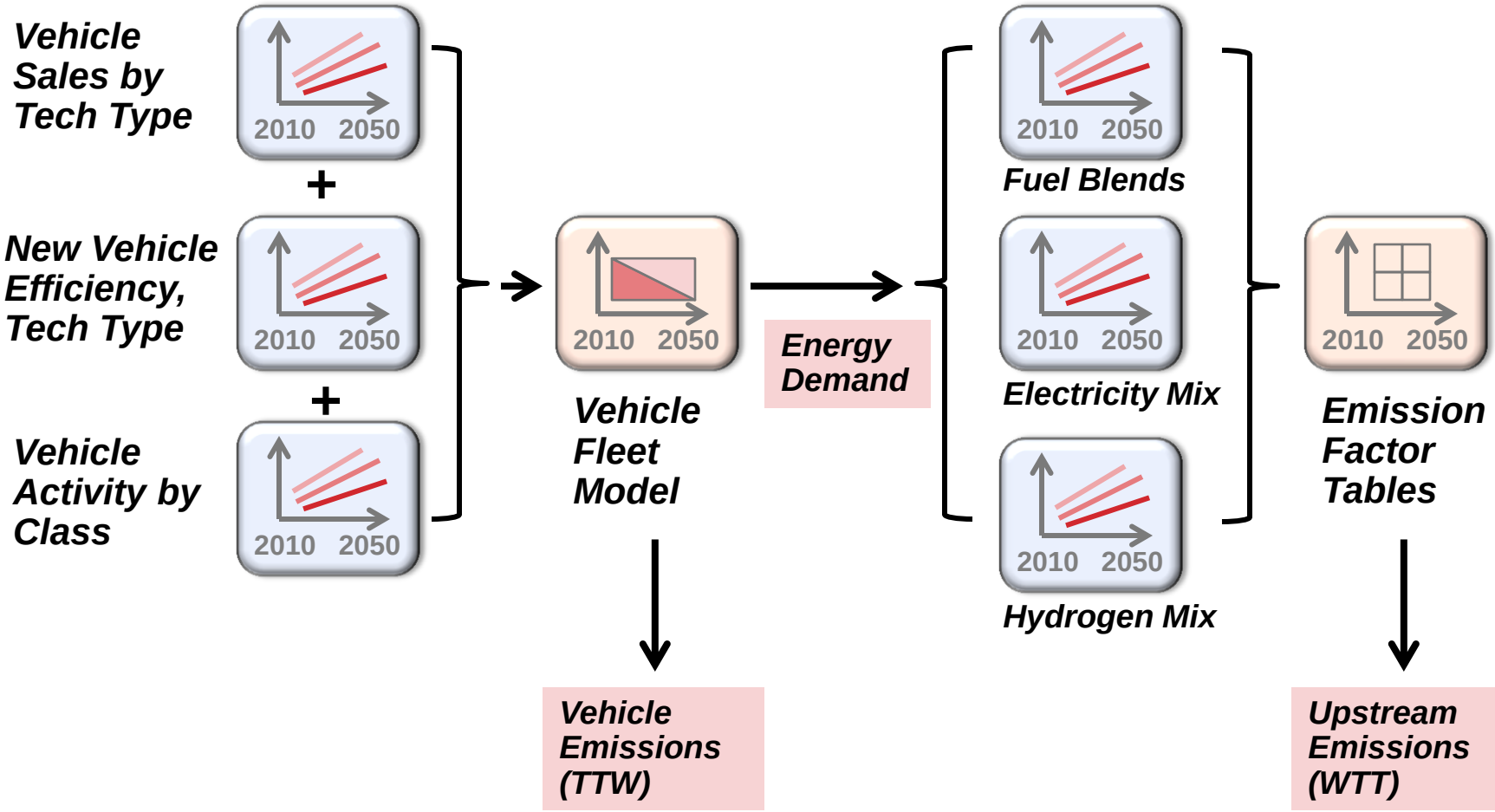
- Caltrans models estimate vehicle populations and VMT reductions from statewide strategies
- Local and regional government input for VMT reduction strategies and adopted SCS
- ARB Vision shows examples of advanced technology and alternative fuels needed

THREE CTP 2040 SCENARIOS

- Vision results for all three alternatives
- Scenario (Alternative) 1 - Baseline
  - CTP 2040 baseline VMT
  - CTP 2040 LDV, HDV, Passenger rail
- Scenario (Alternative) 2 –VMT reductions
  - Aggressive statewide VMT reduction strategies
- Scenario (Alternative) 3 – Adv. Veh & Fuels
  - To achieve remaining GHG reductions for 2050
  - May show various combinations to reach same GHG

SCENARIO PLANNING AND THE ARB VISION MODELING TOOL

SCENARIO TOOL FRAMEWORK



SECTORS / MODES IN VISION 2.0

Mobile Sector Modes Included

- Passenger vehicles
- Heavy-duty vehicles (on-road)
- Rail (freight, passenger)
- Aviation
- Ocean going vessels
- Cargo handling equipment
- Commercial harbor craft
- Construction equipment
- Other off-road vehicles

Industrial & Building Sector Modes Included

- Fuel production for transportation and buildings
- Residential and commercial buildings

MODEL & DATA COORDINATION FOR CTP 2040

MODELS, DATA HANDOFFS, ETC

CSTDM → **EMFAC 2014** → **Vision 2.0**

- VMT aggregated into 4 veh bundles
- 2010, ‘20, ’40
- By county
- By speed bin

- Disaggregate VMT to all vehicle classes
- Extrapolate all years
- Result: TTW CO2e by veh class & year

- EMFAC 2014 import:
  - VMT by veh class
  - EF by veh class
  - For all years
  - Statewide

Rail Plan

Aviation Plan

Caltrans

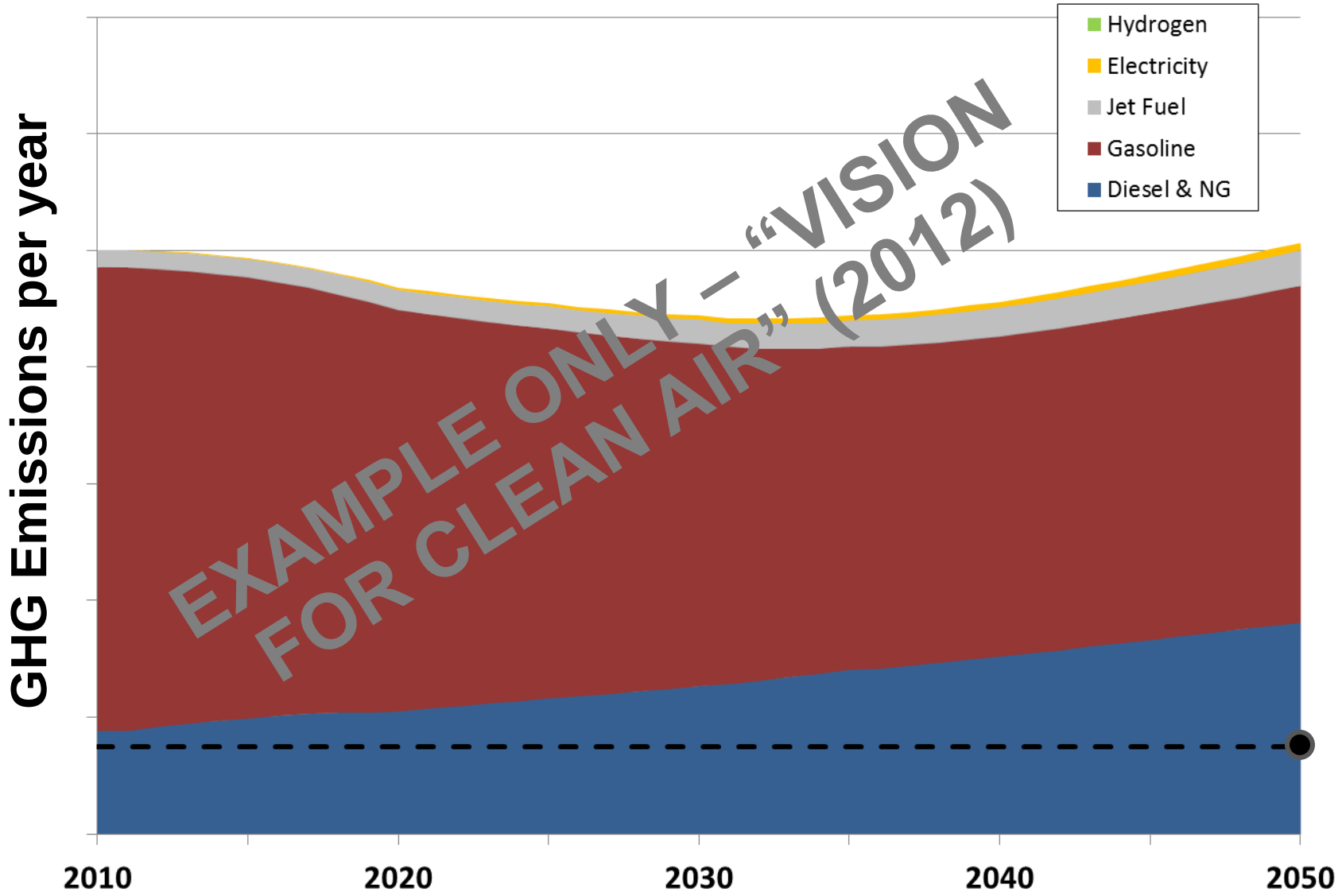
ARB

OUTPUTS AVAILABLE FOR CTP

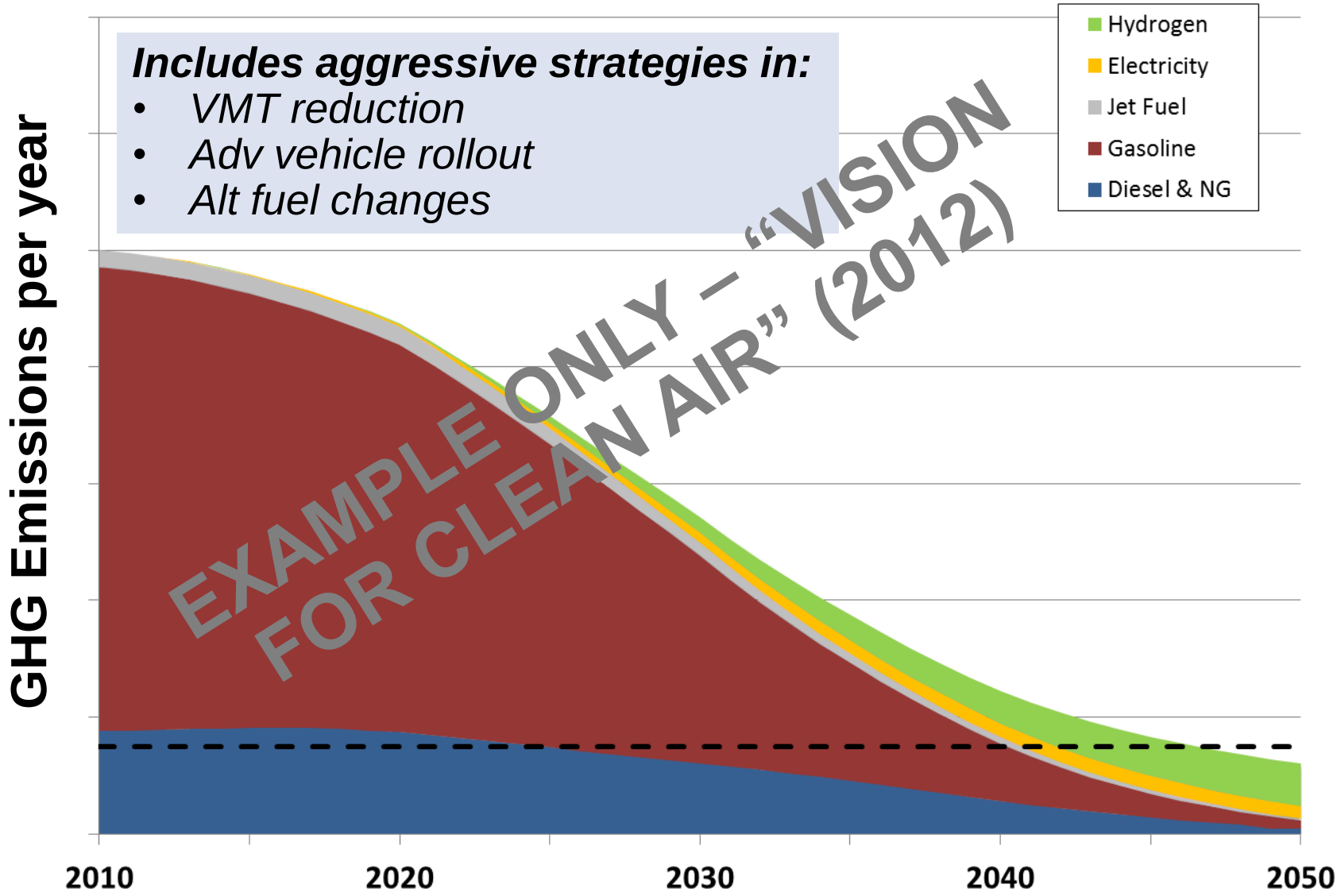
- Total GHG emissions for all three Scenarios
  - GHG results for both vehicle tailpipe ("tank to wheel") and upstream fuel emissions ("well to tank")
- Total fuel demand by type, changing over time
  - Gasoline, diesel, biofuels, electricity, hydrogen, NG
- Results for all transportation modes
- Results for each year from 2010 – 2050
- Documentation of methodologies & assumptions

EXAMPLE RESULTS FROM *PREVIOUS VISION SCENARIOS*

STATEWIDE GHG EMISSIONS: BASELINE



STATEWIDE GHG EMISSIONS: 2050 GHG SUCCESS SCENARIO



RESULTING TRENDS (EXAMPLES) IMPLICATIONS FOR STRATEGIES

Advanced Vehicle Transformation

- LDV ZEV sales as high as 100% by ~2050
  - ARB ZEV Regulation = 15% by 2025
- Electric technology needed in HDVs, Rail, Off-road

Activity Reductions

- VMT reductions in LDV, HDV & other modes critical
  - 20% LDV VMT reductions assumed in 2012 Vision 1
  - GHG/mi declines with fleet efficiency and alt fuels, but VMT reductions remain critical

RESULTING TRENDS (EXAMPLES) IMPLICATIONS FOR STRATEGIES

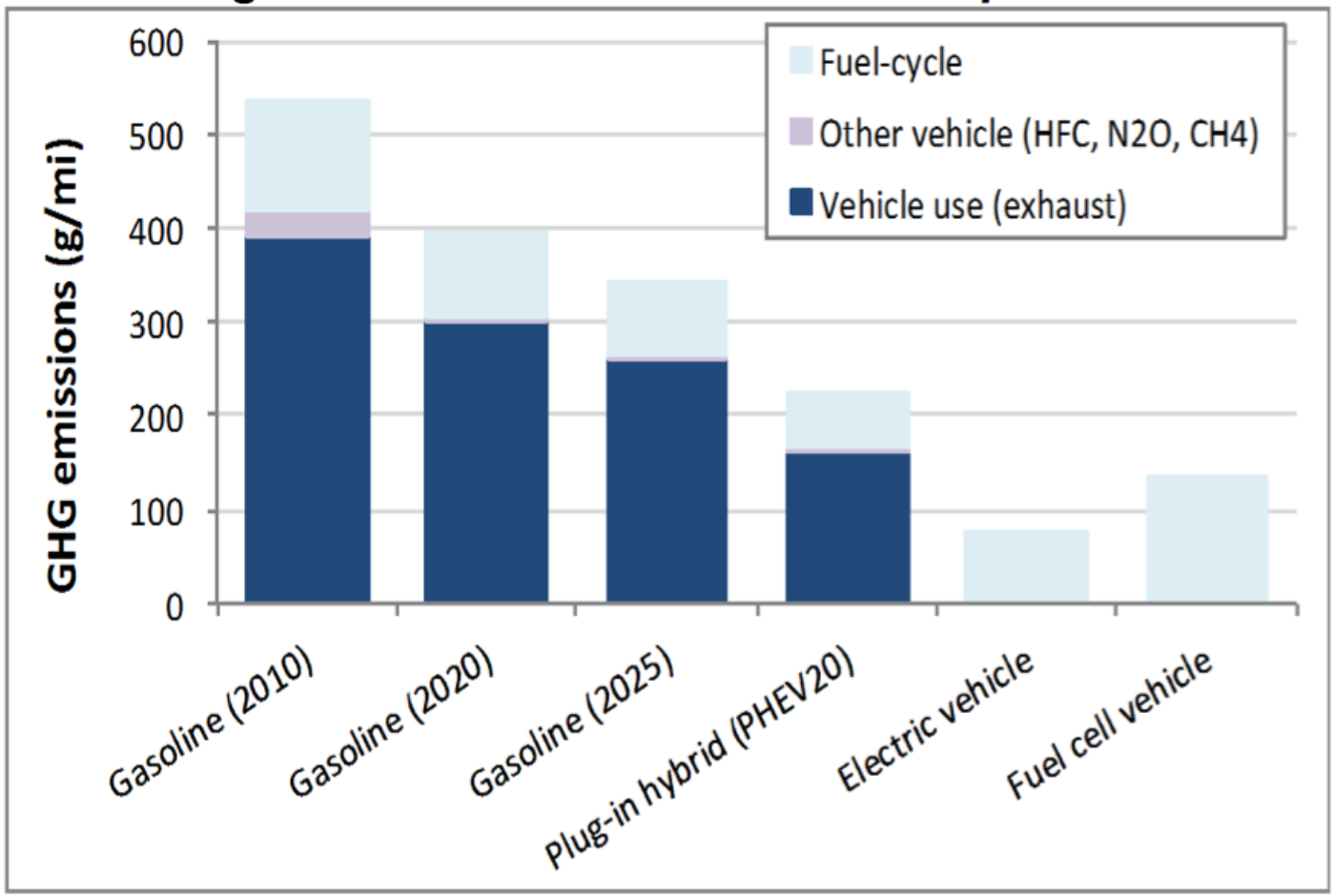
Alternative Fuel Transformation

- Hydrogen and electric charging infrastructure needed throughout our communities and along corridors
  - H2 for LDVs: Over 1,000 stations by 2030* (17 today)
- Biofuels needed for most remaining liquid fuel demand; Used in heavier modes
  - Renewable Diesel example: Potentially 20 new biofuel refineries by 2030** (3 ethanol facilities in CA today)

** 500,000 FCVs on-road by 2030*
*** ~1 billion gallons RD by 2030*

WELL-TO-WHEEL EXAMPLE: WTT (FUEL CYCLE) + TTW (VEH)

Figure 19: WTW GHG emissions comparison



Source: ARB ZEV Regulation Staff Report, Dec 2011

CONCLUDING THOUGHTS

- Include full transportation sector
  - Vision to include all mobile sources, but can truncate
- Consider full WTW emission results
  - Provides more complete context for policy decisions
  - By 2050, most emissions will be upstream fuel (LDV)
- Scenario results to be provided to support:
  - Draft 2 of CTP 2040 public document
  - March / April Caltrans workshops