

# State and Federal Policy Landscape: How It Impacts California's Transportation Sector

Clean Technology Forum

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Sacramento

# Legislation and Policy Context Shifting

- Pre 2007
  - Primarily Reduce Criteria Air Pollutant- On Road Regulations
- Post 2007
  - Continue to Reduce Criteria Pollutants – On Road and Off Road Regulations
  - Reduce Toxics and Soil and Water Contaminants – Regulations
  - Curb Greenhouse Gas Emissions
    - Tailpipe Regulations (AB 1493)
    - Cap and Trade Mechanism (AB 32)
    - Low Carbon Fuel Standard (Executive Order)

# Legislations and Policies Cont'd

- Post 2007
  - Reduce Petroleum Dependency (AB 2076 and AB 1007) – Goals and Plan
  - Increase Alternative Fuel Use (AB 1007 and AB 118)
    - Incentives
  - Provide Incentives for Clean Diesel and Alternative Fuels and Technologies (Carl Moyer, Prop 1B)
  - Extend Federal Alternative Fuel Tax Credits and Incentives and EPACT Requirements(2007 Energy Act)
  - Increase In-state Biofuel Production – Bioenergy Action Plan and Executive Order

# Factors Driving Policy Changes In California

- Transportation Demand Growth
  - At Least 1.5 % Annual Demand Growth Rate Until 2030
  - Net New Population Growth – 500,000 Per Year
- Greater Concerns About Environmental Impacts of Global Climate Change
  - Transportation Sector – 40 % of California's GHG Emissions Inventory
  - Full Fuel Cycle Impacts
- Fuel Price Volatility Impacts
  - Tight Refinery Demand and Supply Balance
  - Crude Oil Price Increases
  - California Net Importer of Refined Product
  - Terminal Storage Constraints

# Activities To Reduce Greenhouse Gas Emissions

- AB 1493 – Reduce Tailpipe Emissions
- Low Carbon Fuel Standard – Reduce Carbon Intensity by 10 % in 2020 for Transportation Fuels
- AB 32 – Global Warming Act

# Types of Greenhouse Gases and Sources (Full Fuel Cycle)

- Extraction – Oil and Gas Extraction: Thermal Combustion and Soil Disturbance (CO<sub>2</sub>, N<sub>2</sub>O, Methane)
- Fuel Production and Terminals – Refineries, Crop Growth/Harvesting, Waste Collection (CO<sub>2</sub>, N<sub>2</sub>O, Methane)
- Fuel Transport – Pipelines, Rail, Tanker Truck (CO<sub>2</sub>, N<sub>2</sub>O, Methane)
- Fuel Infrastructure – Fueling Pumps, Home Refueling and Recharging, Compressor Stations, Fuel Liquefaction (CO<sub>2</sub>, Methane)
- Vehicle and Offroad Applications – Tank to Wheels (CO<sub>2</sub> and Methane)

# What Does This Mean For Fleet Managers and Local Governments

- Compliance With Multiple Policies Is Complex Responsibility – Training and Education Needs
- Purchasing Decisions (Vehicles and Fuels) Require Knowledge of Full Fuel Cycle Impacts
- Local Government Ordinances and Directives Will Echo State and Federal Policies
- Early Adopters Will Receive Incentives to Offset Higher Costs

# California Alternative Fuels Plan (AB 1007)

- Early Development Years (2007-2012)
  - Dominated by Fuel Blend Expansion (E10, B20)
  - Increased Market Niche Penetration (CNG, LNG, Propane, Electric Drive)
  - Construction of Biofuels Production Plants
  - Expanded Introduction of New Vehicle Technology (PHEVs, FFVs, Hydrogen Fuel Cells)

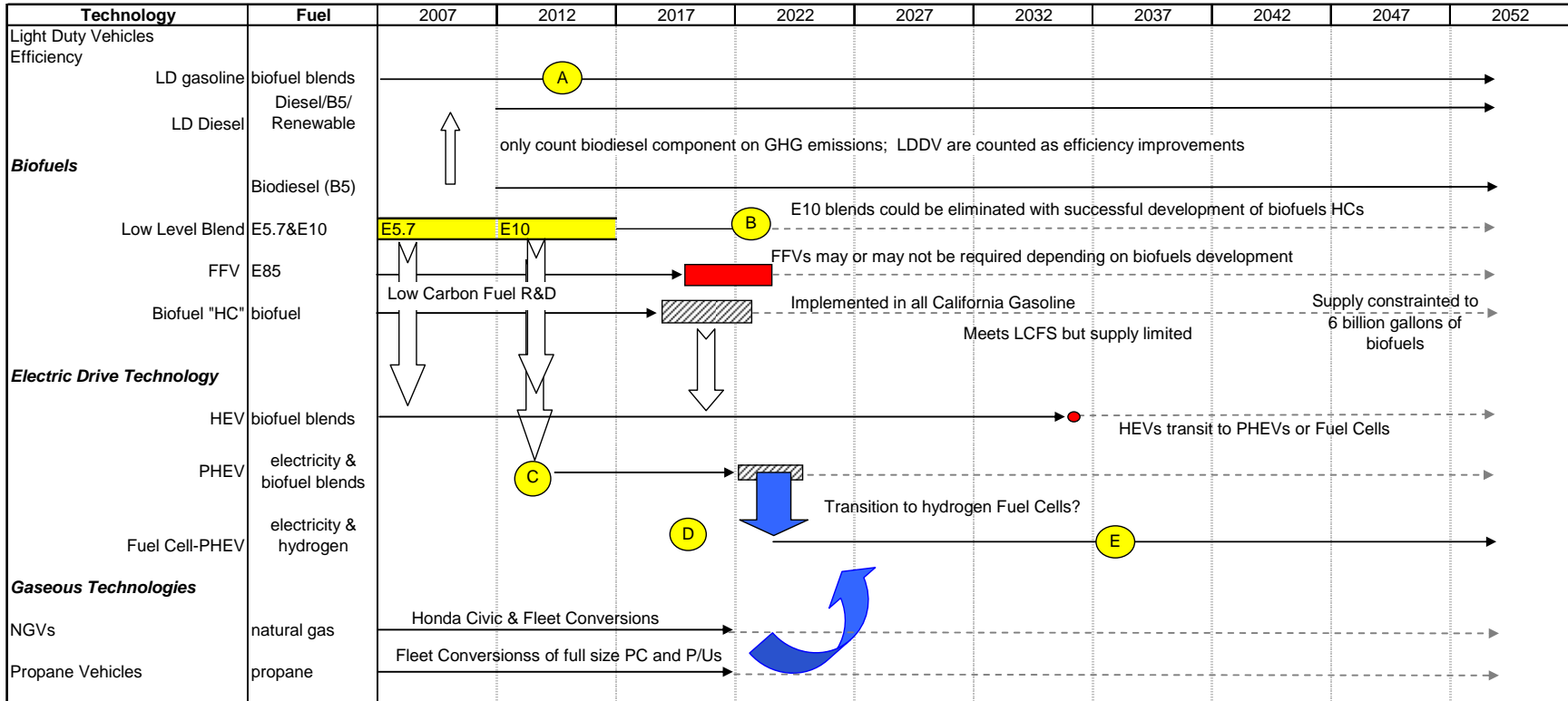
# Alternative Fuels Plan

- Middle Growth Years (2013-2022)
  - Full Compliance with LCFS
  - Fuel Blends Evolve to Biohydrocarbon Options
  - New Vehicle Technologies Reach Mass Market Launch Points
  - Onboard Storage Technology Advances Reduce New Vehicle Costs
  - Market Niche Saturation Becomes Big Contributor to Petroleum Reduction
  - Hybridization of All Vehicles
  - California Biofuel Production Transitions to Cellulose Feedstock

# Alternative Fuels Plan

- Later Maturity Years (2023-2050)
  - Alternative Fuels and Technologies Compete Well in Market
  - Fueling Infrastructure Diversity and Build Out
  - Optimized Vehicle Efficiency
  - Land Use Planning Changes Movement of Goods and People

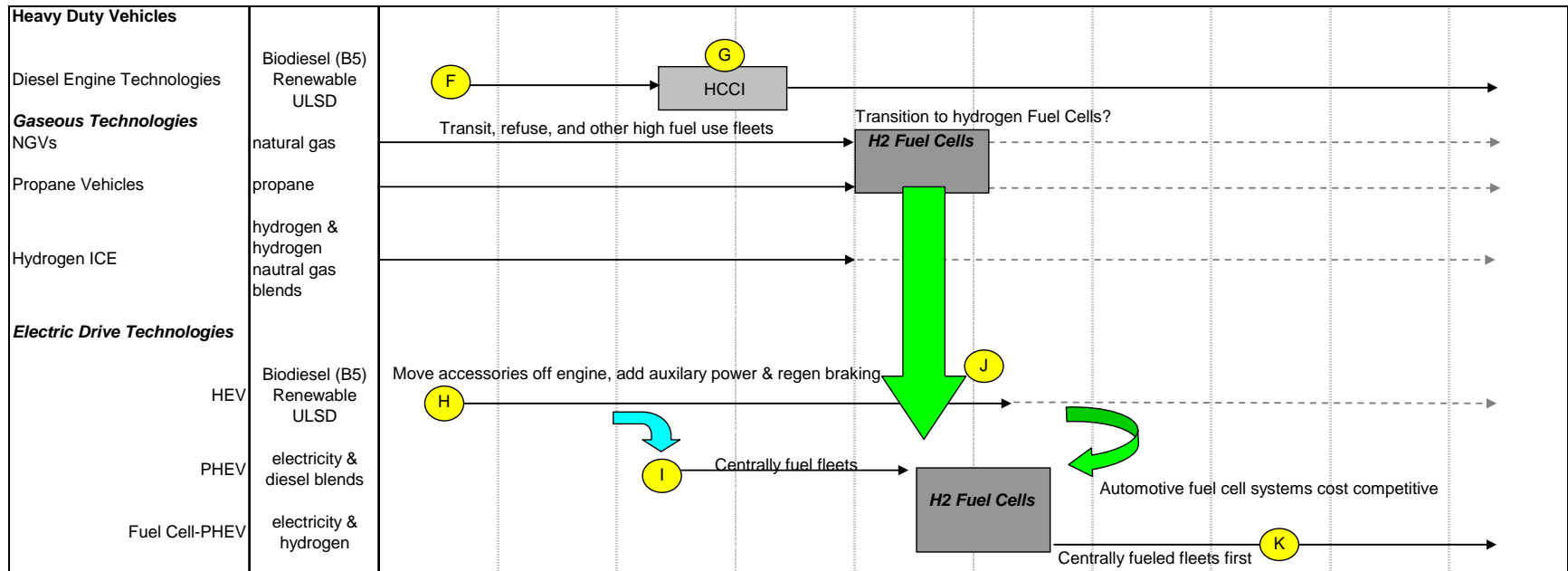
# Alternative Fuel Technology Road Map, 2007 through 2050



## Major Technical Milestones Light Duty Vehicles

- A gasoline approaches diesel efficiencies with HCCI type technologies 2012-2017
- B biofuel "HC" standardized by oil companies to meet LCFS in 2020
- C Lithium Ion battery developed for IHEV applications and ICE PHEVs available in 2012
- D hydrogen FC technologies achieve "cost" targets for mass production; local gaseous hydrogen production using steam reformed natural gas 2020-2035
- E centralized hydrogen production and distribution 2035-2040

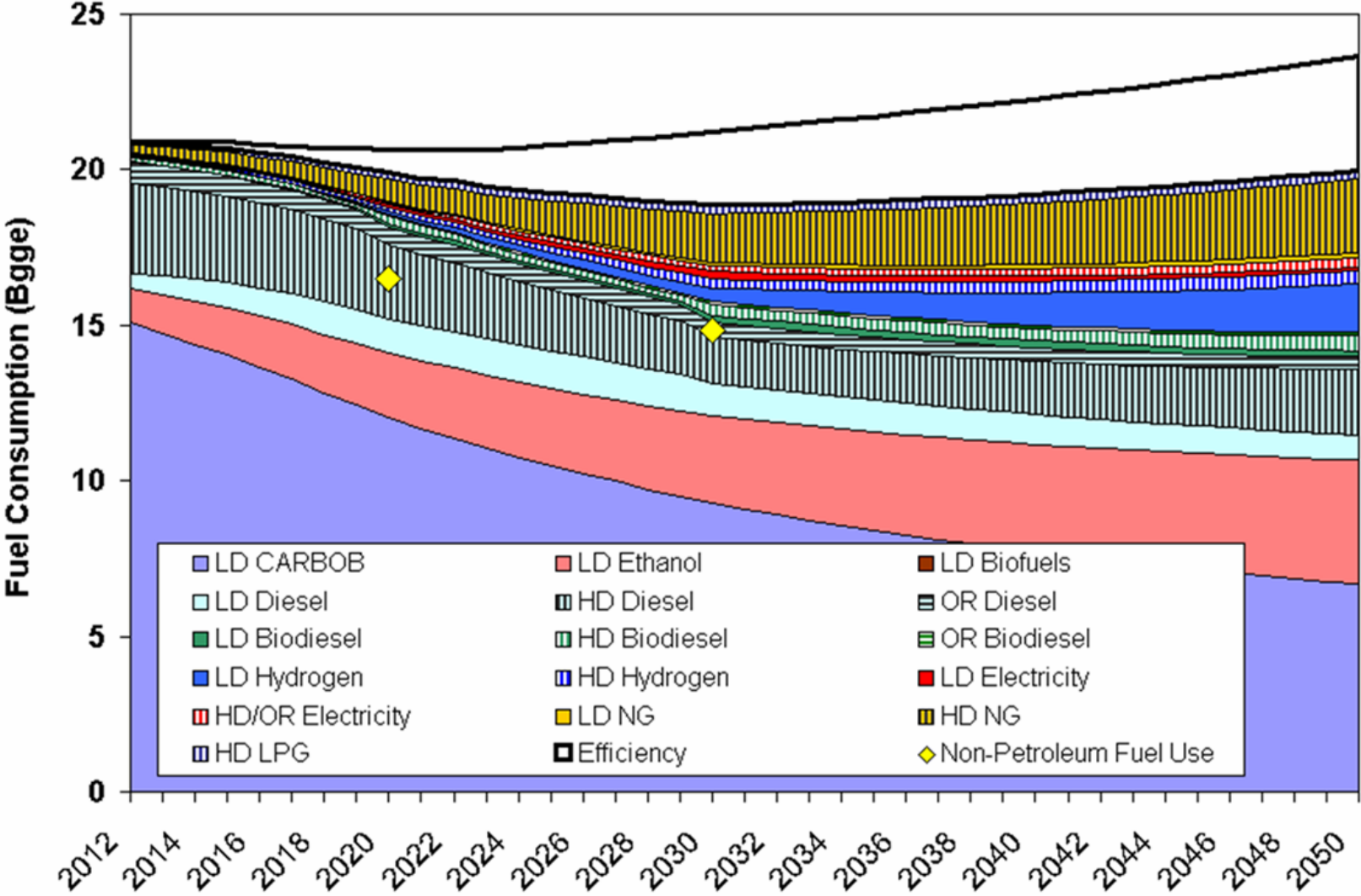
# Alternative Fuel Technology Road Map, 2007 through 2050 Continued



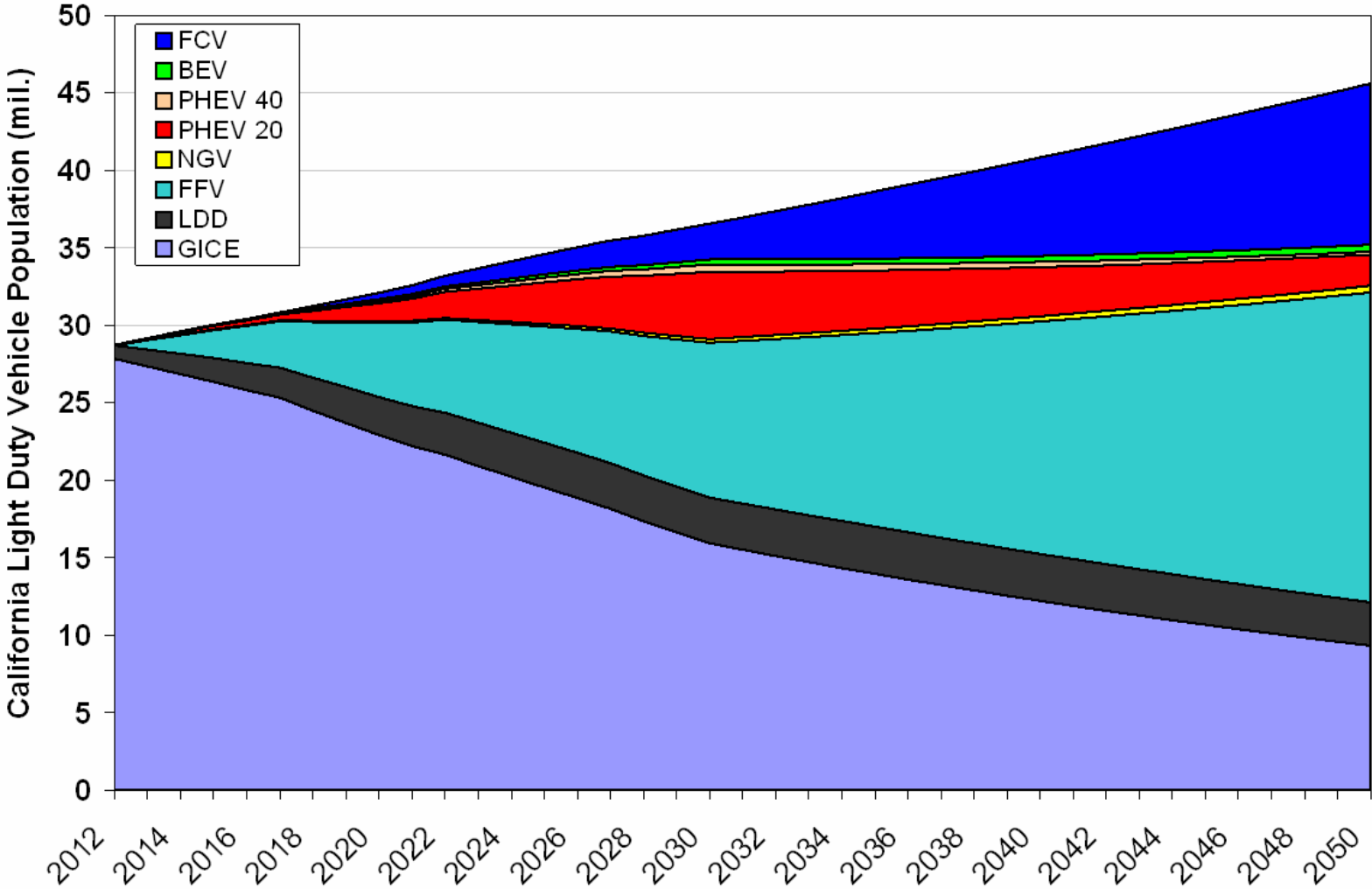
## Major Technical Milestones Heavy Duty Vehicles

- F Biodiesel/renewable diesel added to California ULSD spec 2012
- G Diesel technology starts transition to HCCI 2017
- H Hybrid technology starts to be incorporated in vehicle platforms
- I Lithium Ion battery technology advances PHEV technology to vehicle platforms
- J fuel cell costs competitive with diesel ICEs, fuel cell technology moves to heavy duty niche market
- K centralized hydrogen production broadens infrastructure and vehicle applications

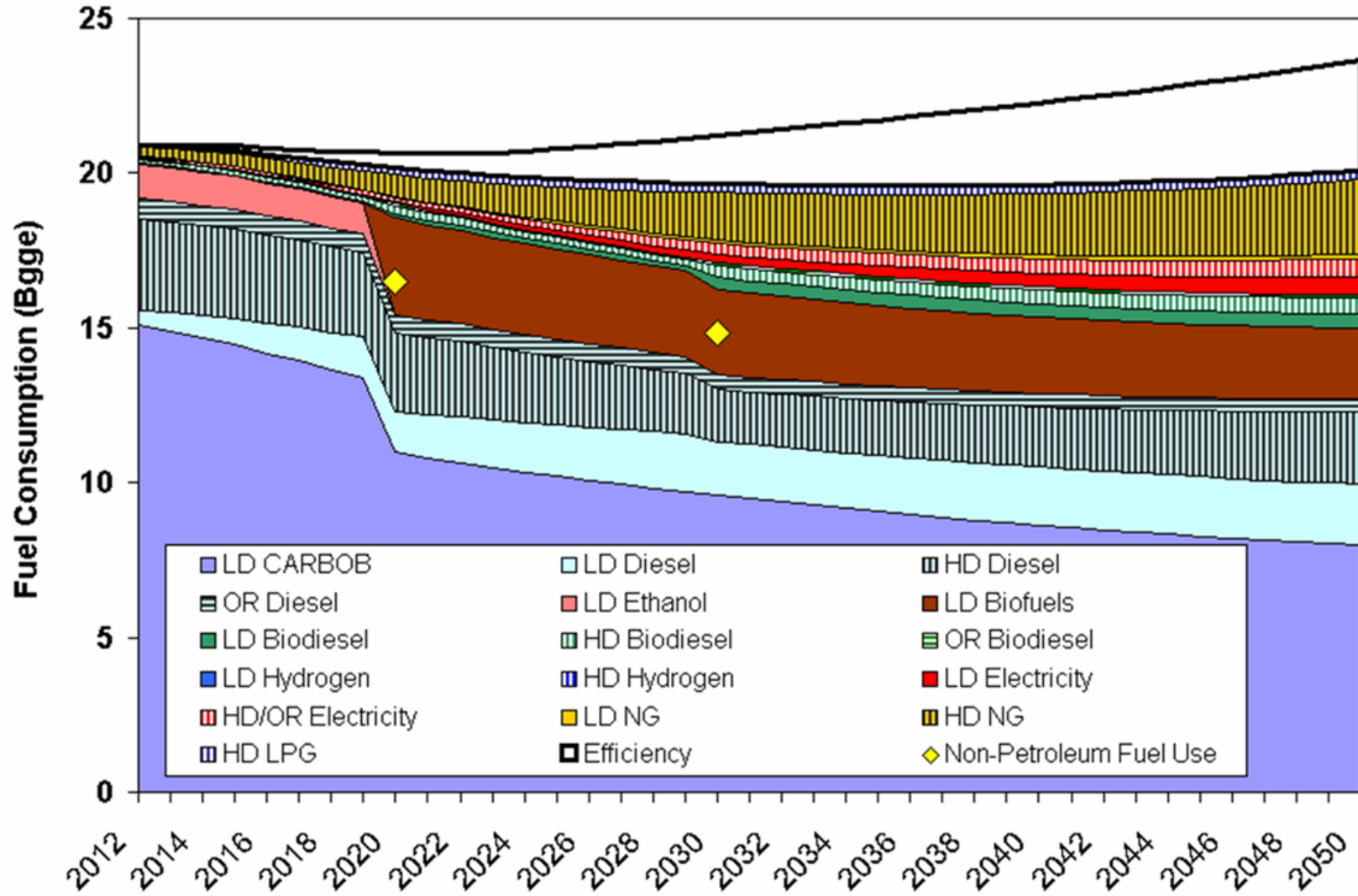
# All Vehicles Mix - Fuel Consumption for Example 1



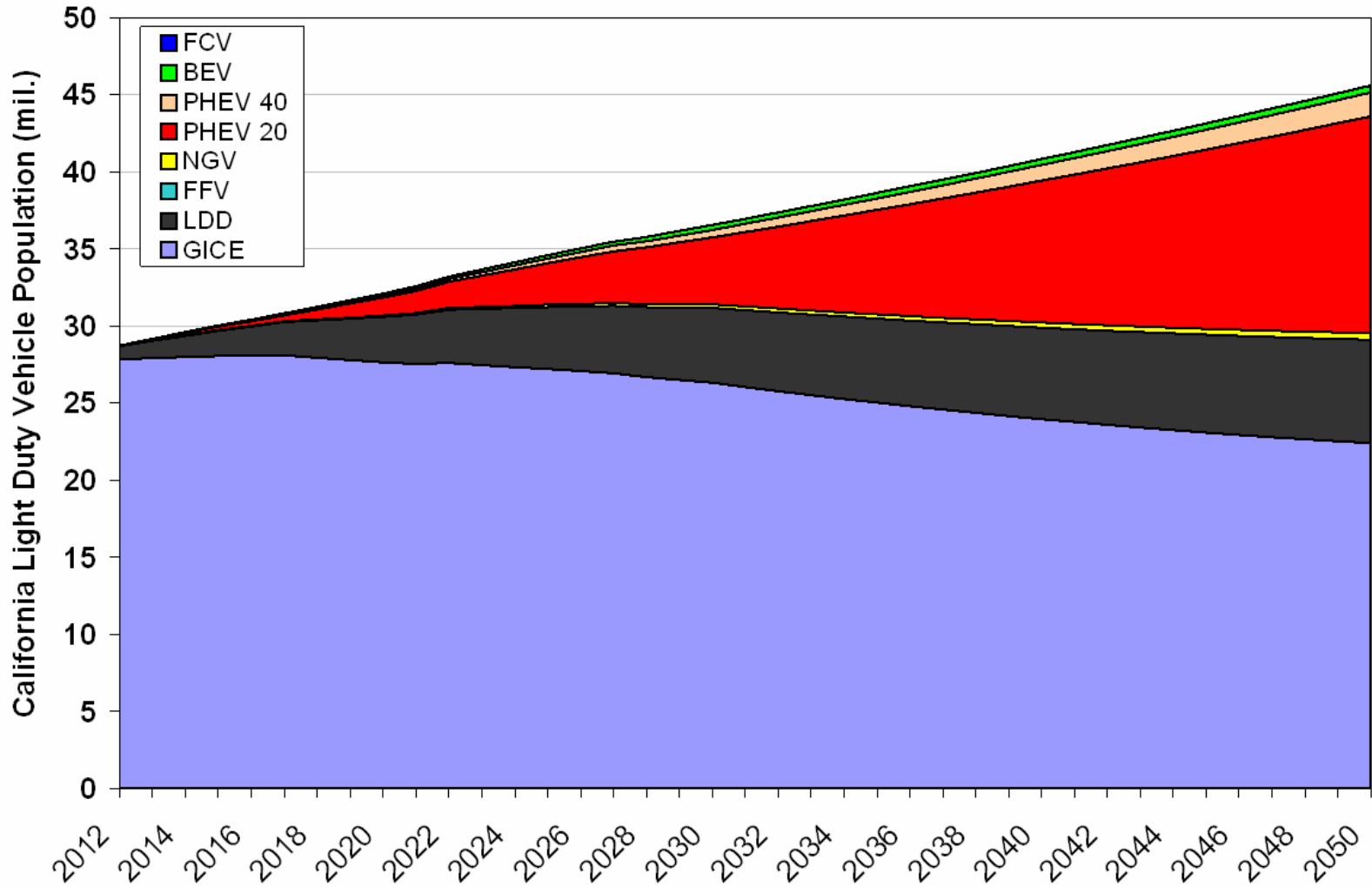
# Vehicle Population Results for Example 1



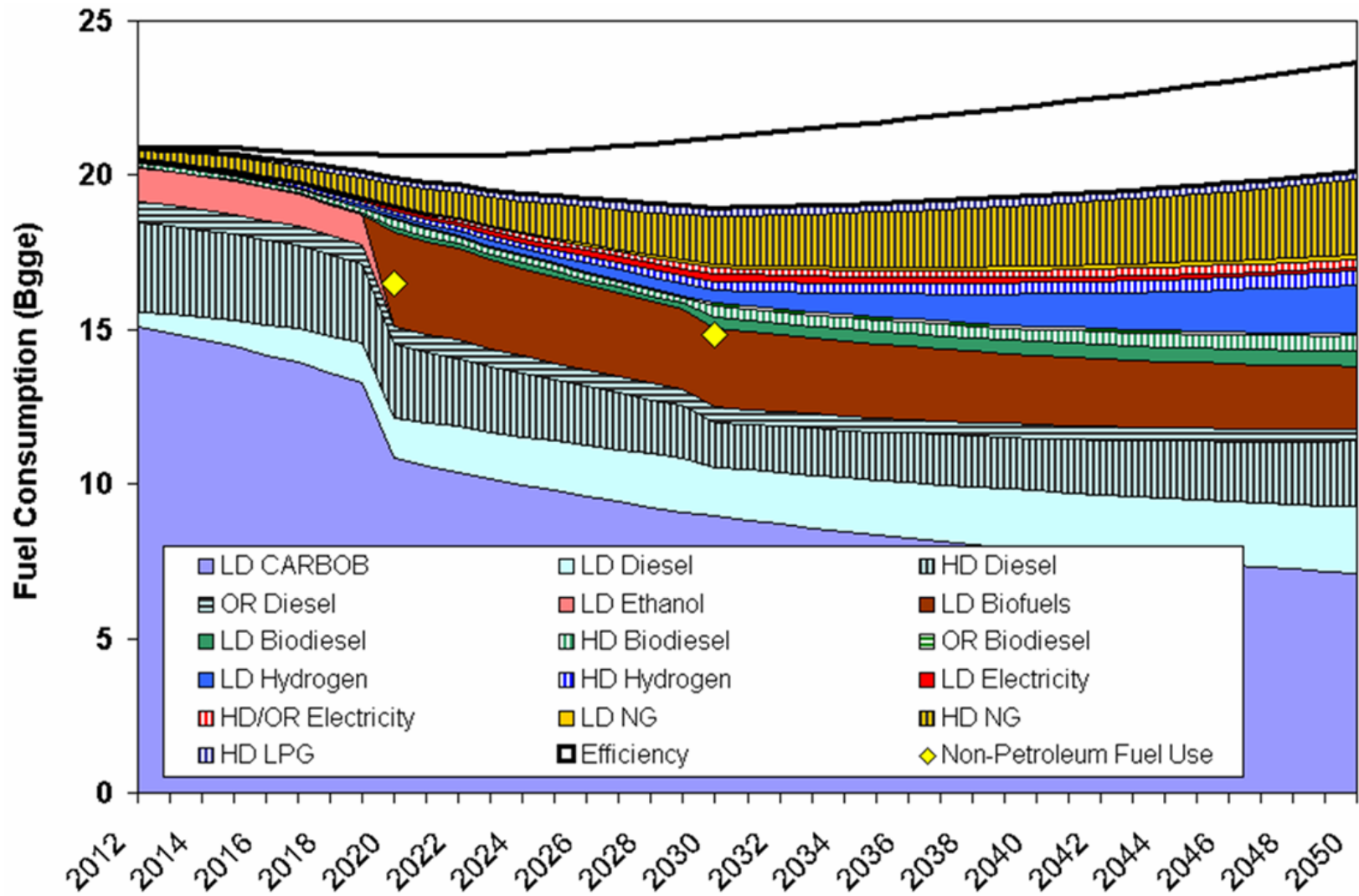
## All Vehicles Mix - Fuel Consumption for Example 2



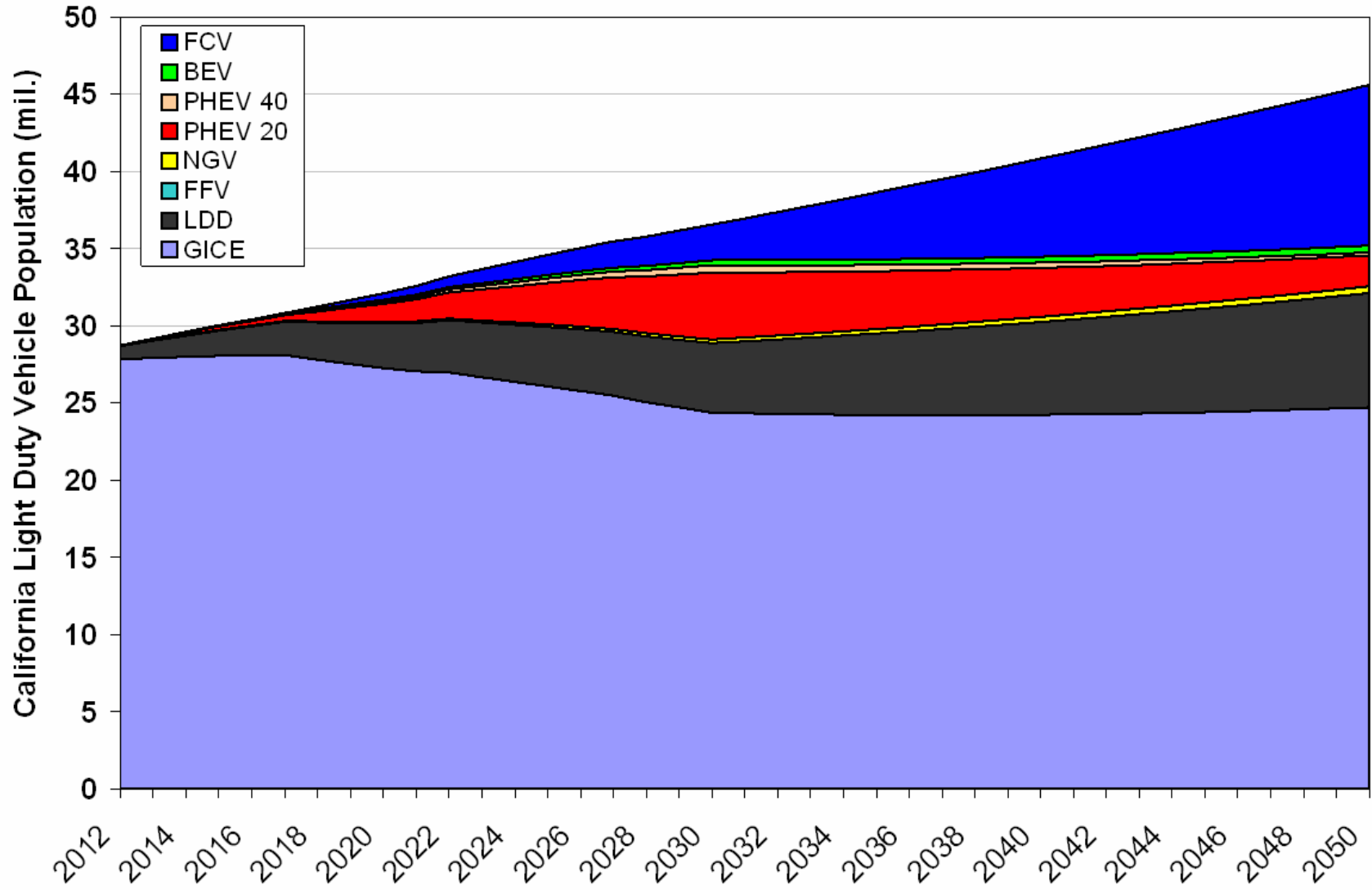
# Vehicle Population Results for Example 2



### All Vehicles Mix - Fuel Consumption for Example 3



# Vehicle Population Results for Example 3



# Plan Factors

- Sustained High Gasoline and Diesel Price Increases
- Technology Advances
- Vehicle Cost Reductions
- Environmentally Acceptable Biofuel Production in California
- Deployment of Accessible Fuel Infrastructure
- Financial Investment (At Least \$100 Billion)
- New/Changing Industry Participants
- Consumer Acceptance
- Use of Full Fuel Cycle Analysis

# Actions Needed

- Extend Federal Incentives
- Develop and Enforce Low Carbon Fuel Standard
- Provide State Incentives (AB 118) - \$100 - \$200 Million Per Year for 8 Years
- Market Investment of At Least \$100 Billion Required Between 2007-2050
- New Industry Participants
- Spur Technology Advances
- Stimulate In-State Biofuel Production
- Use Full Fuel Cycle Analysis as Measurement Method
- Endure Anticipated Sustained High Petroleum Fuel Prices
- Alternative Fuel Mix Cost Effective as Early as 2015 or In 2030-2050 Timeframe
- Achieve Goals to Increase Alternative Fuels: 9 % in 2012, 11% in 2017 and 26 % in 2022.
- Facilitate Education, Training and Outreach Programs

# Anticipated Results of Alternative Fuels Plan

- Reduce Criteria Air Pollution and Water, Soil and Other Environmental Impacts
- Fulfill Petroleum Reduction and Alternative Fuel Growth Goals.
- Fulfill In-State Biofuel Production Goals
- Partially Meet Greenhouse Gas Emission Reduction Targets.

# AB 118 Key Provisions

- Provides CARB Funding For Two Programs (\$80 Million/Yr For 7 ½ Years)
  - Enhanced Fleet Modernization
  - Air Quality Improvement Program
- Provides CEC Funding For Alternative and Renewable Fuel and Vehicle Technology Program
  - \$120 Million/Yr For 7 ½ Years
  - Co-fund Development and Deployment of Fuel Production Plants, Fueling Infrastructure, Vehicles, Engines and Other Technology
  - Co-fund Education, Outreach and Workforce Training

# Relationship of AB 118 Funding to Fleet Managers and Local Governments

- All Projects Must Pass A Series of Criteria Screens:
  - Definition of Terms
  - Incentive Need
  - Environmental Footprint
  - Fulfill Policy Objectives
  - Economic Development, Funding Match and Other Criteria
  - Consistent with AB 118 Incentive Mechanisms

# Relationship of AB 118 Funding to Fleet Managers and Local Governments

- Include Vehicle Fleets and Local Governments in:
  - Regulations
  - Investment Plan
- Sustainability Definition and Goals
  - Proposed Public Forum – May 2008
- Analytical Foundation for AB 118 – Same for Low Carbon Fuel Standard
- Include Workforce Training Programs in Funding Eligibility

# AB 118 Next Steps CEC Program

- Establish Investment Plan Advisory Body  
– Early 2008
- Develop Draft Annual Investment Plan –  
Spring 2008
- Begin Receiving Funding – July 2008
- Initiate Funding Solicitations/Make Awards  
–Early 2009

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