California Environmental Protection Agency

Air Resources Board

Uses for Urban-Derived Biomass for the Low Carbon Fuel Standard

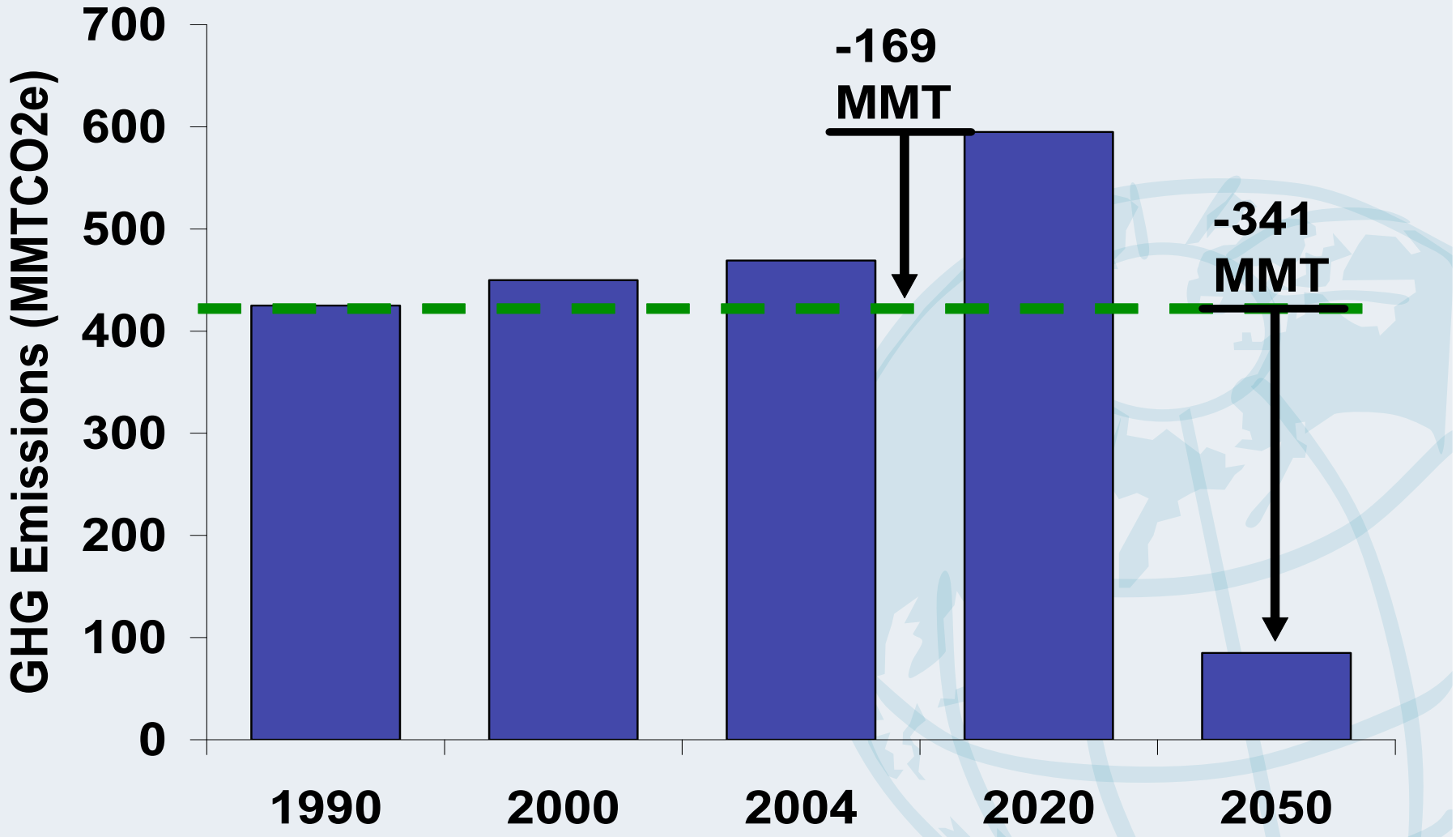
7th Annual Forum of the California Biomass Collaborative

May 11, 2010

Global Warming Solutions Act (AB 32)

- Governor directed the ARB to develop a set of regulations to reduce Greenhouse Gases (GHGs) in the state of CA
- 2020 Target: Reduce GHGs to 1990 levels
- 2050 Goal: Reduce GHGs to 20% of 1990 levels

Large GHG Reductions Required



Transportation Sector Important

- GHG emissions from transportation are large and increasing
- Transportation emissions affected by:
  - Amount and type of transportation fuels
  - Efficiency of motor vehicles
  - Number of vehicle miles traveled

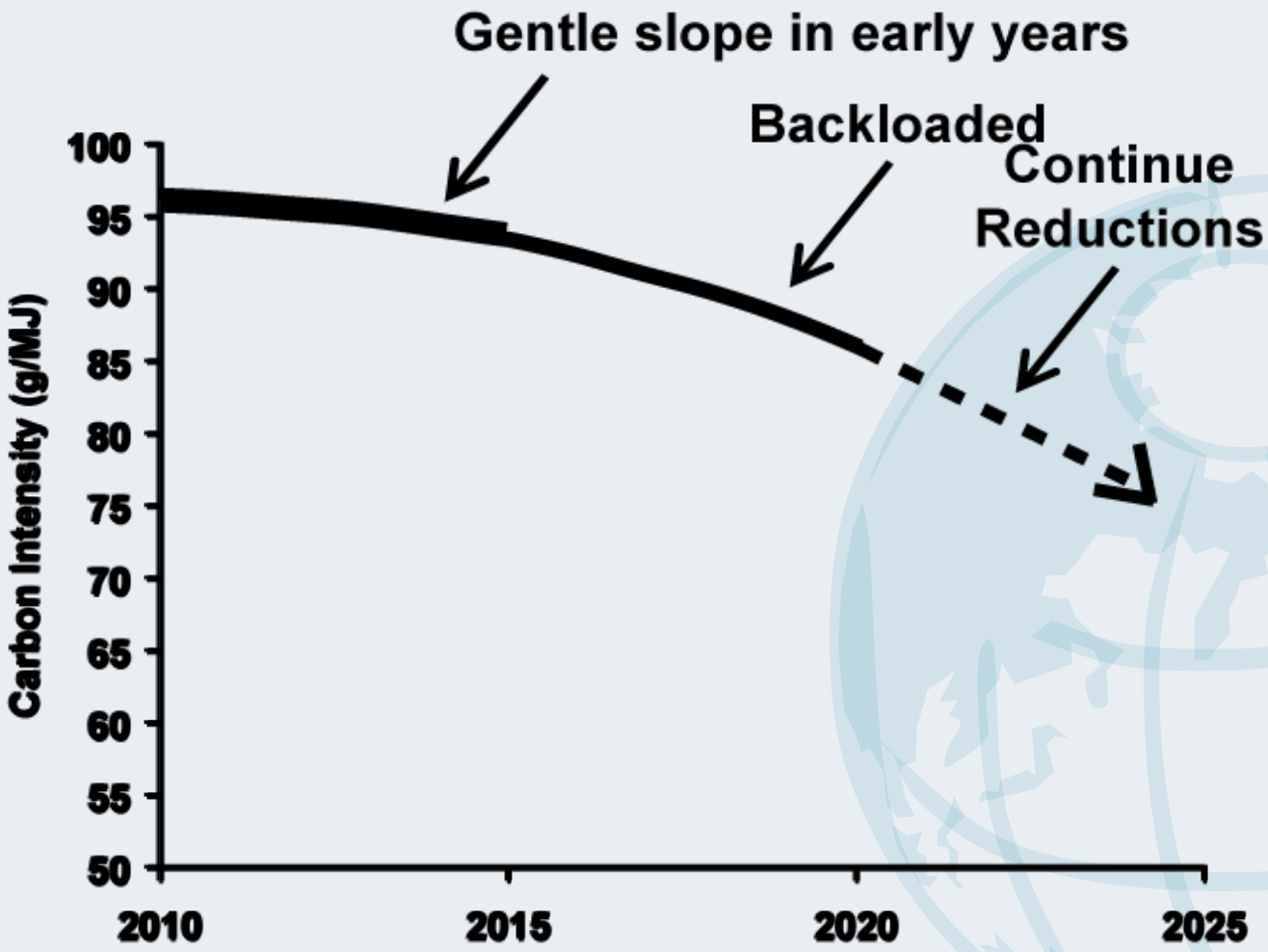
LCFS Goals and Benefits

- Achieve a 10% reduction in the carbon intensity of gasoline and diesel by 2020
- Spur technology development and increase the use of low carbon intensity fuels
- Reduce the amount of petroleum consumed and our dependence on foreign oil
- Will contribute about a 10% overall GHG reduction to the larger AB 32 program

LCFS Mechanics

- Baseline fuel carbon intensity is that of 2010 gasoline and diesel fuel
- Carbon intensity (CI) represents the GHG emissions per unit of energy
- Fuel producers achieve 10 percent reduction by 2020
- Reduction is gradual and weighted toward later compliance years

The LCFS Compliance Schedule



How does the LCFS Work?

- Regulated parties must increase the use of
  - Low carbon intensity ethanol
  - Cellulosic ethanol
  - Electricity, hydrogen, natural gas

- And decrease the use of
  - Petroleum fuel
  - Higher carbon-intensity crop-based biofuels.

Regulated Parties

- Providers of most petroleum and biofuels are "regulated parties"
- Providers of fuels that meet 2020 levels must "opt in" to earn credits:
  - Electricity
  - Hydrogen
  - Natural Gas

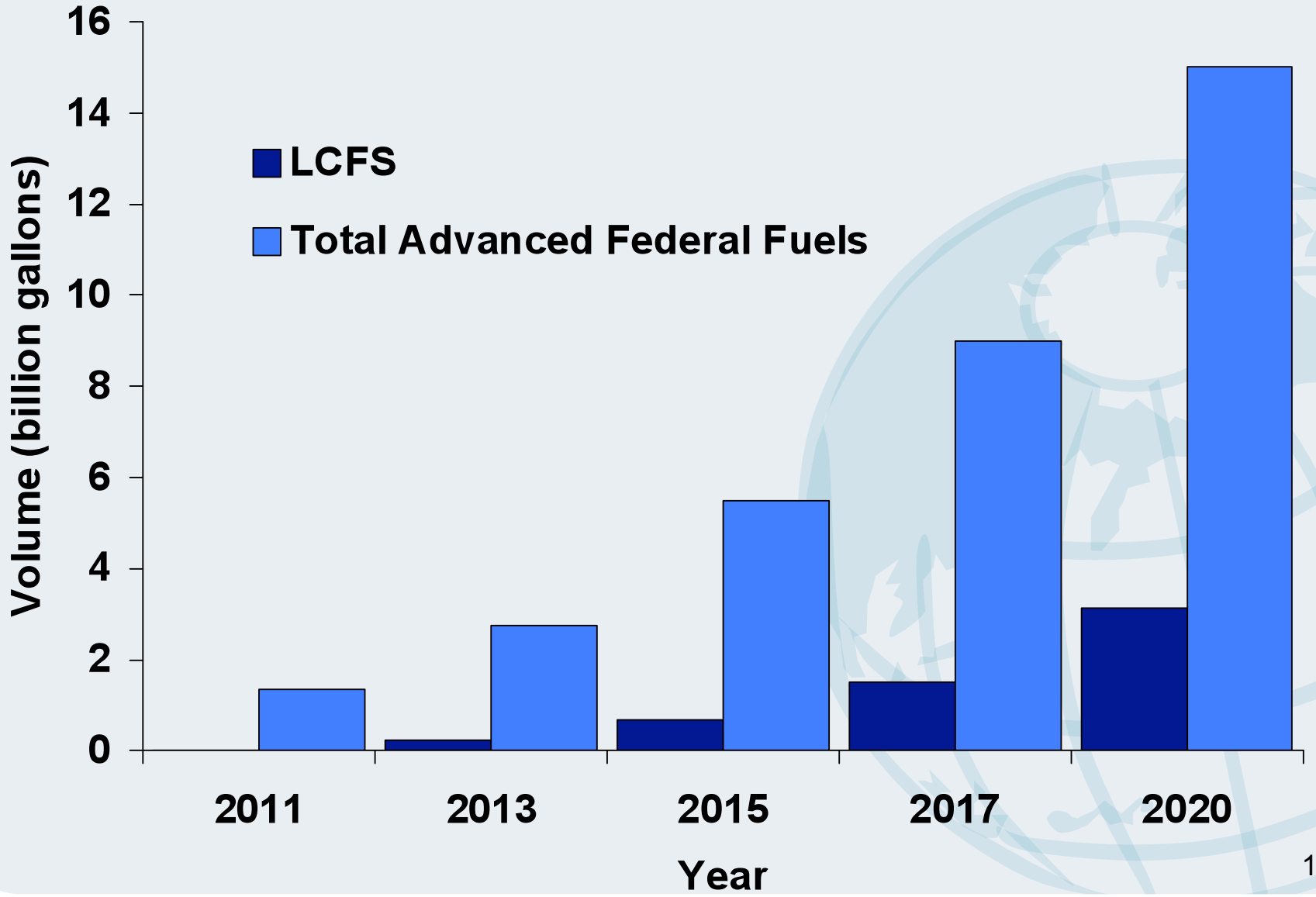
How is Compliance Determined?

- Compliance based on system of determining annual credits and deficits
- Fuels with lower carbon intensity than the standard generate credits
- Fuels with higher carbon intensity than the standard generate deficits
- Annually, the mix of fuels must meet the standard

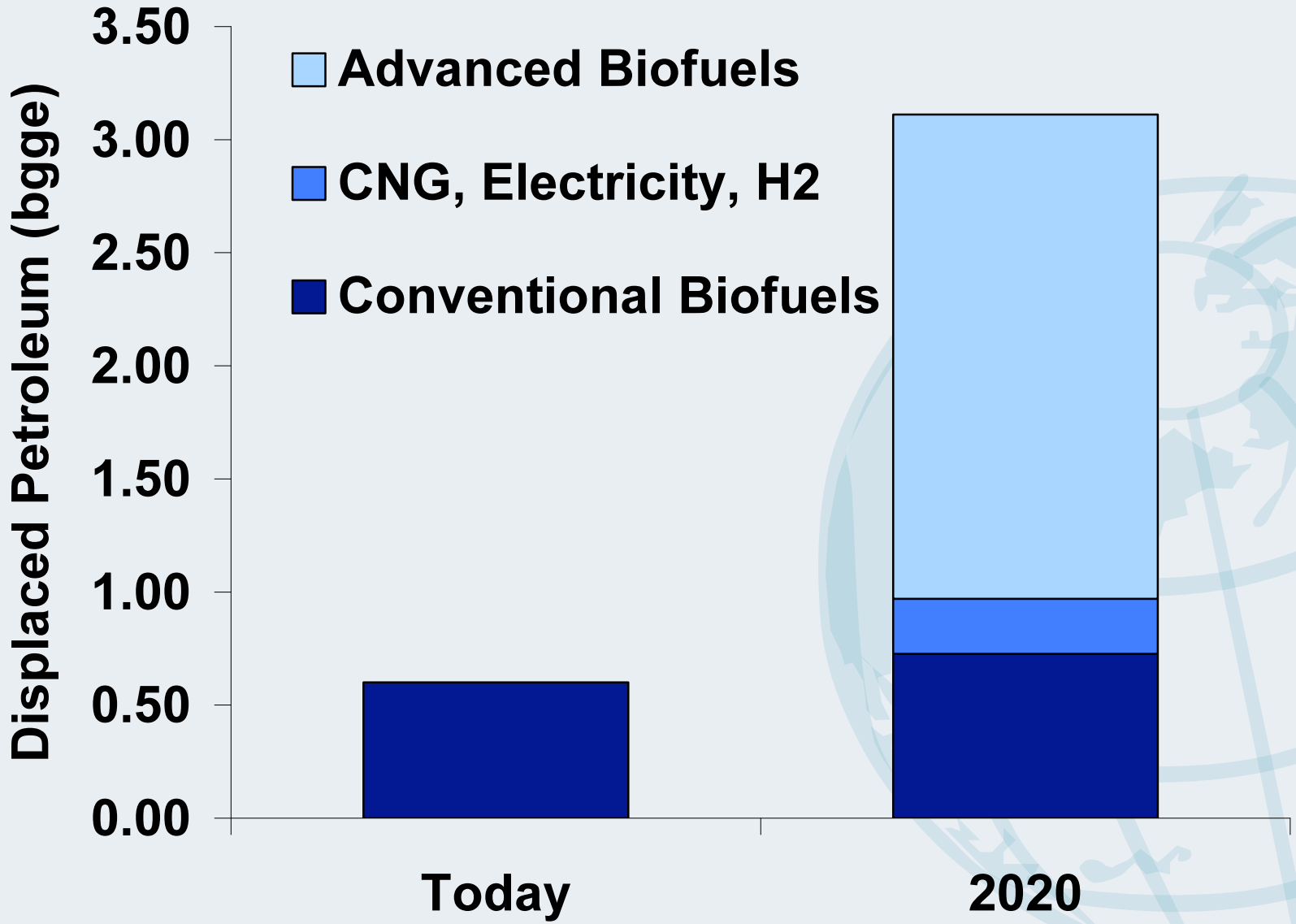
LCFS Compliments the RFS

- LCFS builds upon and improves the RFS
- The RFS will help supply fuel and infrastructure needed to meet the goals of the LCFS
- The LCFS, unlike RFS:
  - Has no volumetric requirements
  - Does not grandfather in any fuels
  - Uses performance-measure approach
  - Provides 3 times the CI reductions under the LCFS

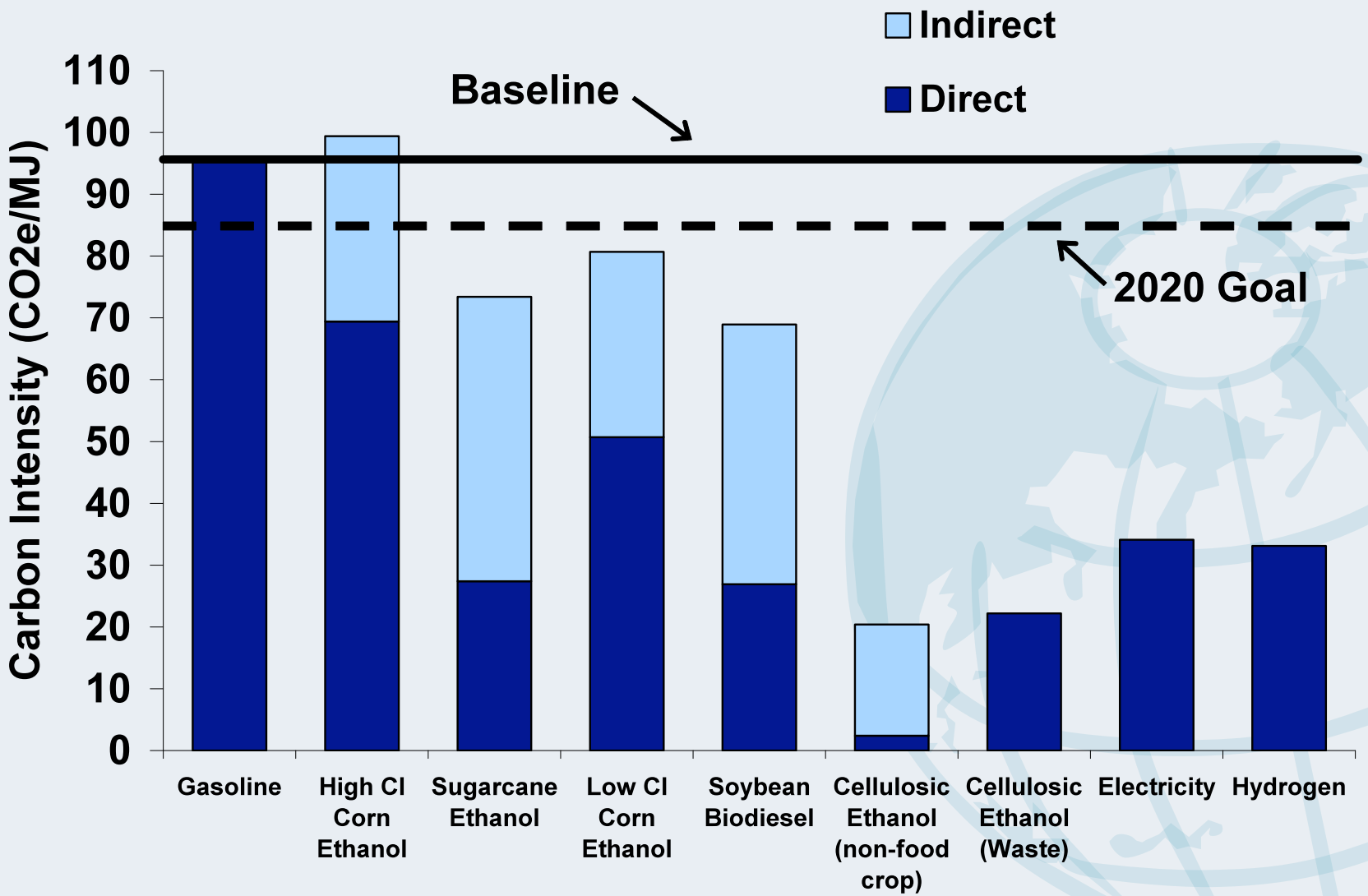
Advanced Biofuel Volumes - RFS vs. LCFS



LCFS Displaces Petroleum



Carbon Intensity of Transportation Fuels



Attractiveness of Urban-Derived Biomass

- Plentiful as a biofuel feedstock
  - Estimated over 8 million dry tons/yr in CA
  - Relatively low prices compared to other feedstocks
- Low carbon-intensity values (=$)
- Fewer sustainability issues

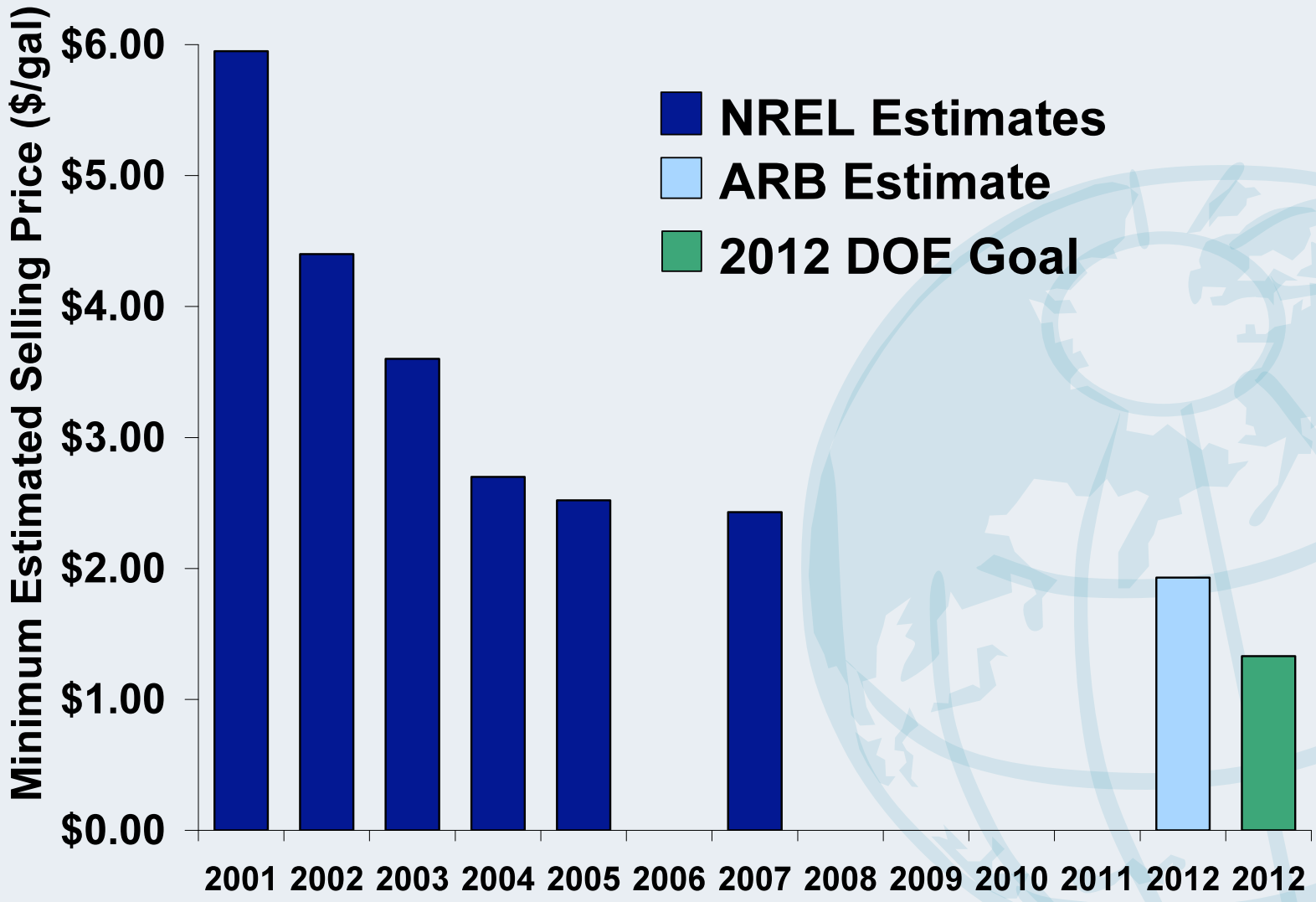
Use of MSW in LCFS Analysis

- Based on available biomass, assumed 25 biorefineries (50 MGY size) may be built in CA
- Average feedstock composition
  - 50% green MSW
  - 44% forest waste
  - 6% straw and grass

Challenges

- Cost of commercial biofuel production
  - Need additional technological improvement
  - Need permits
  - Crude prices must remain elevated
- Attracting investment
  - Loosen credit market
  - Reduce regulatory uncertainty

Cellulosic Ethanol Costs



Contacts

Dean Simeroth
Chief, Criteria Pollutants Branch
916.322.6020
dsimerot@arb.ca.gov
RETIRED

Floyd Vergara,
Manager, Industrial Section
916.327.5986
fvergara@arb.ca.gov

Renee Littaua
Manager, Fuels Section
916.322-6019
rlittaua@arb.ca.gov

John Courtis
Manager, Alternative Fuels Section
916.323-2661
jcourtis@arb.ca.gov

Website:
http://www.arb.ca.gov/fuels/lcfs/lcfs.htm

Mike Waugh
Manager, Program Assistance Section
916.445.6018
mwaugh@arb.ca.gov