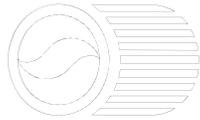


California Environmental Protection Agency



**Air Resources Board**

***Electric Rail in the  
Low Carbon Fuel Standard  
Program***

**November 7, 2012**

# ***Agenda***

- Low Carbon Fuel Standard (LCFS) Program Overview
- Staff Concept for Electricity used in Electric Rail Transportation
  - Regulated Parties
  - Carbon Intensity (CI)
  - Energy Economy Ratio (EER)
  - Credit Calculation
- Requirements for Regulated Parties of Train Electricity
- Sample Credit Calculation for Electric Rail Concept
- Other Credit Opportunities – Natural Gas Mass Transit Vehicles
- Next Steps

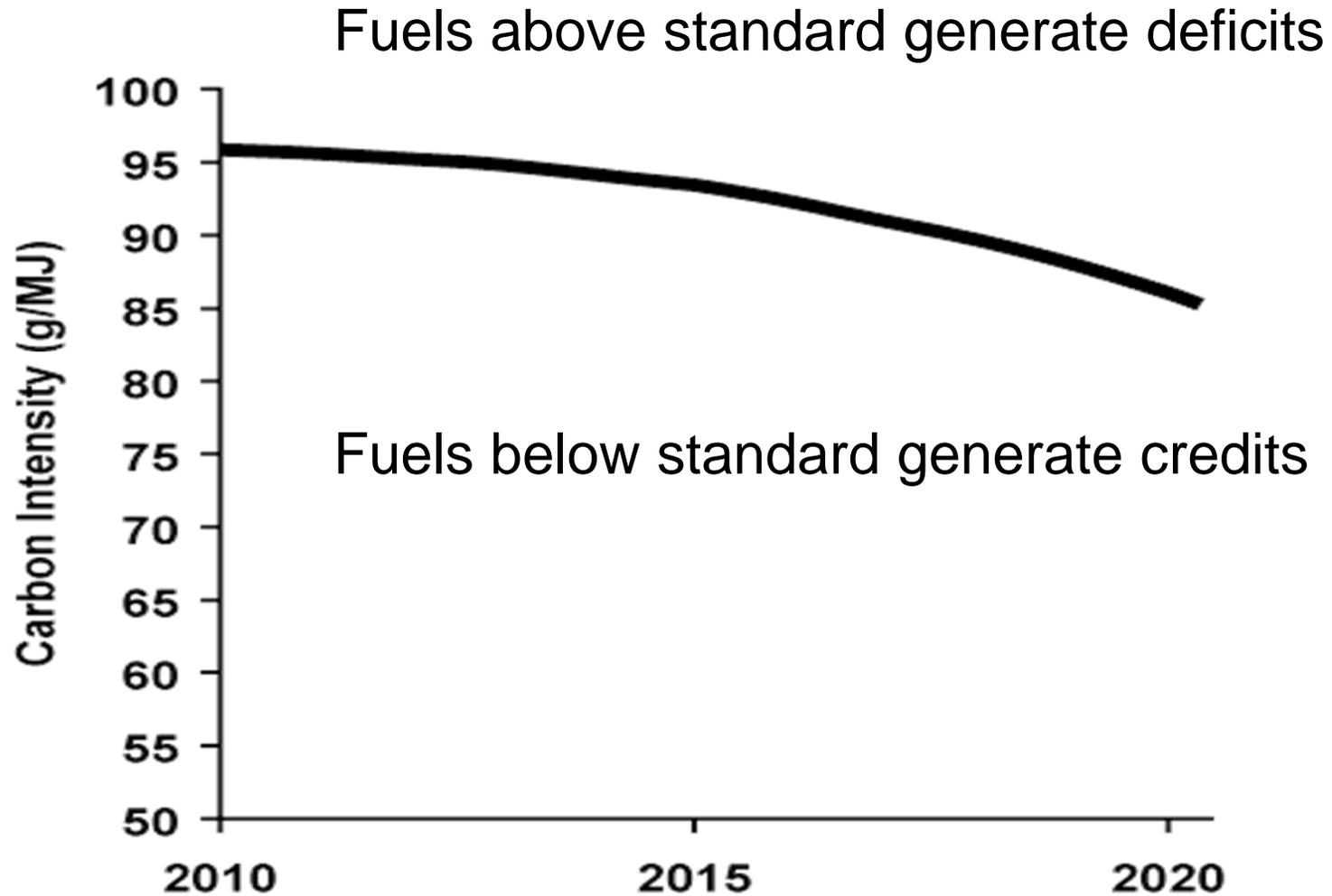
# ***LCFS Program Overview***

- Broad objective: transform the State's fuel supply, reduce GHG emissions, and enhance energy independence/security
- Sets annual carbon intensity (CI) standards for gasoline, diesel, and the fuels that replace them
- LCFS requires 10% reduction in CI of transportation fuel by 2020 (~15 MMT CO<sub>2</sub>e reduced in 2020)

# ***LCFS Program Overview***

- Carbon intensity (CI): the measure of GHG emissions associated with producing and consuming a fuel (gCO<sub>2</sub>e/MJ)
- CI Metric: gCO<sub>2</sub>e/MJ - a unit of carbon intensity in grams of carbon dioxide equivalent per megajoule of energy in the fuel
- CI based on complete lifecycle analysis

# ***LCFS Program Overview***



# ***Concept for Electricity Used in Electric Rail Transportation***

- Regulated Parties
- Carbon Intensity (CI)
- Energy Economy Ratios (EER)
- Credit Calculation

## ***Concept for Electricity Used in Electric Rail Transportation Regulated Parties***

- Transit agencies that provide electric rail service would be the regulated parties
  - Consistent with LCFS natural gas regulated parties
  - Similar to electric vehicle fleet provision, transit agencies are the “fleet operators”
  - Could provide significant revenue for agencies
- Utilities would be the regulated parties with EO approval if transit agencies were not interested in opting in

# ***Concept for Electricity Used in Electric Rail Transportation Carbon Intensity (CI)***

- Potential approaches to CI
  - Statewide marginal electricity mix
  - Statewide average electricity mix
  - System specific electricity mix
- Potentially large CI differences between systems based on rough estimates
- Reference: *Preliminary California Energy Demand Forecast 2012-2022*, California Energy Commission

## ***Concept for Electricity Used in Electric Rail Transportation Energy Economy Ratio (EER)***

- Electric rail can be compared to relative efficiency of bus transit or auto
- Preliminary calculations suggest little difference in EERs between two comparisons
- Large differences between rail systems; statewide average or system specific EERs could be used
  - EER heavy rail 4.6
  - EER light rail 3.3
- Reference: National Transit Database

*[www.ntdprogram.gov](http://www.ntdprogram.gov)*

## ***Concept for Electricity Used in Electric Rail Transportation Credit Calculation***

- Credit calculation (as applied to electric light duty vehicles) allows credit for fuel displacement
- Electric rail predates LCFS
  - Rail transit systems were in place prior to the LCFS
  - Electricity usage from rail transit was not included in the baseline when LCFS was adopted
- For electric rail there is not a true “displacement” of fuels that can be attributed to the LCFS

## ***Concept for Electricity Used in Electric Rail Transportation Credit Calculation***

- Allowing credit calculation for electric rail to include credit for fuel displacement:
  - Make the LCFS program significantly less stringent
  - Inject a significant number of new credits into the market, thus reducing incentives to produce new lower-CI fuels
- Accordingly, ARB staff believes that the fuel displacement factor should not be used in calculating credit for rail transit

# ***Reporting Requirements for Regulated Parties of Train Electricity***

- Quarterly progress reports
  - Metered electricity used for train propulsion (in kW-hr)
  - Carbon intensity of electricity
- Annual reports to verify progress reports

# ***Sample Credit Calculation for Electric Rail Concept***

## **Credit Formula**

**(CI difference between standard and transit electricity) (MJ electricity used)**

- Annual electricity for train propulsion: 280,000 MW-hr =  $1 \times 10^9$  MJ
- Unadjusted CI of electricity: 104.7 gCO<sub>2</sub>e/MJ
- EER: 4.6
- Diesel standard for 2012: 94.24 gCO<sub>2</sub>E/MJ
- 2012 credits

$$= [94.24 \text{ gCO}_2\text{e/MJ} - (104.7 \text{ gCO}_2\text{e/MJ}/4.6)] (1 \times 10^9 \text{ MJ}) (1 \text{ metric ton}/1 \times 10^6\text{g})$$

$$= 71,479 \text{ tons CO}_2\text{e, or } \mathbf{71,479 \text{ credits}}$$

## ***Other Credit Opportunities***

### ***Natural Gas Mass Transit Vehicles***

- For fossil CNG, the regulated party is the owner of fueling equipment where CNG is dispensed
- For fossil CNG and biogas CNG blends
  - Owner of fueling equipment is the regulated party for the fossil CNG
  - Producer or importer of the biogas CNG is the regulated party for the biogas CNG
- The regulated party status (along with the reporting obligations and credits) can be transferred by contract
- Quarterly and annual reporting of fuel dispensed (in scf) required

## ***Next Steps***

- Comments on the concept for electric rail are welcome any time
- January 2013 - next electricity workgroup meeting to discuss electric rail proposal
- October 2013 - Board hearing for 2012 LCFS amendments

# ***Contact Information***

- General information

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**Thank You**