California Environmental Protection Agency

Air Resources Board

LCFS Electricity Workgroup Meeting

February 15, 2013

Agenda

- Staff Concept for Electricity Used in Fixed Guideway Transportation
  - Definition
  - Regulated Parties
  - Carbon Intensity (CI)
  - Energy Economy Ratios (EER)
  - Credit Calculation
  - Requirements for Credit Generation
- Staff Concept for Electricity Used in Forklifts
  - Regulated Parties
  - Carbon Intensity (CI)
  - Energy Economy Ratio (EER)
  - Estimation Methodology
  - Credit Calculation
  - Requirements for Credit Generation
- Next Steps

Concept for Electricity Used in Fixed Guideway Transportation

- Definition
- Regulated Parties
- Carbon Intensity (CI)
- Energy Economy Ratios (EER)
- Credit Calculation
- Requirements for Credit Generation

3

Electricity Used in Fixed Guideway Transportation Definition

- U.S.DOT Federal Transit Association definition:

A "fixed guideway" refers to any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part. The term includes heavy rail, commuter rail, light rail, monorail, trolleybus, aerial tramway, inclined plane, cable car, automated guideway transit, ferryboats, that portion of motor bus service operated on exclusive or controlled rights-of-way, and high-occupancy-vehicle (HOV) lanes.

4

Electricity Used in Fixed Guideway 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

5

Electricity Used in Fixed GuidewayTransportation Carbon Intensity (CI)

- Statewide marginal electricity mix: 104.7 gCO_2e/MJ
- Statewide average electricity mix: 124.1 gCO_2e/MJ
- System specific electricity mix – transit agencies could apply under Method 2 (section 95486)

6

Electricity Used in Fixed Guideway 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
- EER = (MJ/passenger $mile_{diesel\ bus}$)/(MJ/passenger $mile_{rail}$)
- Large differences between rail systems; statewide average or system specific EERs could be used
  - EER heavy rail 4.6 (range 3.0 to 5.5)
  - EER light rail 3.3 (range 2.6 to 5.5)
  - EER trolley bus 3.3
- Reference: National Transit Database (2010 data)

www.ntdprogram.gov

7

Electricity Used in Fixed Guideway Transportation Credit Calculation

- Credit calculation (as applied to electric light duty vehicles) allows credit for fuel displacement
- Electric rail predates LCFS
  - Electric rail 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

8

Electricity Used in Fixed Guideway Transportation Credit Calculation

- Allowing credit calculation to include credit for fuel displacement could:
  - Make the LCFS program significantly less stringent
  - Introduce 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 existing fixed guideway transportation
- Credits (MT) = ($CI_{standard}$-adjusted $CI_{electricity}$)($MJ_{electricity}$)(10^{-6})
- Extensions to existing fixed guideway lines could potentially qualify for fuel displacement credit

9

Electricity Used in Fixed Guideway Transportation Requirements for Regulated Parties

- Quarterly progress reports
  - Metered electricity used for train propulsion (in kW-hr)
  - Carbon intensity of electricity
- Annual reports to verify progress reports
- Regulation could potentially include requirements for use of credit revenue; revenue should promote growth in fixed guideway transportation

10

Concept for Electricity Used in Forklifts

- Regulated Parties
- Carbon Intensity (CI)
- Energy Economy Ratios (EER)
- Estimation Methodology
- Credit Calculation
- Requirements for Credit Generation

11

Electricity Used in Forklifts
Regulated Parties

- Utilities would be the regulated parties
  - Utilities provide the fuel for forklift use
  - Locating forklift operators could be problematic and credits might not be captured
  - An estimate of forklift operation in each utility service area can be made
  - Utilities have the ability to inform fleet owners of the possibility of becoming the regulated parties
- Fleet operators could become the regulated parties if interested

12

Electricity Used in Forklifts
Carbon Intensity (CI)

- Statewide marginal electricity mix 104.7 gCO_2e/MJ
- Statewide average electricity mix 124.1 gCO_2e/MJ

13

Electricity Used in Forklifts
Energy Economy Ratio (EER)

- Argonne National Lab report compared energy use of forklifts using different fuels
  - Reference: *Full Fuel-Cycle Comparison of Forklift Propulsion Systems, Argonne National Laboratory, October 2008*
  - $EER_{electric\ forklift} = 3.1$, compared to energy use of diesel forklift
  - 3.1 is relatively close to EER in regulation for light duty EVs (3.4)
- We welcome information on similar studies on electric forklift efficiency

14

Electricity Used in Forklifts
Estimation Methodology

- Estimate of electricity from forklifts
  - TIAX estimate of class 1, 2, and 3 electric forklift population using U.S. factory shipments 2000-2010 (presented to CalETC, November 2012)
  - Utility share based on number of non-residential accounts (business/commercial)
  - TIAX estimate of energy use for each forklift class
  - Estimate of yearly operating hours from Carl Moyer program forklift project criteria
- Estimate of each utility's forklift electricity usage could be provided each quarter

15

Electricity Used in Forklifts
Credit Calculation

- As discussed in the fixed guideway concept, credit calculation (as applied to electric light duty vehicles) allows credit for fuel displacement
- Electric forklifts predate LCFS
  - Electric forklifts were used prior to the LCFS
  - Electricity use from forklifts was not included in the baseline when LCFS was adopted
- For electric forklifts there is not a true "displacement" of fuels that can be attributed to the LCFS

16

Electricity Used in Forklifts Credit Calculation

- Allowing credit calculation for electric forklifts to include credit for fuel displacement could:
  - Make the LCFS program significantly less stringent
  - Introduce 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 electric forklifts
- Credits (MT)= ($CI_{standard}$-adjusted $CI_{electricity}$)($MJ_{electricity}$)(10^{-6})

17

Electricity Used in Forklifts Requirements for Regulated Parties

- Quarterly progress reports
  - Estimated electricity for electric forklifts use (in kW-hr)
  - Carbon intensity of electricity
- Annual reports to verify progress reports
- Potential requirements for use of credit revenue

18

Next Steps

- We welcome comments on the concepts for fixed guideway transportation and electric forklifts
- **March 5, 2013** (9:00 a.m. to noon) – first workshop for the 2013 LCFS amendments
- **October 2013** - Board hearing for 2013 LCFS amendments

19

Contact Information

- General information

Carolyn Lozo
Air Pollution Specialist
(916) 445-1104
clozo@arb.ca.gov

Manisha Singh, Ph.D.
Manager, Fuels Section
(916) 327-1501
mansingh@arb.ca.gov

- Reporting Tool

Greg O'Brien
Air Resources Engineer
(916) 323-0023
gobrien@arb.ca.gov

20

Thank You