Beyond RFS and MPG: Promoting Cleaner Trucking Services

Warren Lavey
February 2014
President Orders EPA to Strengthen Fuel Efficiency and GHG Emissions Limits for Trucks (2/18/14)

**COMBINATION TRACTORS** (commonly known as big rigs or semi trucks)

Required to achieve up to approximately 20 percent reduction in fuel consumption and greenhouse gas emissions by model year 2018.

Saving up to 4 gallons of fuel for every 100 miles traveled.

**HEAVY-DUTY PICKUP TRUCKS AND VANS**

Separate standards are required for gasoline-powered and diesel trucks. These vehicles are required to achieve up to about 15 percent reduction in fuel consumption and greenhouse gas emissions by model year 2018.

Under the finalized standards a typical gasoline or diesel powered heavy-duty pickup truck or van could save one gallon of fuel for every 100 miles traveled.

**VOCATIONAL VEHICLES** (delivery trucks, buses, and garbage trucks)

Required to reduce fuel consumption and greenhouse gas emissions by approximately 10 percent by model year 2018.

These trucks could save an average of one gallon of fuel for every 100 miles traveled.
“If you’re a business that needs to transport goods, I’m challenging you to replace your old fleet with a clean energy fleet that’s not only good for your bottom line, but good for our economy, good for our country, and good for our planet.”  (Apr. 2011)
National Overview: Technology Choices for Lower Emissions and Energy Efficiency
<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Incremental Cost (Not including Infrastructure)</th>
<th>Annual Fuel Cost</th>
<th>Annual Maintenance Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fix as Fail</td>
<td>N/A</td>
<td>$1,872</td>
<td>FY 12: $3,100 (Baseline)</td>
</tr>
<tr>
<td>New Gasoline</td>
<td>Baseline = $30K</td>
<td>$1,684</td>
<td>Initially Lower</td>
</tr>
<tr>
<td>Diesel</td>
<td>+ $5K</td>
<td>$1,404</td>
<td>Lower</td>
</tr>
<tr>
<td>Ethanol (E-85)</td>
<td>+$0 to $500</td>
<td>$2,433</td>
<td>Same as gasoline</td>
</tr>
<tr>
<td>Hybrid Electric</td>
<td>+ $5K</td>
<td>$1,310</td>
<td>Higher (incl. Battery)</td>
</tr>
<tr>
<td>Plug-In Hybrid Electric</td>
<td>+ $20K - $40K</td>
<td>$618</td>
<td>Higher (incl. Battery)</td>
</tr>
<tr>
<td>Battery Electric</td>
<td>+ $20K - $40K</td>
<td>$618</td>
<td>Undetermined (Likely higher w/ battery replacement)</td>
</tr>
<tr>
<td>Compressed Natural Gas</td>
<td>+ $4K - $5K</td>
<td>$936</td>
<td>Same as gasoline</td>
</tr>
<tr>
<td>Propane</td>
<td>+ $4K - $5K</td>
<td>$1,775</td>
<td>Same as gasoline</td>
</tr>
</tbody>
</table>
Carbon Intensity of Alternative Fuels in California Heavy-Duty Vehicles

- ULSD
- LNG
- Biodiesel (Soy)
- New Diesel (Soy)
- CNG
- Hydrogen (NG)
- Electricity
-蝇. Diesel (Tallow)
- Biodiesel (Grease)
- Dairy CNG
- Landfill CNG

Carbon Intensity (adjusted gCO2e/MJ)
With various technologies, behaviors and logistics, carriers differ in GHG, PM and other air toxics emissions

Package Delivery Carriers’ Emissions (grams/mile)  (2012 EPA SmartWay)

<table>
<thead>
<tr>
<th>carriers by ranking</th>
<th>CO2</th>
<th>NOx</th>
<th>PM2.5</th>
<th>PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>top 20%</td>
<td>950</td>
<td>2</td>
<td>0.025</td>
<td>0.025</td>
</tr>
<tr>
<td>bottom 20%</td>
<td>1350</td>
<td>10</td>
<td>0.225</td>
<td>0.225</td>
</tr>
</tbody>
</table>
Transportation Accounts for 28% of U.S. GHG Emissions (EPA)
Trucks Emit 1.5 Times More GHG than Cars, and 75 Times More GHG than Buses

(Cong. Res. Serv. 2013)

<table>
<thead>
<tr>
<th>Category</th>
<th>Total GHG Emissions</th>
<th>Percent of Motor Vehicle Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Cars</td>
<td>632.1</td>
<td>39.5%</td>
</tr>
<tr>
<td>Light Duty Trucks</td>
<td>552.4</td>
<td>34.5%</td>
</tr>
<tr>
<td>Medium- and Heavy-Duty Trucks</td>
<td>401.2</td>
<td>25.1%</td>
</tr>
<tr>
<td>Buses</td>
<td>12.1</td>
<td>0.8%</td>
</tr>
<tr>
<td>Motorcycles</td>
<td>2.2</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,600.0</strong></td>
<td></td>
</tr>
</tbody>
</table>
Growth in Truck Emissions

(Cong. Res. Serv. 2013)
U.S.-China Climate Change Working Group (July 10, 2013)

Five action initiatives include:

• “Reducing emissions from heavy-duty and other vehicles:

  • Heavy-duty vehicles are the fastest growing source of greenhouse gas emissions from transportation in the United States and account for more than half of transportation fuel consumed in China.
  • Light-duty vehicles also contribute significantly to greenhouse gas emissions, fuel use and air pollution.
  • Efforts under this initiative will include advancing comprehensive policies to reduce CO2 and black carbon emissions through: enhanced heavy-duty fuel efficiency standards; cleaner fuels and vehicle emissions control technologies; and more efficient, clean freight.”
Air pollutants from diesel-powered vehicles contribute to respiratory illness, heart disease, cancer, and premature death. Minority and low-income communities near transportation hubs and throughways bear disproportionate impacts.

(EPA advisory report, 2009)
Illinois Overview: Cleaner Trucks in the Chicago Climate Action Plan (2008)

21% of City’s GHG emissions from cars, buses, trucks and trains

Mitigation Strategies and MMTCO$_2$e reductions

- Faster, more efficient freight movement 1.61
- Boost transit system ridership by 30% 0.83
- Switch to cleaner fuels 0.68
- Higher federal fuel efficiency standards 0.51
- Increase walking and biking trips by 1 million 0.01
Cook County in the EPA Clean Diesel Campaign

Annual health benefits and costs from reducing diesel PM emissions by vehicle particulate filters

Cook County, IL  Ton of PM reduction

• Cost  $35,000
• Benefits  $2,273,000
Government Tools Beyond RFS, MPG and Other Regulations

1. Conditions on Access

2. Environmental Preferences in Procurements

Concession Agreement with Licensed Motor Carriers (2008)

- Phase-in of emissions standards, 2008-12
  - Maintenance plan
  - Annual reports
- Truck Impact Fees
  - Incentives for cleaner trucks
  - Helps finance replacements
- Grants: $56 million in incentives to purchase 2,700 cleaner trucks
- Obligation of Terminal Operators
Progress through LA/LB Ports Clean Truck Program

• 80-90% reduction in truck emissions
  – 2008 ban on pre-1989 trucks removed 1,500 trucks
• $1 billion in private investment toward purchase/lease of 7,000 clean trucks
• Health benefits for 2 million people living near ports
  – LA Port trucks caused $100 m to $590 m in public health costs in 2007
U.S. Supreme Court Limits Provisions of Municipal Concession Agreements for Trucks (June 2013)

• Port allowed to “bar a truck from operating at its facilities to prevent an ongoing violation of the agreement’s requirements.”

• However, federal regulations preempt local or state criminal enforcement of placard and parking requirements
Chicago Initiatives on Cleaner Trucks

Chicago to Buy 20 Electric Refuse Trucks
November 19, 2012

TURN OFF ENGINES
Idling more than 10 seconds harms the environment and wastes more gas than restarting engine
EPA standards, Science Experiments, consumerenergyincentives.org

Illinois Green Fleets

Our City. Our Future.
City of Chicago
Department of Business Affairs and Consumer Protection

TAXICAB INDUSTRY NOTICE

August 5, 2011
Notice No. 11-035

Six-Month Pilot Program
for CNG Taxicabs to use the Airport Fast Lanes

The Department of Business Affairs and Consumer Protection announces the unveiling of a pilot program for City of Chicago licensed compressed natural gas (CNG) taxicabs to use the “short trip” lanes at Chicago airports.

To be eligible to enter the “short-trip” lanes at the airports, CNG taxicabs must:

- Display the official City of Chicago “Green Taxi Chicago Compressed Natural Gas Vehicle” sticker. BACP staff will distribute and affix the official stickers to CNG taxicabs at the Public Vehicle Inspection Facility located at 2420 W. Pershing Road, Chicago, Illinois.

- Be in compliance with all City of Chicago requirements for public passenger vehicles.

The six-month pilot program will run from August 5th, 2011 to February 5th, 2012. After the six months, BACP will assess this program and determine if this program will continue, change, or end.

The cost of converting vehicles to CNG is reimbursable through the Green Taxi Program. For information, please visit:
Chicago City Council/Mayor Force Lower Emissions From Coal Power Plants

Another Chicago Victory! Fisk and Crawford Coal Plants Shutting Down!

Posted March 1, 2012 by nicolas_lampert in Inspiration
Chicago Imposes Some Environmental Conditions on Expansion of Englewood Rail/Truck Terminal
Welcome to Englewood

• Low income, minority community
• 50% unemployment
• Poor air quality; high asthma incidence
• Many abandoned sites
• Crime
Expansion Plan by Norfolk Southern

• $285 million expansion of existing Norfolk Southern rail yard from 140 to 225 acres
• 400 new jobs
• Increase truck traffic to, from and within yard – 500 to 800 more trucks on streets daily
Initial Approval by Chicago City Council
(April 2013)

• NS purchases 105 City-owned lots for $1.1 million

• NS also agrees to contribute:
  – $3 million toward transportation improvements and area schools
  – Unused rail spurs for bike trail
Chicago Plan Commission

• Approval required to expand 2 tax-increment-financing (TIF) districts

• More active coalition seeking conditions
  – Sustainable Englewood Initiatives
  – ELPC
  – Respiratory Health Association
  – Northwestern Legal Clinic

• Vote delayed
Final Agreement for Chicago Approval
(Sept. 2013)

• Pollution controls for 36 of 38 trucks used within yard by 2018
• Cleaner engines or filters for 12 pieces of lift equipment in yard in 2013
• $1 million fund for environmental projects in Englewood; contribution to improve park
• $1 million fund for job training
• City to make efforts to address truck congestion and idling
Did the City consider ... ?

• As condition for transfer (or lease/operation) of City-owned properties, phase-in standards for vehicles using rail yard
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- Apply portion of TIF funds for rail yard to
  - Rebates on heavy users’ purchases of particulate filters and alternative fuel vehicles
  - Traffic controllers to ease congestion near schools and other densely populated areas in Englewood
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  – Rebates on heavy users’ purchases of particulate filters and alternative fuel vehicles
  – Traffic controllers to ease congestion near schools and other densely populated areas in Englewood
• Grant priority access to City facilities (airports, ports) for heavy users of rail yard that purchase alternative fuel vehicles
More Widespread, Aggressive Truck Access Conditions Coming in Illinois?
2. Environmental Preferences in Procurements

Opportunity: Leverage $500 Billion in Annual Fed Purchases
Illinois Transportation Sustainability Procurement Program Act (Aug. 2013)

• **Purpose**: “State processes for procuring freight, small package delivery, and other forms of cargo transport and shipping services take into consideration not only cost and quality, but also commitment to, and execution of, best environmental practices of vendors”

• **Best value analysis** shall “give appropriate weight” to bidders’ GHG emissions, energy use and other environmental considerations

Similarly, IL Executive Order on Green Gov (2009)
In support of Executive Order 13514 and other applicable statutes, regulations and Executive Orders, and in recognition that harm to the environment, including from greenhouse gas pollution, has quantifiable costs and negative impacts on the economy and federal agency operations, it is the Government’s intent to reduce as far as practicable the environmental impacts of services provided under this contract.
GSA DDS3 (cont.)

GSA will be assessing contractors on their current existing capabilities to report on environmental metrics and the result of those metrics for the most recent reporting periods.

- GHG
- Alternative fuels use
- Emissions of pollutants
- Fuel efficiency

Additionally, GSA will assess contractors based on annual targets for environmental improvement and their plan in place to improve the Contractor’s environmental performance.
Cleveland’s Purchasing Program Supporting Local and Sustainable Businesses (Jan. 2010)

WHEREAS, purchasing local products will reduce the City of Cleveland’s carbon footprint ... ; and
WHEREAS, encouraging local businesses to follow sustainable practices will expedite their participation in high-growth sectors of the economy such as renewable energy, recycling, green building, zero waste and other sustainable businesses ...;

A Contracting Department shall apply a Bid Discount of two percent (2%) to a bid received from a Local Sustainable Business .... The maximum amount of any Bid Discounts applied to a bid ... shall not exceed $50,000.
How to Implement Best Value Analysis with Environmental Factors?

Strategy: “Reasonable” price adjustment based on eco-label
Economic Strategy: Monetize Social Costs to Develop Integrated Prices

\[ P_i = C_i + E_{1,i} \times S_1 + \ldots + E_{n,i} \times S_n \]

- \( P_i \): price offered by Vendor(i) in best value evaluation
- \( C_i \): charge by Vendor(i) for product or service
- \( E_{1,i} \): amount of first environmental factor (type of pollution) associated with Vendor(i)’s product or service
- \( S_1 \): social cost of unit of first environmental factor


GSA in DDS3: “harm to the environment has quantifiable costs”

Diesel Emissions Reduction Act (2005)

– From 2008 to 2010, EPA awarded $470 mil to 350 grantees; public health benefits from reduced emissions in $3.4 bil to $8.2 bil range
Quantifying Public Health Benefits of Reduced Truck Emissions

EPA regulation of diesel fuels and engines; Regulatory Impact Analysis

“By 2030, ... particulate matter (PM) and nitrous oxides (NOx) will be reduced by 380,000 tons/year and 7 million tons/year, respectively. This will result in annual benefits of over $290 bil, at a cost of approximately $15 bil.”
Environmental Cost Elements in Pricing Truck Services

- White House Interagency Working Group on Social Cost of Carbon (Nov. 2013) $37/mt
- EPA Regulatory Impact Analysis for NO\textsubscript{2} NAAQS (2010) $9,047/t
- EPA Diesel Emissions Quantifier (2010) – estimates of public health costs of PM\textsubscript{2.5} emissions from diesel trucks, by county $1.2 \text{mil/t national average}
- Nat. Research Council, Hidden Costs of Energy (2010) estimate of social cost of PM\textsubscript{10} 5\% of PM\textsubscript{2.5}
Emissions Metrics Available for Freight and Package Delivery Services

• Fleet average emissions and fuel use
  – EPA Motor Vehicle Emission Simulator
  – EPA SmartWay

• Haul-specific measurements (in some cases)
  – Company accounting systems

• Supporting operations
  – Global Reporting Initiative
  – Carbon Disclosure Project
## Estimated Social Cost Elements for Package Delivery Service
(cents/package; national average)

<table>
<thead>
<tr>
<th>carriers by ranking</th>
<th>CO2</th>
<th>NOx</th>
<th>PM2.5</th>
<th>PM10</th>
<th>total emissions costs</th>
<th>emissions costs as % of DDS vendor price</th>
</tr>
</thead>
<tbody>
<tr>
<td>top 20%</td>
<td>3.0¢</td>
<td>1.6¢</td>
<td>2.6¢</td>
<td>0.2¢</td>
<td>8.0¢</td>
<td>1.0 %</td>
</tr>
<tr>
<td>bottom 20%</td>
<td>4.2¢</td>
<td>8.0¢</td>
<td>23.8¢</td>
<td>1.4¢</td>
<td>37.4¢</td>
<td>4.8 %</td>
</tr>
</tbody>
</table>
Economic Approach to Best Value Assessments

**Goal:** Add social cost elements to bid price

**Smaller steps:** Use social cost estimates to guide pricing in selection of
- procurements for environmental preferences
- certification (eco-label)
- measures and weights
- price adjustments
Along with regulations, governments should apply conditions on access and environmental preferences in procurements.