

Suggestions by UC study team

Designing the Low Carbon Fuel Standard in California

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This is Hugely Important

This is the most important policy initiative in transportation fuels, perhaps ever! It is a durable framework for guiding investments and the transition to alternative fuels.

"We're very constructively engaged, and we're not opposed to meeting the governor's goals."

Cathy Reheis-Boyd, CEO of Western States Petroleum Association, in today's SF Chronicle

Two Background Notes

Note 1: Our recommendations are result of extensive consultation with oil companies, electric and natural gas utilities, biofuel companies, environmental groups, and ARB and CEC, as well as others such as PUC and car companies. We held over 30 major meetings, most lasting 2-3 hours. Most were attended by 3-7 individuals from the respective organizations.

Note 2: LCFS is a key strategy to reduce GHG emissions from transport sector, but there are other important strategies:

- i) More efficient vehicles (CAFE and California's GHG vehicle standards), and
- ii) less vehicle travel

Outline

- Principles
- Point of regulation
- Baseline and scope
- Default values and credit trading
- Interface with future AB32 emission caps
- Special issues: electricity, biofuel land effects, sustainability
- Next steps

Principles Underlying LCFS

- Provide durable framework for orchestrating near and long term transition to low-carbon alternative fuels
 - Send consistent signals to industry and consumers to reduce GHGs
 - Synergistic with vehicle GHG standards in AB1493 (Pavley)
- Stimulate technological innovation
- Premised on performance standard, is tightened over time (after 2020)
- Government does not pick winners (or losers!)
 - Provide industry with flexibility in how they respond
- Use lifecycle approach
- Rely on measurable data as much as possible
- Consistency with other states, US, EU, and others
 - E.g. use federal Renewable Identification Number, UK protocol
- Start with baby steps (allow for institution learning)
- Conduct occasional review of protocol and methods (but not targets) – every 5 years?!

Point of Regulation

- **Refiners, blenders, and importers**
 - These organizations either manufacture or import finished transportation fuels
 - Existing point of regulation for fuel formulation and emissions
- Alternative points of regulation (not recommended):
 - Fuel distributors (possible)
 - Retail stations (too numerous and too difficult administratively)
 - Households and individuals (only academics and economists would recommend this)

Baseline & Scope

- Baseline

Recommendation: Use measurable (historical) data, not forecasts...
thus use data from last year for which good data are available

- Scope

Recommendation:

1. Apply the standard to all gasoline and diesel fuel, including off-road
 - Jet fuel and marine fuels not included (State lacks jurisdiction?)
 - But allow (opt-in) credits for substitution of low carbon fuels for jet and marine fuels
2. Allow all low-carbon alternative fuels to generate credits
 - Biofuels (ethanol, biobutanol, other); natural gas; electricity; hydrogen

Default Values for Fuels

Recommendations:

1. Assign a lifecycle GHG default value to all fuel paths (similar to UK system)
 - Default value is conservative (but better than worst case)
 - ARB will define defaults in LCFS Protocol
2. Provide additional credits to fuel suppliers that beat the default value
 - LCFS Protocol will contain methods to determine values for better production processes for each fuel
 - Requests for additional credits (beyond default value) will be subject to 3rd-party certification

Credit Trading Among Fuel Providers

Recommendation: Allow trading and banking among all transport fuel providers

How?

- Overachievers generate credits that can be sold to underachievers
 - Not a cap, no allowances to allocate
 - Note: total fuel emissions could increase (because of greater fuel use)

Why?

- Trading provides flexibility that allows companies to innovate and develop low-cost strategies
- Trading creates competition which speeds innovation and lowers costs
- Emissions trading has largely successful track record
 - Lead phase-out from gasoline
 - SO_x from coal-fired powerplants
 - Criteria pollutants under the Clean Air Act (bubbles, banking)

Trading Beyond Fuel Providers?

YES: Allow opt-in in aviation, bunker fuels and off-road diesel/gasoline fuel use

EVENTUALLY? Allow trading between fuel providers and automakers

NO

- Prohibit purchasing of credits (“offsets”) from outside California (but others can purchase credits from California energy producers)
- Prohibit purchasing of credits (“offsets”) from other industries

Goal is to stimulate technological innovation in the transportation sector

Need tailored sector-specific program because of unique aspects of transport sector ... low price elasticity, large co-benefits.

How to Interface with AB32?

- Lifecycle nature of LCFS means there will be regulatory overlaps with AB32 caps on oil refineries, electric utilities, and oil production
- Possible protocol/approaches:
 - LCFS supercedes all other caps (emissions associated with LCFS at refineries, utilities and oil production are deducted from caps)
 - Apply fixed emission factor value for conventional oil production and refineries for purposes of LCFS compliance
 - Oil companies and electric utilities are regulated twice
- Caps and LCFS targets can be adjusted based on which approach is used

Still under discussion

Ways to Meet Low Carbon Fuel Standard

- Blend low-carbon fuels (biofuels) with gasoline and diesel
- Introduce low-GHG alternative fuels (eg, electricity, natural gas, hydrogen)
- Buy credits from low-GHG fuel suppliers
- *Plus, improve efficiency of refineries and oil production if they are included in LCFS (as well as cogeneration, carbon dioxide sequestration, etc.)*

Electricity (and NG) Issues

- Options to measure electricity used in vehicles
 - Meters in house or vehicle
 - Analytically determine number of vehicles in electricity supply territory and average usage and efficiency characteristics
- Need special attention to PHEVs which are bi-fuel (and not commercialized yet)

Recommendations

1. Allow credits for electricity substituted for off-road diesel applications (airports, construction, forklifts, etc)
2. Develop protocol to handle “fuel electricity” interface with AB32 caps on electric utilities (either double crediting for LCFS and AB32 cap, or keep separate)

Land Use Change and Biofuels

- GHG emissions associated with land use changes can be large with biofuels -- but they are uncertain and not well understood

Recommendations

1. Exclude land-related emissions during first 5 year period (2010-2015), but protect sensitive lands
2. Over next 6 years (2008-2013), conduct intensive research on land effects and incorporate into models and rules (rules taking effective in 2016).

Energy suppliers should be on notice that the calculated global warming emissions for many biofuels may be sharply reduced in next phase.

Related Environmental Justice & Sustainability Issues

- Air quality
- Siting of facilities (environmental justice)
- Soil erosion
- Habitat loss and biodiversity
- Job opportunities and working conditions
- *But doesn't kill 3 billion people, as claimed by Fidel Castro in today's SF Chronicle*

Recommendations:

- 1) Require report by regulated entities (similar to UK)
- 2) Handle apart from LCFS

Continuing Need for Research

- To develop new, lower-carbon fuels (by industry)
- To better measure the global warming intensity of fuels and create a modeling framework for lifecycle emissions
 - We recommend research over the next 12-15 months to improve the GREET model, which should then be used to develop the refined LCFS Protocol for the first compliance period (2010-2015)
 - Conduct research to develop a better framework for analysis with which to refine the LCFS Protocol for second compliance period.
- To develop compatible international standards and rules.
- To design and evaluate trading mechanisms.

Coordinating With Others

- **California:** regulations take effect 2010
- **Other States:** Proposals in BC, WA, OR, AZ, NM, MN, and...IL?
- **United States:** Bills by Boxer (D-CA), Feinstein (D-CA), Obama (D-IL) Inslee (D-WA)
- **Other countries**
 - **United Kingdom:** Renewable Transportation Fuel Obligation being implemented
 - **Germany and other European countries:** various proposals
 - **European Union:** monitoring and rules under development

Next

Research, rule-making, model refinement and protocols

- **2007** – Two UC reports (May); LCFS inserted into CEC/CARB Alternative Fuel Plan (AB1007); Adopted by CARB as AB32 “early action”; CARB rulemaking begins
- **January 2010** – LCFS regulations take effect
- **2013** – We recommend 5 year review of models and methods (but not targets)
- **2018** – Initiate tightening of LCFS targets

CONCLUSION: This is Hugely Important

Yes, there is uncertainty.

Yes, there are challenges.

Yes, more research is needed.

But... this is the most important policy initiative in transportation fuels, perhaps ever!

It is a durable and flexible framework for guiding investments and the transition to alternative fuels. We need to make this work.

Thank You

- S.M. Arons, A.R. Brandt, M.A. Delucchi, A. Eggert, A.E. Farrell, B.K. Haya, J. Hughes, B.M. Jenkins, A.D. Jones, D.M. Kammen, S.R. Kaffka, C.R. Knittel, D.M. Lemoine, E.W. Martin, M.W. Melaina, J.M. Ogden, R.J. Plevin, D. Sperling, B.T. Turner, R.B. Williams, C. Yang
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Enforcement & Compliance

- Enforcement through review of documentation (consistent with federal RIN)
- Spot checks
- Will require creation of information upstream (well or farm), certification, and maintenance of the chain of custody
- Fee for noncompliance option
 - Legitimate and legal
 - State uses funds to purchase transportation-sector credits or otherwise advance the goals of the LCFS
- Fines for misrepresentation or other malfeasance

Enforcement & Penalties

- Enforcement through review of documentation certifying the GHG emissions and quantities used
- Spot checks [works for RFG where every gallon must meet spec, but not for LCFS. Random audits with deeper investigation]
- Will require creation of information upstream (well or farm), certification, and maintenance of the chain of custody
- Fines for misrepresentation or other malfeasance

Rationalization/Shuffling

- Markets respond to incentives (this is their principal virtue)
- California cannot avoid re-arrangement of existing biofuel production to send the cleanest fuel here
- Estimated size: up to 3 percentage points by 2012
 - Use this opportunity to allow industry to ease into compliance in the first several years and allow for innovation and investment.

Indirect effects

- All fuel production decisions have indirect effects
 - For instance, the increase in corn ethanol production has helped raised the price of corn in the U.S. and the world, which makes food prices higher and will induce more corn production globally.
 - Unavoidable in a world with global food and energy markets
- No clear understanding of these issues
- No agreement on how to quantify or model them
- Not clear that a fuel-based standard could possibly address these issues.
 - The farmer in Iowa who switches from corn-soy to corn-corn rotation cannot know and should not be held accountable for the global indirect effects of this switch.
- Biofuels that rely on crops (and therefore land) probably have the biggest indirect effects.

Biofuels Land Use Issue

- GHG emissions associated with land use changes can be large with biofuels -- but uncertain and not well understood
 - Carbon released from soil when intensively farmed (esp great for rainforests, fallow land, prairies)
 - Potentially large releases of N_2O (strong GHG) from use of fertilizer
 - Large indirect effects: e.g., switching from soy to corn production means land elsewhere is switched to soy production (perhaps by cutting down rain forests)
 - Existing tools are not adequate to estimate these effects (but more research on this in Europe)
- We recommend excluding land-related emissions during first 5 year period
- Over next 5 years, conduct intensive research on land effects and incorporate into models and rules
- Energy suppliers should be on notice that GHG credits will likely be sharply reduced in next phase (except for crop and wood residues)

Vehicle-focused changes

- Electricity and hydrogen are potentially important new fuels that require new vehicles and new infrastructure (very little for electricity – meters, tariffs, and policies)
- Incentives to adopt this technology must be focused on the key decision-maker, the vehicle purchaser
- Define “fuel electricity” as the power that flows through dedicated electric vehicle meters at special (low) rates.
 - Outside of AB32 requirements
 - Can create LCFS credits that should go to the vehicle owner.
 - Other electricity (e.g. a relative’s garage plug) is *not* fuel electricity.
- Electric vehicles offer potentially huge new revenues for utility companies, which provide significant incentive to them

Program review?????

- No major go/no-go decision is needed
 - 10% reduction by 2020 is feasible, and a 15% reduction may be
- Research and technological innovation will require updating of emission measurement protocols
 - Bi-annual
 - Regulatory proceeding
 - Does not include revisiting the targets

LCFS is a Key Strategy to Reduce GHG Emissions from Transport Sector

- **Lower carbon fuels**
 - at least 10% reduction in GHGs per unit of energy by 2020
- More efficient vehicles
 - CAFE and California's GHG vehicle standards
- Less vehicle travel