

**Low Carbon Fuel Standard
Policy and Regulatory
Development
Working Group 3 Meeting**

December 20, 2007

California Environmental Protection Agency



Air Resources Board



Summary of Staff Recommendations from Previous Meeting

Scope of Standard	Apply to gasoline, diesel, natural gas, propane, electricity; hydrogen under evaluation; exclude aviation and bunker fuel
Diesel Fuel and Drivetrain Efficiency Adjustment Factor	Fuel carbon intensities include vehicle efficiency adjustment factors
Upstream Emission: Crude Oil	Using a fixed, average value for conventional crude oil; non-conventional heavy crudes (tar sand, oil shale, coal to liquid, gas to liquid, other heavy oils) treated separately
Baseline	Use 2006 data



Agenda

- **Discussion of policy issues**
 1. Targets
 2. Banking and trading of credit
 3. Point of regulation
 4. Compliance and penalties
 - a. Compliance paths
 - b. Penalty
 - c. Tracking/certification/auditing
 5. Land use change
 6. Default values
 7. Co-products
 8. Sustainability
 9. Uncertainty in LCA
 10. System boundaries
- **Stakeholder presentations**
- **Future meeting dates**



1. Targets



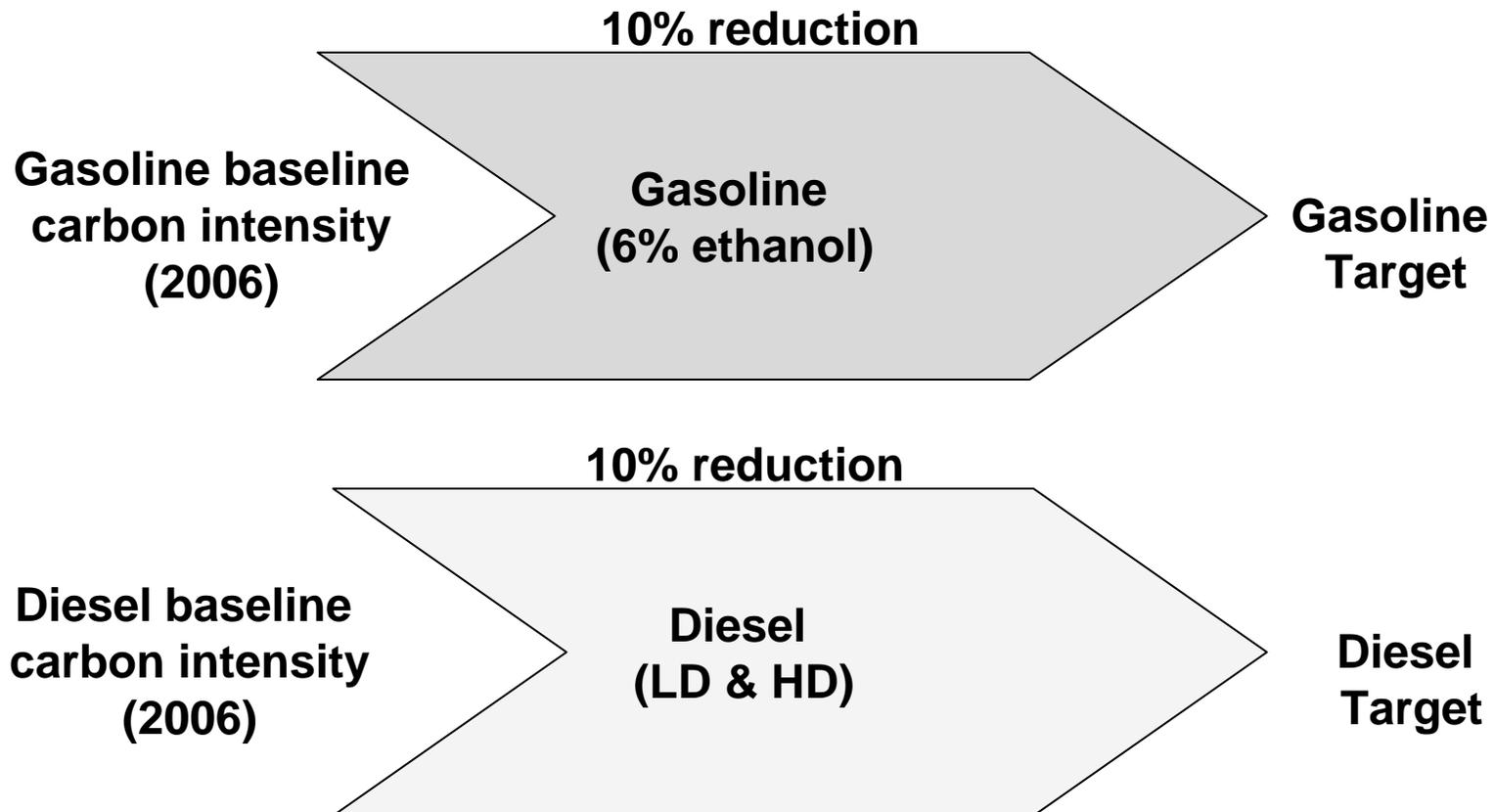
1. Targets: Options Considered in UC Report

- **Option 1 (UC Recommendation):** Providers of transportation fuels regulated by or participating in LCFS should be held to the same standard, which is the target value for all transportation fuels, 83 CO₂e/MJ in 2020
- **Option 2:** Obtain 10% reduction from current average performance for each fuel
- **Option 3 (UC Recommendation):** Use gasoline sales as compliance tool, with diesel opt-in; increase gasoline target carbon intensity reduction to 12.4%; diesel and other petroleum fuel have no target



1. Targets: Staff Recommendation

- Separate compliance targets for gasoline and diesel with 10% reduction each





2. Banking and Trading of Credits



2. Banking and Trading of Credits

UC Recommendation:

- LCFS credits not allowed for AB32 compliance
- Borrowing of credits not allowed
- Regulators serve as record keepers only; buyers and seller do not communicate price of allowance to the regulators
- Allow voluntary emissions reductions by retiring the credit

Staff Recommendation:

- Export LCFS credit to AB32 but not allow for import
- Credits do not have expiration date up to 2020
- Credits can be traded between transportation fuels
- Borrowing of credits – under discussion
- Credits denominated in mass units – ton CO₂eq



3. Point of Regulation



3. Point of Regulation: Staff Recommendation

	Liquid Fuels	Electricity	Hydrogen and natural gas
Regulated entities	Refiners, blenders, and importers	Providers of <i>transportation</i> electricity	(Under discussion)
Point of regulation	Point at which finished gasoline or diesel is first manufactured or imported	(Fuel quantification needed) <u>Issues to consider:</u> -Dedicated meters for charging BEVs and PHEVs -Availability of metering technology -Analytical estimates	(Fuel quantification needed)



4. Compliance paths, penalty, auditing/certification



4a. Compliance Paths

- **Option 1 (UC Recommendation): Technology Forcing**
 - Volumetric requirements for fuels with specified low-GHG performance before 2010
 - Carbon intensity reduction in the last few years of the LCFS
- **Option 2 (UC Recommendation): Accelerating**
 - Small changes in carbon intensity required in the beginning years
 - Reductions accelerate in the later years to meet the 10 % target in 2020
- **Option 3: Linear**
 - Absolute reductions in AFCl values to reach target
 - Annual decrease of 0.84 gCO₂e/MJ or 0.91% to 1.00% annually over the compliance period
- **Option 4: Rationalized**
 - Assumes that sufficient rationalization is feasible for the first year
 - Effect is limited to one year and no additional credits are created by rationalization
 - Once this effect is accounted for, a simple linear decrease in AFCl is imposed each year

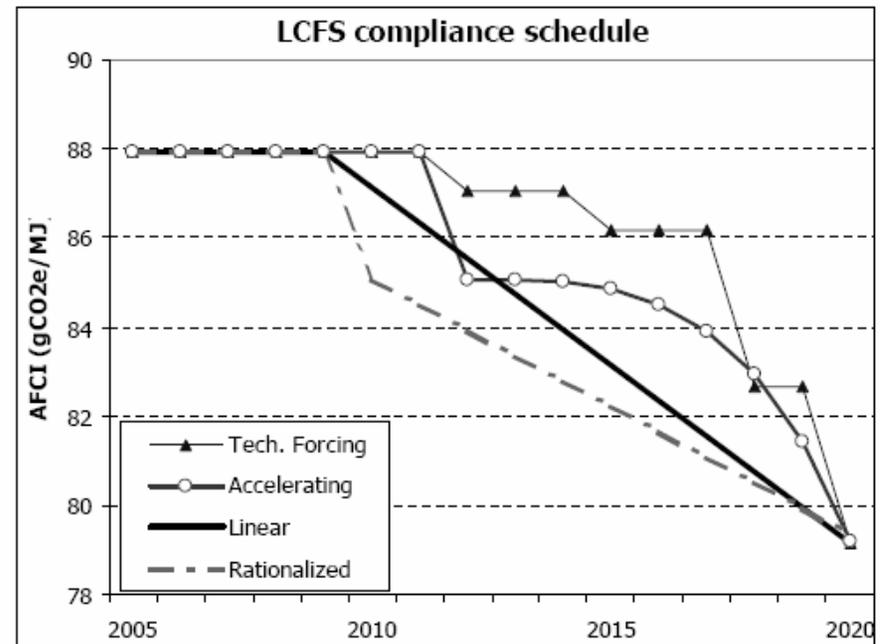


Figure 3.1 UC Report Part II

UC Recommendation: A compliance path that does not require significant near-term carbon intensity reductions



4b. Penalty

UC Recommendation:

- Obligated parties have the option to comply by paying a fee, not a fine for non-compliance
 - GHG content above the standard entails payment of a fee proportional to the excess content and fuel volume
 - Regulations should provide severe administrative penalties for misreporting – example: \$100/gal of fuel misreported

Staff Recommendation:

- Compliance through fee payment not allowed
- Penalties described in the Health and Safety Code 38580 pursuant to Division 25.5, CA Global Warming Solution Act of 2006

<http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=38001-39000&file=38580>



4c. Tracking/Certification/Auditing: USEPA RIN

- **Overview**
 - RIN is a 38-digit Renewable Identification Number
 - Unique RIN assigned to all renewable fuel produced or imported into the U.S.
 - Obligated parties demonstrate compliance by accumulating sufficient RINs
 - RINs can be banked or traded to another party

- **UC and staff analysis suggest RIN not applicable for LCFS**
 - GWI information not tracked
 - Cellulosic ethanol identifier and equivalency factor serve little value for LCFS
 - Any party can transfer fuel without assigned RIN or with a different assigned RIN
 - RIN is designed to accommodate liquid fuels – LCFS must track all fuels, including electricity, LPG, CNG, and hydrogen



4c. Tracking/Certification/Auditing: Staff Recommendation

- Reporting system similar to UK RTFO but based on ARB WTW lifecycle analysis
- Reports based on the records of RIN transactions
- Reported submitted annually
- Tiered look-up table used for default values

1. Fuel Type

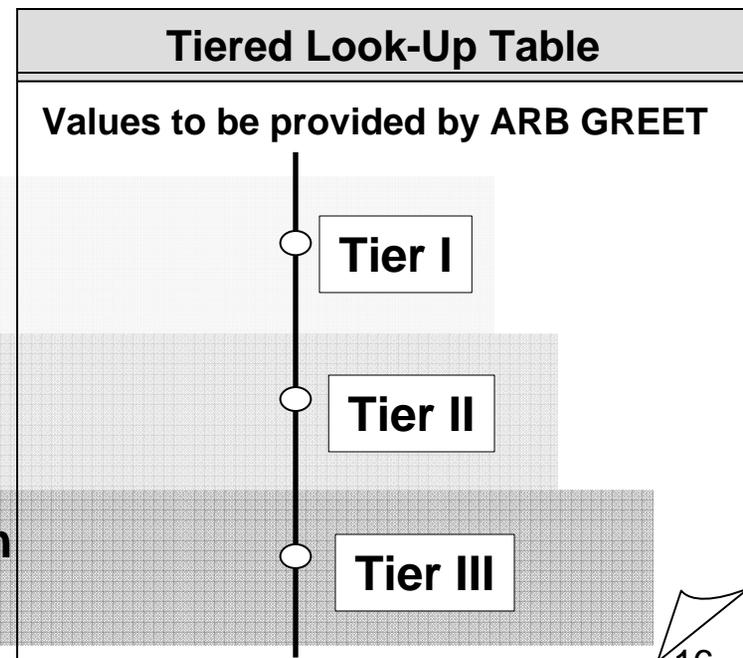
(ie: biodiesel)

2. Fuel Type + Feedstock

(ie : biodiesel, soy)

3. Fuel Type + Feedstock + Feedstock Origin

(ie : biodiesel, soy, USA)





5. Land Use Change



5. Land Use Change: Definitions

Direct land use change

- Biofuel crops grown on land that was previously used differently
 - *Example 1:* Forest converted to cropland
 - *Example 2:* Permanent grassland to cropland

Indirect land use change

- Land use for biofuels increase pressure on land use change worldwide
 - *Example 1:* Corn growth on historical soybean land in the U.S. causes previously uncropped land in the Amazon to be converted for soybean production
 - *Example 2:* Palm oil used in biofuel causes increase in demand of production of of palm oil for food. As a result of the market demand, native forest is converted into land for palm oil production



5. LUC: UC Recommendation

- Develop a non-zero estimate of the global warming impact of direct and indirect land use change for crop-based biofuels and use this value for several years of LCFS implementation
- Participate in development of internationally accepted methodology for accounting for land use change
- While values should be specific to CA, calculations methods should be internationally accepted
- LCFS could include a rough estimate of emissions from global land use conversion from crop-derived biofuel (not doing so is same as assigning zero)



5. LUC: Staff Recommendation

- Include both direct and indirect LUC
- Evaluate impact of direct and indirect land use change:
 - Change of land from current to biofuel crop
 - Change from permanent grassland to crop growing
 - Change from forest to crop growing
 - Drainage of land for agriculture
- Current Issues:
 - Indirect/direct land use values
 - Determine methodology for assigning default values
 - Determine amortization time period: 10, 20, 30, or 100 years

Direct effect of LUC for ethanol

- Results vary strongly by chosen amortization period (20, 30, 100 year)
- Carbon emissions estimates also vary by a factor of 2
- Direct effects provide an approximate upper bound on indirect effects

Tropical forest to sugarcane (g/MJ)			
	20-yr	30-yr	100-yr
low	230	150	50
medium	290	190	60
high	440	300	88

Tropical Forest to corn (g/MJ)			
	20-yr	30-yr	100-yr
low	420	280	80
medium	540	360	110
high	830	550	170

8

Sample. For illustration purposes only.



6. Default Values



6. Default Values: UC Recommendations

- Use approach similar to UK RFTO for biofuels
- Pessimistic default values determined for each input and processes
 - Any set of higher GWI fuels with cumulative volume less than 5% of total exclude from consideration as default
- Fuel providers can elect to opt-in or use default
- For crop-based feedstock, use regional per-crop average GWI
- GWI values needed for all co-products
- Current market conditions need to be considered in accounting framework



6. Default Values: Staff Recommendation

- Evaluation of similar efforts:
 - UK RFTO – tiered approach with values from IPCC; provides regulated parties opportunity to replace default with actual data
 - USEPA – may provide starting estimates for ARB lifecycle analysis
- How to define default values
 - Average values
 - Worst case scenarios
 - Conservative values
- What are the criteria of assigning default values
 - If value not available, consider empirical estimates
 - If higher carbon intensity fuels have cumulative volume less than 5%, should fuel be considered in default value calculations
- How to determine and include sustainability information



7. Co-Products



7. Co-Products

Basic Definition:

- A useful product which is produced as part of the process of producing fuel from a feedstock. Its value is usually dictated by a market for this 'useful product'
- *Example 1:* DDGS from ethanol production
- *Example 2:* Glycerin from biodiesel production



7. Co-Products

UC Recommendation:

- GWI values would be needed for all co-products
- Accounting system would need to define standard GWI values for co-products
- Accounting framework must take into account current market conditions for these co-products and should be updated to account for changing market

Staff Recommendation:

- Consider substitution/displacement method used for biofuels
- Consider allocation method for petroleum-based fuels
- Identify and develop values for co-products:
 - Animal feed (DDGS, soybean meal), electricity, glycerin, refinery products from gasoline and diesel production that provide credits in the near term
- Consider updates to co-product values made every 3-4 years based on market assessment



8. Sustainability



8. Sustainability: UC Recommendation

- Fuel providers should be required to report on the sustainability of impact of fuels, especially biofuels
- Keep LCFS simple as possible in the early years – no additional regulatory requirements on sustainability issues unrelated to transportation
- Reporting should include impact of biofuel production in CA, as well as impact through the US and globally
- Global scale assessment of sustainability is recommended since global market for biofuel will be affected by increase consumption in CA
- ARB's should pay close attention to international efforts on sustainability – important for LCFS to be compatible with international efforts



8. Sustainability: Staff Recommendation

- Issues under consideration:
 - Land erosion
 - Pesticide and fertilizer run-off leading to eutrophication (starving lakes and water bodies of oxygen) and toxic impact on human and animal health
 - Biodiversity
 - Water use due to larger demand for biodfuel production
 - Water pollution resulting from crop growing and and fuel production
 - Displacement of indigenous people from land
 - Environmental justice
 - Labor law violations, particularly in other countries
- Investigate developing qualitative criteria rather than quantitative for 2008-2010; additional refinement in 2010-2020
- Currently working with UCB/UCD to evaluate the issues
- Review USEPA draft regulation for initial direction



9. Uncertainty



9. Uncertainty

- **Types of uncertainty**
 - Market uncertainty
 - Input value uncertainty
- **Impact of uncertainty**
 - Magnitude of the impact to the LCA pathway



9. Uncertainty

UC Recommendation:

- Do not ignore parameters that are uncertain or difficult to measure – doing so is assigning a value of zero
- ARB should use the simplest model possible and establish clear criteria for updating the parameters

Staff Recommendation:

- Perform sensitivity analysis of “large impact” components of a given pathway and estimate impact
- Clearly outline the approach used to calculate a ‘value’ or a ‘range of values’
- USEPA LCFS process may provide starting point
- UCB and UCD create research papers on uncertainty and the impacts



10. System Boundaries



10. System Boundaries

UC Recommendation:

- LCFS must develop best estimates based on simpler approaches or choose a limited system boundary and acknowledge that leakage will occur outside of that system boundary

Staff Recommendation:

- Develop methods to clearly define system boundaries for all fuels being considered for LCFS for 2010 timeframe
- Consider co-product displacement boundaries and provide for boundary expansion to include co-product pathways
- Investigate co-product expansion limit



Tentative Future Meetings

- **Tentative future meeting dates:**
 - January 18, 2008 (Friday)
 - February 21, 2008 (Thursday)

- **Proposed future meeting topics:**
 - Remaining items not addressed today
 - Interaction with AB32, AB1493 and other policy instruments
 - Upstream emission: refineries
 - Carbon capture and storage
 - Environmental justice
 - Cost analysis
 - Research needs
 - Additional topics brought up in WG meetings/workshops



Thank You

- Christina Zhang-Tillman
Phone: (916) 324-0340
Email: czhangti@arb.ca.gov
- Visit our website at:
<http://www.arb.ca.gov/fuels/lcfs/lcfs.htm>