

Low Carbon Fuel Standard Life Cycle Analysis (LCA) Working Group 1 Meeting

October 23, 2007

California Environmental Protection Agency



Air Resources Board

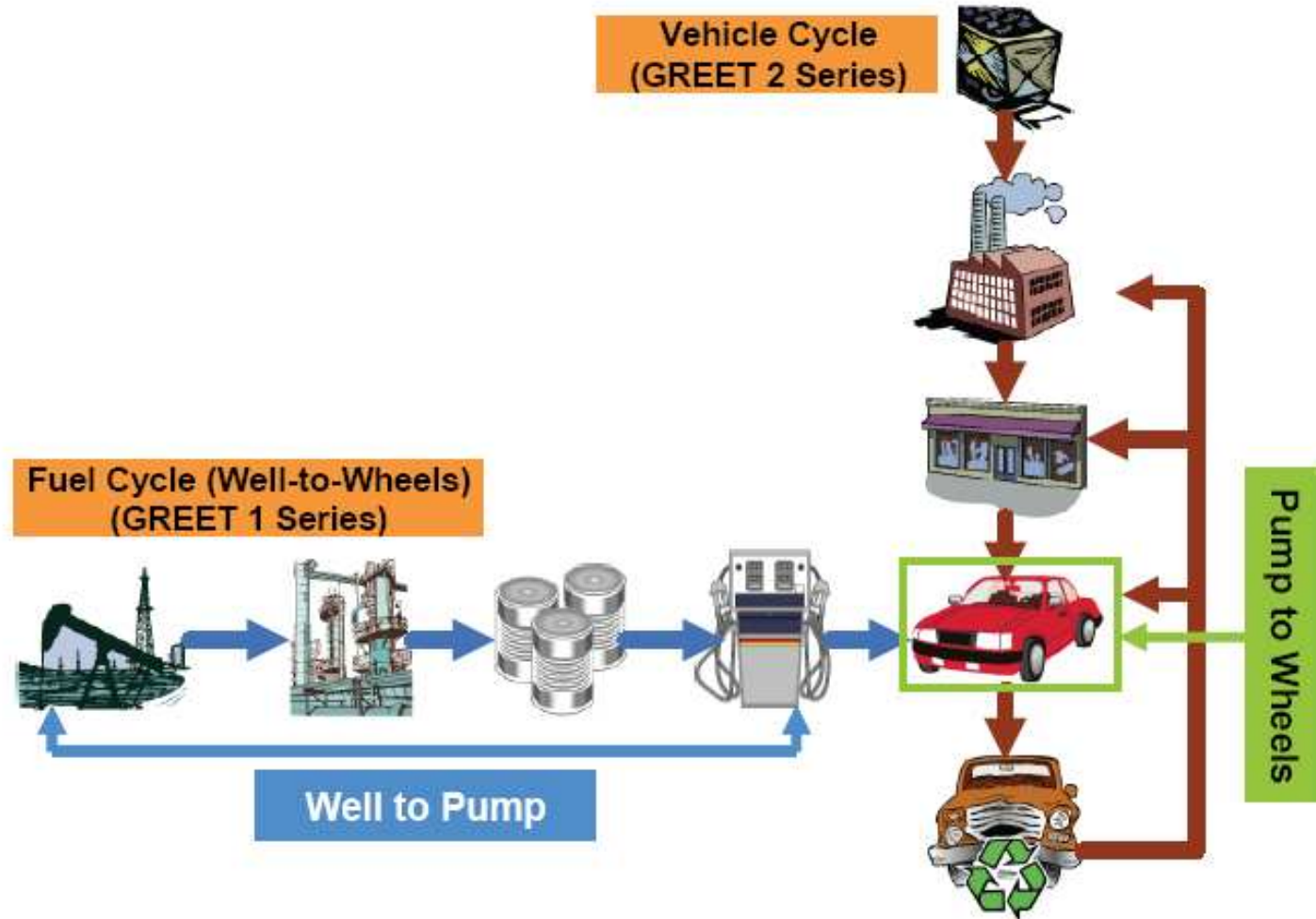
Agenda

- Introductions
- Specific issues to be discussed at this meeting
- Discussion how to resolve these issues
- Stakeholder comments
- Stakeholder presentations
- Other items to be discussed
- Topic of focus for next meeting
- Proposed meeting date(s)

Specific Issues to be Discussed

- ☞ System boundary
- ☞ Co-product issues
- ☞ Land use impacts

REET Model



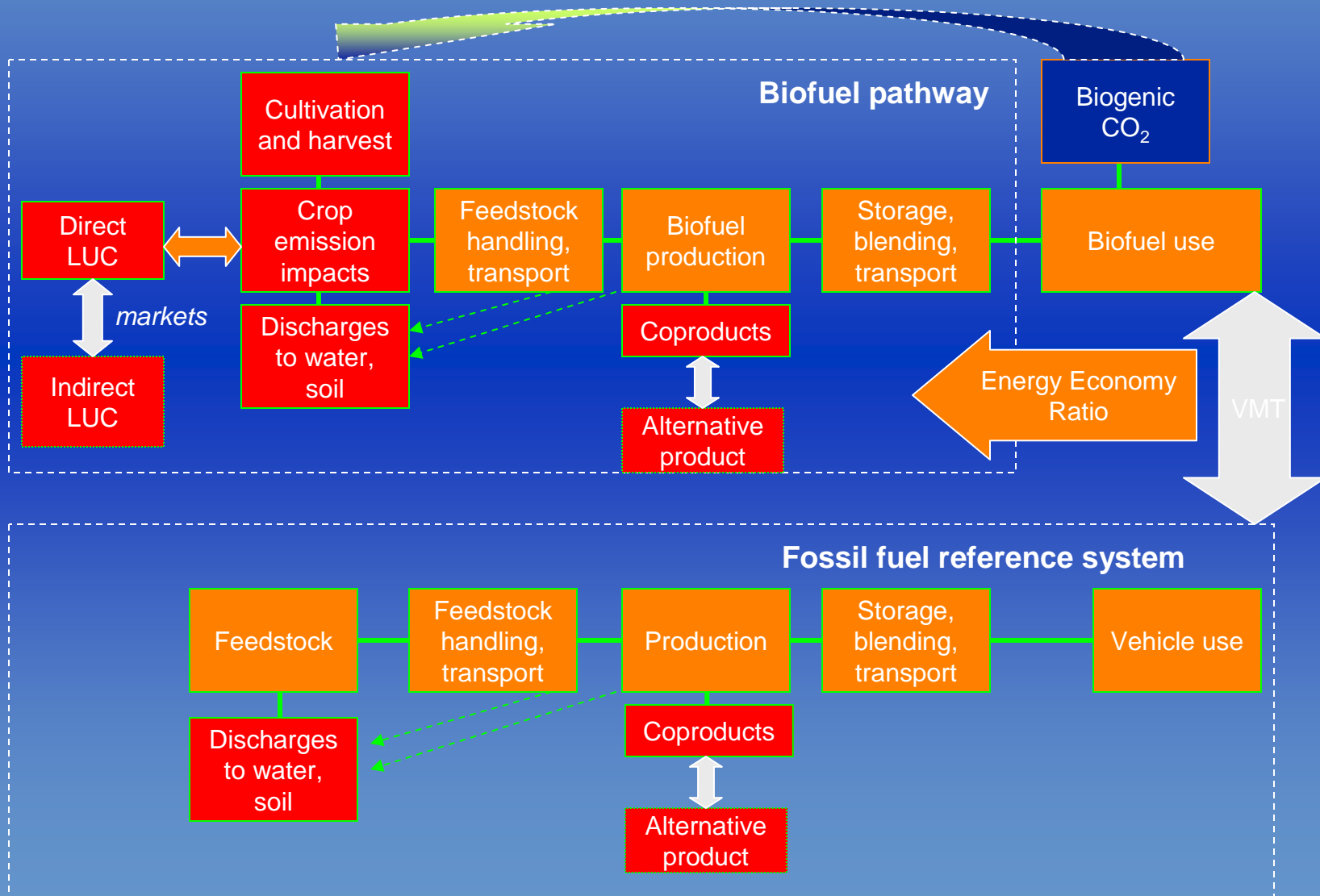
AB 1007 Modified GREET Model

- Modified GREET Model for California
Conditions for AB1007:
 - California fuel specifications (RFG3, ULSD, etc.)
 - California vehicle emission factors
 - California electricity mix
 - California emission factors for stationary sources
 - Changed transportation distances
 - Efficiencies of some industrial processes

U. S. EPA Proposed GREET Modifications

- ☞ U. S. EPA modifications to the GREET
 - Added or changed farming inputs for lime and fertilizer use
 - Considered cellulosic ethanol from corn stover and forest waste
 - Included biomass as a process fuel in corn ethanol dry milling
 - Changed GREET mix for dry mills (corn ethanol)
 - Updated electricity mix to reflect current national mix
 - Updated default CO₂ value from land use by considering agricultural sector model
 - Used yellow grease as a feedstock not provided in GREET

System Boundary



Co-product Credit

- ☞ Displacement/Substitution: where co-products from a pathway avoid the production of this from another source or replace the need for an equivalent product
- ☞ Allocation by attribute: products of the most value allocated the most burden in the pathway
 - Mass based
 - Economic value
 - Energy intensity

Co-Product Methods from Other Studies

- ☞ U. S. EPA has adopted a displacement method
- ☞ CONCAWE favored the substitution approach
- ☞ GREET uses the displacement approach as default (but provides the market value option also)
- ☞ AB 1007 (Energy Commission) used the GREET default method

Co-Product Methods from Other Studies (cont.)

- U. K. RTFO suggests the substitution approach
Recommends market value and energy based allocation where substitution not applicable
- Cramer Commission strongly recommends the substitution method with energy or market value to be considered as alternatives

Co-Product Credit Discussion

- ☞ ISO 14040 LCA recommends 'system expansion' which can be inferred as 'substitution'
- ☞ Define co-product in the system boundary
- ☞ Ideally expand system boundary to include co-products
- ☞ Solicit suggestions from working groups on best practice for assigning credit

Land Use Issues

- ☞ Land Use (LU) issues
 - Address Carbon cycle impacts
 - Address Nitrogen cycle impacts (from fertilizer, manure, crop rotation, residue use, etc.)
 - Direct and Indirect use of land
 - Land cover change impacts (albedo, evapotranspiration, dust from farming, etc.)
 - Others

Land Use Issues (cont.)

☞ Current work by others to include aspects of land use:

- U. S. EPA is considering the use of FASOM, a long term economic model of the U. S. ag. Sector. The work done to date includes the examination of land use change domestically due to increases in renewable fuel production and use.
- U. K. RTFO considers direct land use changes from forest or permanent grasslands but no account of alternative land use for existing agricultural systems

Land Use Issues (cont.)

- ☞ Current work being done to include aspects of land use:
 - German Biofuels Directive: assigns a 'default value' assuming worst case land use and producers have the obligation to substantiate land use changes for credit.
 - Models such as DAYCENT are being used to estimate soil carbon emissions and removals. It is also being developed for N₂O emissions from agricultural land.

Land Use Issues (cont.)

- ☞ Some thoughts for discussion:
 - UC study: Develop an estimate of GHG impacts by direct and indirect LU. Participate internationally in developing methodology for accounting LU change
 - Consider IPCC methodologies being used to provide national greenhouse gas Tier 1 methods. Adapt Tier 2 and Tier 3 methods to ensure regional effects are captured.
 - U. S. EPA's Low Carbon Regulation could provide a framework for directing LU impacts

Sustainability

- ☞ Sustainability issues
 - Ecosystem impact
 - Biodiversity
 - Availability of food due to crop diversion to biofuels
 - Water use
 - Others
- ☞ Suggested approaches to resolve
 - Minimize unintended negative consequences of biofuels
 - Maximize GHG benefits
 - Consider all environmental impacts (water, soil, food supply, agricultural runoff, biodiversity)

Sustainability (cont.)

- U.S. EPA: considered “Sustainability Research Strategy” to protect human health and preserve natural resources
- UC: additional research on sustainability impacts with international efforts

Comments from Stakeholders on Land Use Issues

☞ Pacific Forest Trust

- To consider emissions from conversion of existing natural lands to biofuel crops
- Standardized regulatory and mandatory reporting of lifecycle emissions and emission reductions from biofuels
- Both environmental and economic perspective when accounting for lifecycle emissions related to biofuels
- Accounting must be tailored to include biofuels from managed forestlands
- Benefits of the LCFS must not come at the expense of other important environmental benefits

Comments from Stakeholders on Land Use Issues

- ☞ Sustainable Conservation (suscon.org)
 - Need to consider secondary effects of biofuel crop production. Current farm used for ranching may be used for biofuel crop production and the rancher may push his beef production in to old growth forest
 - Large uncertainties in C stored or released during from crop production for biofuels; depends on type of crop grown, irrigation and tillage practice, fertilization, rotation, soil type, etc. Can we address this issue?
 - May be possible for petroleum companies to increase fuel mileage with existing petroleum fuels (via additives and reformulations): would oil companies take actions to increase fuel mileage which could lead to decreased demand for fuel?

Stakeholder Presentations

☞ Presentations?

Next Meeting Topic

- ☞ Focus for next meeting of WG1
- ☞ Work to be accomplished before next meeting

Next Meeting Date

- ➡ Next meeting date: early November
- ➡ Future meetings

For More Information

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<http://www.arb.ca.gov/fuels/lcfs/lcfs.htm>

Open for Discussion