CALIFORNIA ENERGY COMMISSION

SUSTAINABILITY CONCEPTS FOR AB 118

The Alternative and Renewable Fuel and Technology Program

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Informal Stakeholder Discussions
California Energy Commission
July 24, 2008

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AGENDA

- Welcome and Meeting Purpose
- Introductions
- Energy Commission Schedule for Sustainability Goals and Characteristics in Regulations, Investment Plan and Solicitation
  - Establishment of Sustainability Working Group
- Presentation: *Sustainability Concepts for AB 118* by Energy Commission Staff
- Open Discussion

Sustainability and AB 118

- Sustainability Part of Each AB 118 Element
- **Regulations** will form implementing framework
  - Must be approved by OAL to distribute money
- **Investment Plan** will be strategic plan
- **Solicitations** (or RFPs) and other funding mechanisms will contain specific criteria and data requirements for applicants for AB 118 funding

Sustainability and AB 118

- Statute Requires Energy Commission to Develop Sustainability Goals
- Regulations
  - Four draft goals proposed for regulation to meet statutory obligation
    - Sustainability regulations not part of August 11 workshop
    - Sustainability regulatory workshop planned for September 9
- Investment Plan and Solicitation
  - Sustainability “characteristics” and eventual evaluation “criteria” incorporated in IP and Solicitation

Sustainability Working Group

- Energy Commission will form multi-stakeholder technical working group for sustainability issues

  August 15 – Kick-Off Meeting

- Seek representatives from:
  - Biofuels Industry (growers, producers, distributors)
  - Government Agencies (ARB, Food and Ag, US EPA)
  - Environmental Non-Governmental Organizations
  - Academia (UC Berkeley, UC Davis)
  - Infrastructure developers
  - Auto Industry

Draft Schedule for AB 118 Sustainability Regulations

July 8 – Regulatory Workshop

Release of Concept Paper and Draft Goals

July 24 – Informal Stakeholder Discussion

Aug. 15 – Sustainability Working Group Mtg.

Aug. 25 – Energy Commission Posts Draft Sustainability Regs.

Sept. 9 – Public Workshop on Draft Regs.

Sept.19 –Written Comments Due on Draft Regs.

Oct. 7 – Draft Regulations Submitted to OAL

SUSTAINABILITY CONCEPTS FOR AB 118

Energy Commission Staff Presentation by Jim McKinney

AB 118 Basics

- **Purpose**

  To transform California's transportation market into a diverse collection of alternative fuels and technologies and reduce California's dependence on petroleum.

  "…develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies." Health and Safety Code Section 44272(a)

- **Funding**

  For the *Alternative & Renewable Fuel and Vehicle Technology Program*, the Energy Commission will receive $120 million/year for over 7 years.

  ARB will receive $80 million/year for over 7 years for *Enhanced Fleet Modernization* and *Air Quality Improvement.*

Program Elements

- Implementing Regulations
  - Establish Sustainability Working Group
- Investment Plan
  - Annual Solicitations
- Advisory Committee
- Schedule
  - Adopt Regulations and Investment Plan to Disperse Initial Funds in March 2009

Program Goal

- The goal of the Alternative and Renewable Fuel and Vehicle Technology Program is to *"…develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies."*

Health and Safety Code Section 44272 (a)

Additional AB 118 Goals

- Meet standards established by ARB and the Low Carbon Fuel Standard to reach emission reduction goals
- Achieve petroleum reduction
- Encourage and support in-state production of alternative fuels
- Develop and deploy new vehicle technology
- Create jobs for Californians through education and workforce training

AB 118 Context

- California uses 20 billion gallons of fuel - 95% petroleum
- State Alternative Fuels Plan Goals (AB 1007)
  - 9 % by 2012 increasing to 26 % by 2022
  - 20 % at 2020 means
    - Displacing 4 billion gallons of petroleum-based fuel
    - 370 million gallons of new alternative supply annually
    - Current in-state production is 80 million gallons ethanol and 25 million gallons biodiesel
- Bioenergy Action Plan
  - 20% of biofuels used in 2010 to be produced in California
- AB 32: Reduce GHG levels to 1990 levels by 2020
  - 80% of 1990 levels by 2050
- Low Carbon Fuel Standard: Reduce carbon intensity of all transportation fuels 10% by 2020

AB 118 Sustainability Provisions

Section 44271(a)(2)

"Establish sustainability goals to ensure that alternative and renewable fuel and vehicle deployment projects, on a full fuel-cycle basis, will not adversely impact the state's natural resources, especially state and federal lands."

Preferences to Projects Maximizing Environmental Criteria

Section 44272(b)

- Consistency with Climate Change Policy and Low Carbon Fuel Standard
- Project's ability to reduce criteria pollutants and multi-media impacts
- Project's ability to decrease water pollutants
- No adverse impact to sustainability of state's natural resources
- Project's ability to reduce GHG emissions by at least 10% from petroleum baseline on a life-cycle basis

Energy Commission Challenge for AB 118 and Sustainability

- Interpret the Sustainability Language from AB 118
- Write Regulatory Goals
- Guidance for Investment Plan Solicitations
  - Applicants must submit enough information to know if a "sustainability test" has been met
- Reasonable Condition Use of Public Money?

WHAT DO WE MEAN BY SUSTAINABILITY?

What Do We Mean By Sustainability?

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

Brundladt Report, 1987 World Commission on Environment and Development

Sustainability Idea Broadly Used

- 3 Main Components
  - Environmental – Social – Economic
- Widely Used Concept in:
  - Community Development
  - Forestry
  - Fisheries
  - Agriculture
  - Transportation Planning
- Is it a Set of Standards or a Philosophy?

Intuitive 3rd Grade Interpretation

- Doing something better than it is done now by using resources more efficiently and less wastefully, and by having smaller waste streams
- Watch out for the unintended consequences
- For Alternative Fuels and Technologies, sustainability likely means producing fuels better and differently than conventional fuels

What Do We Mean by "Better?"

1. Better than what? – To what are we comparing alternative fuels and vehicle technologies?
    - Petroleum Baseline
    - Agricultural Production Baseline
2. How much better?
3. What do we need to measure to know if we are doing things differently enough for them to be better?

How Much Better? = Thresholds

- Better Than Current Practices for Non-Sustainable Industries?
- No Net Loss or Change from Status Quo?
- No Unacceptable Change?

- Biofuel Production Means More Resources:
  - Land, water, fertilizer, chemicals, labor, energy

Sustainability and Existing Regulatory Standards

- Is a Sustainable Practice different than Current Regulatory Standards?
- California has stringent standards:

CEQA	Environmental Permits
Air Quality	Water Quality
Toxics	Biodiversity Protection
Land Use	Labor

- Does This Equal Sustainability?

What Do We Measure?

Ecological Components		Social Components
Energy Use	Habitats & Ecosystems	Public Health
GHG Emissions	Biodiversity	Economics
Water Use	State / Federal Lands	Land Use Changes
Waste Water Discharge	Criteria Pollutants	Environmental Justice
Forest Cover	Toxics Emissions	

Metrics to Assess Carrying Capacity

- Carrying Capacity is the ability of an air basin, watershed, land area, or ecosystem to absorb resource extraction and pollution loading until its basic functions are impaired.

Carrying Capacity Examples

- **Climate and Atmosphere**
  - How much carbon and CO2-eq can the Earth's atmosphere absorb until the climate changes?
- **Criteria Pollutants**
  - How much loading can an air basin absorb until public health, animal health or ecosystem health are impaired?
- **Water**
  - How much water can be withdrawn, or how much nutrient loading and toxics can be discharged until beneficial uses and aquatic ecosystems are impaired?
- **Forests**
  - How much timber can be harvested without impairing basic ecosystem function?
- **Wildlife**
  - How much habitat and how many individuals can be lost until a species reaches the endangerment threshold?

Scaling Issues

- What is the boundary of the physical, geographic or social system about which we are concerned?
- What is the timeline for the system we are considering: 1 year, 50 years, or 1,000 years?
- Issues
  - GHG emissions are global pollutants
  - Water use is regional
  - Waste water discharge may be a localized issue
  - Indirect land use changes are global, regional, and localized

Information Requirements

- How much of what information is needed to determine if an alternative fuel or vehicle technology is “sustainable?”
- Who provides the information and analysis? When is the information provided in the AB 118 funding request schedule?
- Are some LCA models more robust and suitable than others? Do information claims on sustainable products and processes need to be certified by third parties?
- How do we decide if a proposed project meets sustainability criteria? Are all metrics and parameters given equal weight, or are some more important than others?
- Remember: Information costs money to compile

Utility and Limits of LCA Models

- LCA models like GREET good at GHG emissions and energy balances
- For water use, waste water discharge, solid waste, criteria pollutants, land use and habitats, LCA models can only make relative comparisons, not absolute determinations
  - Can't assess localized impacts

7 Sample Frameworks to Assess Sustainability

7 Sample Frameworks to Assess Sustainability

Energy Commission staff has identified 3 general approaches to assess sustainability:

1. Science and Standard-Based Assessments like CEQA and Environmental Performance Reporting
2. Documented adherence to applicable laws and regulations
3. Adoption of Best Management Practices

Sustainability Screening Based on CEQA and Major Environmental Permitting

CEQA Hierarchy

Avoid, Minimize, Mitigate Impacts

CEQA Information and Process

1. Clear, quantified descriptions of ecological and social systems of concern – The Baseline
   - Energy, GHGs, water, forest cover, habitats, environmental justice, etc.
2. Project description
   - Enough information to assess project impacts
3. Analysis of how project affects physical and social environment
   - Significance criteria and thresholds
4. Mitigation Measures to reduce impacts to non-significance

Sustainability Reporting for the UK's Renewable Transport Fuels Obligation

- 7 Principles

  Carbon Storage, Biodiversity Conservation, Soil Conservation, Sustainable Water Use, Air Pollution, Workers Rights, Land Rights
- Emphasizes farm/firm-level reporting based on compliance with existing national laws
- Meta-Standards for Each Fuelstock
  - Builds on standards developed for programs like forestry and palm oil
- Monthly and Annual Reporting
- Chain of Custody Certification
- Sustainability Program Certification by 3rd Parties

Roundtable for Sustainable Palm Oil

8 Principles and 40 Criteria for Sustainability Certification

1. Transparency
2. Compliance with Applicable Laws and Regulations
3. Long-Term Economic Viability
4. Best Practices for Growers and Millers
5. Environmental Responsibility, Conservation of Natural Resources and Biodiversity
6. Consideration of Employees, Individuals & Communities Affected by Growers and Mills
7. Responsible Development of New Planting
8. Continuous Improvement

Key Question: Can It Guarantee Sustainable Production?

Brazilian Ethanol Sustainability Factors

Ecological Areas of Concern	Socio-Economic Areas of Concern
Water Use	Competition with Food Production
Water Pollution	Employment
Biodiversity	Income Distribution
Soil Erosion	Land Tenure
Fertilizer Use	Wages
Genetically Modified Organisms	Working Conditions and Worker Rights
Sugarcane Burning	Child Labor
Greenhouse Gas Emissions and Energy Balance	Social Responsibility and Benefits
	Competitiveness

Smeets et al. developed comprehensive, science-based metrics to assess sustainability of sugarcane ethanol production in Brazil.

- Emphasize compliance with existing laws.
- Concluded that sustainability cannot be assured at present time.

California Sustainable Winegrowing Alliance

- Voluntary Standards and BMPs with Self-Reporting
- 529,000 Acres and $2 billion annual revenues (2004)
- Stresses Continuous Improvement and BMPs, rather than absolute standards
- Practices and Criteria similar to RSPO, but no enforcement or certification
- Impressive Results

Wine Alliance Sustainability Factors

Sustainable Winegrowing Practices	
Viticulture	Winery Water Conservation
Soil Management	Material Handling
Vineyard Water Management	Solid Waste Reduction
Pest Management	Environmentally Preferred Purchasing
Wine quality	Human Resources
Ecosystem Management	Neighbors and Community
Energy Efficiency	

Energy Independence and Security Act of 2007

- Renewable Biomass Definitions
  - Crops and crop residues from lands cleared prior to statute
  - Trees and tree residue from tree plantations established prior to statute
  - Slash and thinnings from non-federal forests, but not ecological communities of special status, or old growth or late successional forests
- Studies to Assess Renewable Fuel Standard

Environmental Performance Reporting as Conducted for the *Integrated Energy Policy Reports*

- Science-based assessments of environmental effects of state's power generation system
- Assumes full regulatory compliance
- Tests effectiveness of current environmental regulatory standards and policies
  - Many int'l sustainability programs based in compliance
- Similar to CalEPA EPIC Reports
- Findings: Regulatory standards often lag state of the science

Sample EPR Findings (Often Non-Intuitive)

- **Power Plant Emissions**
  - 1 percent of NOx emissions. No longer principle driver for AQ planning
- **Cooling Water Use**
  - Energy Commission policy driving new cooling technologies
- **Once-Through Cooling**
  - Scientific understanding of ocean ecology driving new polices
- **Renewable Environmental Impacts**
  - Hydropower: Fisheries and Water Quality
  - Wind: Avian fatalities and visual effects
  - Solar Thermal: Impacts to desert ecosysems

Additional Sustainability Frameworks

- UC Berkeley recommendations to ARB for the Low Carbon Fuel Standard
- Roundtable on Sustainable Biofuels
- Council for Sustainable Biomass Production
- European Commission – Directorate General for Transport and Energy
  - Dutch report on Sustainability and Certification

Sustainability from Other Sectors

- Forestry and Wood Products
  - Forest Stewardship Council
- Agriculture
- Fisheries
- Transportation
- Social and Environmental Justice
  - Corporate Responsibility Programs
- BMPs and Chain of Custody

Practical Examples: Sustainability and AB 118

Potential Projects and Fuel Pathways

Alternative Fuel Types	Feedstocks	Source	Processing and Distribution Infrastructure
Biodiesel	Domestic and foreign energy crops (algae, soy, palm oil), waste grease, and oils	Row crops, aquaculture, Waste collection	Industrial processing, distribution, fueling stations
Biomethane	Landfill gases, feedlots, biomass	Landfills, feedlots	Gas processing, distribution, fueling stations
Biomass to Diesel (Fischer-Tropsch)	Wood wastes, ag wastes, energy crops		Industrial processing
Butane	Petroleum refining and natural gas	Refineries	
Electricity	Cal. grid – renewable and fossil, National and International grids	Natural gas, nuclear, hydro and coal powerplants. Renewables	Transmission and distribution lines, residential and commercial charging stations
Ethanol	Bioenergy crops (corn, sugar cane, sorghum), farm & feedlot waste streams, fiber and woody materials (cellulosic materials)	Row crops, woodlots, farms, feedlots	Industrial processing, distribution, fueling stations
Dimethyl Ether	Propane / natural gas derivative		
Hydrogen	Natural gas and electricity derivatives, industrial byproducts (nuclear), water cracking (energy intensive)	Refineries	Distribution, fueling stations
Renewable Diesel	Domestic and foreign energy crops, waste grease and oils, algae	Row crops, aquaculture, Waste collection	Industrial processing, distribution, fueling stations
Natural Gas	Domestic and Canadian wells, LNG imports	Natural gas and petroleum wells	Transmission and distribution pipelines, residential, commercial, institutional charging stations

Practical Example No. 1: Ethanol Processing Facility in California Using Midwest Corn Feedstock (Based on Great Valley Ethanol EIR)

- **Key Assumptions**
  - Midwest corn brought by rail to San Joaquin Valley processing plant. Produces ethanol and distillers grain. Final products shipped by truck.
  - **Inputs:** Electricity, natural gas, water
  - **Waste Streams:** GHGs, criteria pollutants, VOCs, waste water
- **GHG Threshold**: 10% lower GHGs on LCA basis?
  - How about when indirect land use added to LCA analysis?
- **Sustainability Aspects**
  - Corn Production in Midwest
  - Corn Mash Processing
  - Final Product Distribution

Practical Example No. 2: Sugarcane Production and Ethanol Processing in California's Imperial Valley

- **Key Assumptions**
  - Large acreage of sugarcane production on existing farmland
  - Displaces alfalfa, winter wheat
  - Uses existing water rights
  - On-site processing of juice and bagasse (Brazilian method with cogen)
- **GHG Threshold**: 10% lower GHGs on LCA basis?
  - Jenkins and Williams show GHGs 80% below petroleum baseline
  - How about indirect land use changes from crop displacement?
- **Sustainability Aspects**
  - Sugarcane production
  - Juice processing and bagasse use in electricity cogeneration
  - Distribution

Practical Example No. 3: B20 Biodiesel Using Malaysian Palm Oil Certified by Roundtable on Sustainable Palm Oil

- **Key Assumptions**
  - Palm oil grown and processed in Malaysia using practices specified in RSTO certification requirements
- **Key Questions**
  - How robust is RSTO standard? Can it be verified?
- **GHG Threshold**: 10% lower GHGs on LCA basis?
  - How about indirect land use changes from forest clearing?

Other Practical Examples

- E-85 Fueling Station in State Garages
  - Include fuel pathway in analysis?
- Residential Electric Charging Stations for Plug-In Hybrid Electrics
- Commercial Hydrogen Fueling Stations
- Baseline Comparisons:
  - Petroleum
  - Agricultural Production

Projects in Development by Sustainable Conservation

- Sweet sorghum trial in Sacramento Valley
- Westlands Water District fallow land remediation using canola and mustard
- Biomethane upgrade at dairy facility to produce transportation fuel
- Winters walnut farm experiments with Fischer-Tropsch fuel development

STAFF FINDINGS, INTERPRETATIONS AND RECOMMENDATIONS ON SUSTAINABILITY FOR AB 118

Summary of Draft Staff Paper:

Regulatory Concepts on Sustainability Goals for the Alternative and Renewable Fuel and Vehicle Technology Program

July 2008, Energy Commission Publication No. 600-2008-006-D

Staff Findings on Sustainability

- Energy Commission recognizes sustainability concerns with alternative fuels, especially biofuels
- California market size creates risk of induced environmental & social damage from large volumes of alternative fuels
- Staff finds no singular off-the-shelf sustainability model or program
- Sustainability issues complex & continuously evolving

Staff Assumptions

- Sustainability means “lower impact” not “zero impact”
- Sustainability encompasses global environmental and social issues and cannot be limited to “state’s natural resources”
- Sustainability goals and measures will require environmental performance and production practices that exceed extant regulatory standards
- Infrastructure cannot be separated from fuel pathway

Staff Goals for Sustainability Program

- Flexible framework for evolving Investment Plans
- Promote sustainability without undue burden to emerging technologies
- Recognize long-lead time for some fuels
- Continue to learn about Indirect Land Use Effects and Food v. Fuel issues
- Compliment the work of ARB on LCFS

Staff Goals for Sustainability Program

- Identify benchmark-caliber systems for sustainability and certification that can be used in California
- Balance “California-centric” provisions of AB 118 with reality of global market
- Leverage California’s market size and environmental ethic to drive international standards towards systems of certified, sustainable production

AB 118 Sustainability Provisions

Section 44271(a)(2)

"Establish sustainability goals to ensure that alternative and renewable fuel and vehicle deployment projects, on a full fuel-cycle basis, will not adversely impact the state's natural resources, especially state and federal lands."

Staff Interpretations of Statute

- "Not adversely impact" means projects subject to CEQA must fully mitigate impacts to non-significant level
- "State's natural resources" include:
  - Forests, range lands, waters and watersheds, biodiversity (fish, wildlife, flora) resources and habitat, coastal land and water, minerals, farmland
- "State and federal lands"
  - surface and subsurface (water bottoms and tidal zones) lands owned wholly or in part by any branch or division of California State and federal government

Sustainable Fuel Production

- Amounts of land and natural resources used for alternative fuel production, and the resulting pollution loading from air, water, toxic and solid waste streams, do not further and unacceptably degrade already damaged ecosystems, water basins, and air basins in California, the U.S., and around the world.

Sustainable Fuel Production

- Sustainable practices recognize and respect the physical carrying capacity limits of natural systems at the local, regional, and global scale.
- Sustainable practices respect human dignity and contribute to the economic welfare of people around the world.

Proposed Sustainability Goals

Energy Commission staff proposes four sustainability goals and examples of 10 project characteristics that would further each goal.

- Project “characteristics” may evolve into some type of evaluation criteria in Investment Plan or Solicitations to assess how proposed projects meet the sustainability goals

Sustainability Goal No. 1

Support Fuel and Technology Options with the Best GHG Reduction Potential to Meet 2020 and 2050 Targets

(29% and 80% below 1990 baseline)

1. Minimum 10% life cycle reduction in GHG emissions for direct and indirect land-use effects
2. Recognize potential of “bridging technologies” and “long-term incubation” effects to further goals

Sustainability Goal No. 2

Support Production of Fuels and Technologies More Environmentally Efficient and Less Environmentally Damaging Compared to Petroleum, Agricultural, & Natural Resource Baselines.

3. Maximize waste stream feedstock use
4. Purpose-grown energy crops with Best Management Practices
   - Cooperative effort with UC Davis
5. Use recognized certification / reporting systems
6. Biofuels suitable to CA resource/climate constraints
7. Use extant agricultural lands to minimize ecosystem impact
   - Exclude feedstocks from Conservation Reserve Lands?
8. Renewable energy/cogeneration used in production

Sustainability Goal No. 3

Support Certified Sustainable Production of Biofuels for California Markets While Providing Economic Benefits to Producer Countries

9. Recognize best-available sustainable production methods and practices
10. Recognize use of internationally recognized certification and reporting systems

Sustainability Goal No. 4

Minimize Risk of Unanticipated Consequences from Alternative Fuel Production

- Use of Adaptive Management approach to update funding criteria in response to new information
- Continue developing GREET and other tools to assess sustainability