Comments on Sustainability Standards for the Low Carbon Fuel Standard

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August 5, 2011

These comments provide a general overview of the notion of sustainability as applied to biomass energy and biofuels in particular. They also include specific comments on LCFS Sustainability Principles and Criteria recently offered in draft form by CARB staff. Lastly, recommendations are included for alternative formulations and processes for establishing sustainability standards for California's LCFS. These remarks are my personal views, not that of the California Biomass Collaborative or my academic affiliation. They are largely non-technical in nature, but focus instead on important principles which so far have not been fully developed in the current LCFS Sustainability Standards process. An additional, more technical response is in preparation.

The term sustainability is beset with semantic ambiguity and influenced by changing values

The notion of sustainability is both comprehensive and illusive. It is a comprehensive notion because any concern can be included when considering sustainability, and any issue may be important. It is illusive because many of the values and circumstances that must be included when considering sustainability guidelines are subject to change, often unexpectedly and unpredictably. Since this is the case, decision making must be as accountable and transparent as possible and open to processes that allow for improvement as needed.

Generic notions of the definition or meaning of sustainability are not useful in creating rules to guide public policy and necessary choices that regulatory agencies must make in implementing such policies. Everyone agrees that nature should be preserved for future generations in ways that allow human and other life to thrive, that human life depends on well-functioning natural systems, and that economic and social goals must considered as part of natural resource policy.

Because these goals are expansive and subject to interpretation, specific content must be provided to guide their use. Confusion arises because values associated with sustainability commonly are expressed qualitatively, while regulation requires quantitative metrics. When creating specific policies that translate qualitative ideas into regulations, unavoidable differences in perceptions, objectives, and methods arise. Creating sufficient consensus given such differences requires a fair and transparent process. Clarity is needed about properties associated with each of the three elements of sustainability, and about how they are first identified and subsequently measured. Where measurement is inappropriate or misleading, good process is required to reach sufficient consensus to create policy or make decisions.

Many current California laws or agency processes address sustainability

In many ways, the core activity associated with creating and administering sustainability standards is similar to the creation of law in general. Many laws allocate resources and embody public preferences about proper allocation. There are few perfect laws, and no perfect governments, but effective laws reflect social consensus about vital issues reached in a largely transparent process. In the United States, republican government provides the rules for forging agreement, and elections provide the opportunity for the public to participate and approve or disapprove of the outcomes. In a similar way, sustainability guidelines may affect choices about the allocation of resources that are often resolved politically. By-passing that difficult process may result in both unstable outcomes and political illegitimacy.

In addition, many regulatory agencies or processes conscientiously involve public participation. California has many such activities at any given time. For example, to help create sustainability guidelines for the Low Carbon Fuel Standard, the CARB has created a Sustainability Standards Advisory Group (http://www.arb.ca.gov/fuels/lcfs/workgroups/lcfssustain/lcfssustain_meetingarc.htm). Other agencies concerned with water use, agriculture, forestry, waste management, and agriculture also have advisory groups that help make recommendations, set rules or evaluate alternatives. In many ways, these processes focus on issues correlated with or important to the notion of sustainability and are good models of how to create sound sustainability policies in specific

subject matter areas. Where such processes exist, there is no need to create separate ones, nor new rules or guidelines. Indeed, doing so would create redundancy and legal confusion. In the absence of review of existing regulations and guidelines, new rules would devalue the hard work and undermine the civic virtue of those participating in parallel agency processes. It would usurp the legitimate role of these agencies and processes. If redundant or fugitive regulation results from the assertion of sustainability standards for the LCFS, the net result would be undesirable from the point of view of the LCFS as well: unnecessary inhibition of new fuel development n CA and use of the fuels needed to reduce GHG emissions that are necessary for the state to meet the stringent objectives mandated by AB 32, without substantial increases in environmental protection.

In-state production of biofuels

Biomass production is unique among alternative energy sources in that it is much more locally variable than other forms of energy. Even though wind and sunshine vary, local adaptation of feedstock production adds additional complexity to biomass based processes. Large scale or generic models cannot have sufficient detail to avoid error in assessment. Wherever possible, sustainability assessments for biofuel production systems must be project-specific, and based on locally determined estimates. This is not an impossible requirement currently, since there are few projects advancing in CA, and the means exist in diverse agencies or semi-public groups like the California Biomass Collaborative to carry out such assessments.

Third party, generic guidelines defining sustainability will be less valuable when applied to in-state production than current California regulations. Environmental regulation in CA is likely to be the most stringent in the world in most areas. Third party standards and certification aspire to regulatory standards and process that are the norm in CA. In any case, the state's rules and regulations were derived through legitimate state processes and are both superior and mandatory for that reason. Third party standards are unnecessary for in-state production and simply add dead-weight costs.

As a matter of public policy, all recent governors have urged state agencies to work together to

eliminate redundancy and irrational or conflicting regulations. This is very difficult to achieve in practice for many, diverse reasons. Sustainability standards, however, provide an opportunity to identify existing successful regulatory programs and laws in a comprehensive and rational framework. Since many regulations already exist that contribute to environmental and social sustainability, creating guidelines for the LCFS should first be an exercise in identifying regulations that already help implement or ensure sustainable practices relating to biomass harvest and landscape use. This review of relevant rules and laws will be a step towards regulatory rationalization strongly supported in public policy, and significantly improve the prospects for new developments fuels in CA. There will be no sacrifice of current levels of environmental protection since existing and relevant laws would be more clearly identified and better defined for the public. So an essential first step to establish sustainability standards for the LCFS is sufficient review of related state and federal regulations already protecting air, water, soil and wildlife. In all cases, these rules are already in place.

A two stage process is needed. First, CARB should review current state and federal regulations associated with the protection of air, water, soil and wildlife that might apply to biomass production and use for fuels and power in California. Second, for in-state biofuel production, CARB needs to identify locally specific models or approaches adaptable to site-specific project assessment. Each project will have locally-specific benefits and risks. By comparing existing regulations with project specific assessment, some gaps may or may not be identified that could reasonably be considered for inclusion in sustainability guidelines. Effectively illustrative case studies will be accumulated as precedents, refining the regulatory meaning of sustainability as applied to CA experience. What may be judged sustainable in one instance or location may not be so in another, yet still be a just and reasonable outcome. This approach embeds learning in the sustainability standard process and allows for adjustment as circumstances require[1]. Transparency and rigor should assure public confidence and acceptance of outcomes by most

[1] A potential example for a learning based process analogous to what is proposed here is the development by the California Resources Agency of a programmatic Environmental Impact Assessment for anaerobic digesters (http://www.swrcb.ca.gov/rwqcb5/water_issues/dairies/dairy_program_regs_requirements/dairy_peir_final_cert.pdf) for use throughout CA. The need for this EIA was identified as a result of many failed attempts to site AD units, especially on dairy farms in the Central Valley, It was realized from trial and error that consistency in application and interpretation of state regulations would help with the establishment of new facilities. The most critical general steps were identified and embodied in the EIR. This effort required the cooperation of several state agencies and is now regarded as helpful and successful.

reasonable people. The qualitative language used in common discussion about the meaning of sustainability could be examined against actual cases as part of public learning. This is also consistent with pathway analysis that is already part of the LCFS.

An added value of this outcome would be accurate identification of any gaps that are not adequately considered by existing regulations. The gaps identified could be the special province of sustainability guidelines specific to the LCFS. Probably the only area that may need consideration is the means of identifying fuel carbon intensity for domestic CA biofuel production. But this mechanism already exists in part in the regulation through the provision of alternative pathway submission.

Another principle that should be primary is that sustainability regulations wherever possible should be chosen to promote new pathways to economic prosperity as part of compliance. Frequently, standards are seen by some as means of restricting activities and controlling behavior. This is a poor starting point for standards. Rather, they should provide strong guidance towards desirable outcomes. That means that initially, regulations should be more encouraging than prohibitive and become more prohibitive and learning occurs in response to real issues identified from trial and error.

Imported biofuels

Biofuel production in the United States is regulated under the Energy Independence and Security Act by the US EPA (RFS2_ http://www.epa.gov/otaq/fuels/renewablefuels/regulations.htm). This law also include production in CA. Imported biofeuels, especially ethanol from Brazil, are assessed in the RFS2 There are also trade rules and tariffs that regulate imports of biofuels. The LCFS already includes some consideration of international sustainability by including the ILUC in its calculation of fuel GHG intensity.

Besides ILUC provisions in the LCFS and federal laws and rules, there are a number of third party certification efforts underway (van Dam et al., 2008; Round Table on Sustainable Biofuels; http://rsb.epfl.ch/; European Union,

http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/901&format=HTML&aged=0&language=EN&guiLanguage=en). The EU has recently nominated five that it considers effective and sufficient to provide assurance of sustainability. For imported biofuels, CA could follow a similar process. It is likely that many of the sustainability certification groups are functionally equivalent. One criteria for choice among them would be the additional costs added to fuels from the need to certify. Because of CA's demanding GHG reduction goals, it is likely that only the most expensive biofuels will be useful in the state. Any additional costs associated with certification will add to already high fuel costs, so minimization of thee transaction costs would be a reasonable criteria for choosing among certification systems. The CARB Sustainabilty Advisory Committee could undertake this effort with staff support, or a third party contractor could be chosen to carry out a systematic evaluation in the manner of the EU. It is unlikely that differences among sustainability certification systems will be significant given the much larger uncertainty about the value of such efforts.

Biofuels exported from California

It is hard to foresee a situation in the near to mid-term under which biofuels produced in CA are exported to other states or countries. Wood chips, sawdust, and other wood products that might be used for power have been exported, but no likely no biofuels. Such fuels, if any were to be produced, would not be the concern of the CARB and would have to meet whatever standard the importing country or agent chose to establish.

Agriculture and forests as sources of biofuels in California

Most projections of pathways to meet California's ambitious green house gas reduction goals (CCST) foresee the use of Biofuels. Other public policy goals, including sustaining rural prosperity, and local and national energy security and independence are also potential consequences of the use of Biofuels. Older executive orders set targets for in-state production of biofuels that increase with time. In California, there are opportunities for feedstock production from diverse starch, sugar and oilseed crops, and in the Imperial Valley from sugarcane. If the technology for making ethanol or other liquid fuels from cellulose becomes cost effective, then

saline and other waste waters might be used for biofuel feed stock production of salt tolerant crops in California, particularly perennial grasses, making biofuel feed stocks available while helping to better manage one of the environmental effects of agriculture. Recent analyses of the potential for feedstocks in California are found in Jenkins et al., 2009, and Kaffka, 2009.

Vehicle electrification is considered an important pathway for GHG reduction from transportation in California. Some electricity for vehicle use could come from biomass. Use of biomass from diverse sources in California for power or fuel in California substitutes for the use of fossil energy sources and may reduce greenhouse gas emissions compared to current energy sources, particularly petroleum. A range of feedstocks are potentially available in California including woody biomass from forests, and biomass from MSW and other urban sources, and from farms in the form of old orchards and prunings.

If biomass is converted to fuels in California economically, local economies will benefit from jobs and other forms of investment and wealth will be retained within the state. Potential secondary benefits for the landscape include markets for residual materials from forest harvests that are currently piled and burned in place, and new markets for woody biomass derived from fuel load reduction in forested regions with an overabundance of trees and brush. Fuel load reduction preserves the ecological values of forests by preventing forest destruction by large or catastrophic wildfires with associated benefits for clean water, reductions in particulate emissions to the atmosphere, and adverse effects on public health.

Sustainable biofuel production in California will require innovation, research, and supportive public policies, including those affecting water supplies for irrigation. Since biofuels will be needed to meet future GHG reduction goals, and state policy encourages domestic production, sustainability standards, as much as possible, should be useful in encouraging such production and in rationalizing existing sets of sometimes conflicting state policies, programs and rules.

The California Biomass Collaborative has created modeling tools that simulate regional or specific farming systems across the diversity of conditions found in the state (Kaffka and Jenner, 2011). These models estimate optimum crop mixtures or rotations (cropping systems), and the prices or yields at which new crops for biomass or crop residues can be acquired by fuel producers. The model quantifies all the resources used in the cropping system, and the resources that would have been used by crops that leave the rotation. Simple crop substitution in complex

cropping systems does not occur. Changing one crop affects a number of others and overall farming system resource use. To understand the resource effects of biomass crop production, changes at the cropping system level must be accounted. These vary across the state. These modeling tools are being used to advise several different groups evaluating plans for agricultural feedstock based biofuels. This model has also been used for an initial assessment of biofuel crop adoption on wildlife populations using arable or neighboring cropping systems in the state (Stoms et al, submitted). This approach to integrated assessment should be used in LCA and related sustainability assessments, and is a minimal level needed to reasonably consider the consequences of new biofuel based production within agricultural lands in the state.

Comments on current CARB draft guidelines

For biofuel production, sustainability will be characterized by increasing resource use efficiency and adaptability, and the achievement of multiple landscape objectives, even if some efficiency is sacrificed. Agreement about other aspects of sustainability that are primarily social or value-based can only come from a continuous process that embodies principles of procedural rationality, especially stakeholder participation. The CARB Sustainability advisory committee is one such example of such a process. Some of these values and concerns are not measurable, or only in ways that are incompatible with more traditional estimations of efficiency. Different values may be incongruent. More difficult is the significant uncertainty about the future, which makes determining the right objectives for optimization uncertain and unpredictable.

CARB staff have summarized and integrated a large number of sustainability standards and presented language including principles, criteria and indicators, for wildlife and other conservation objectives, and for soil, water, and air quality protection (http://www.arb.ca.gov/fuels/lcfs/workgroups/lcfssustain/07182011draft_principles.pdf). All of these subjects have been the subject of previous meetings by the LCFS Sustainability Work Group and there is a public record including presentations and recorded comments and discussions. Some of this material, but not all, is included in the guidelines created by staff.

These guidelines are largely if not entirely qualitative and general in character. At the most inclusive level, it is easy to agree to protect important environmental attributes, but the guidelines as written do not lend themselves easily to regulations that could be adopted without

serious ambiguity or disagreement hindering their effectiveness. During the most recent work group meeting, I offered extensive commentary on individual criteria and guidelines. Only a few examples are noted here.

Principle 5 discusses soil quality and healthy biological systems. It mentions reducing field travel zones, and permanent soil cover and terracing. Soil quality was the subject of comprehensive presentation by Dr. Michael Singer from the Department of Land, Air and Water resources at UC Davis earlier in the year (http://www.arb.ca.gov/fuels/lcfs/workgroups/lcfssustain/09152010Singer.pdf). During that presentation he discussed the notion of soil quality in general and its lack of usefulness in California in particular. Similarly for the term soil health, which is difficult to define in any meaningful way. The maintenance of soil productivity over time is clearly an issue of significant concern and an element associated with sustainability. But assessing that characteristic of production systems is complicated and involves at best an integrated effort including long term applied research and simulation modeling, and observation of production trends (Kaffka, 2009). Assessing this property quantitatively is beyond the capacity of individual producers and is the responsibility of agricultural scientists.

Principle 6 discusses water quality and quantity of surface and groundwater, suggesting that it must be maintained or improved. This principle too is full of qualitative concepts that seemingly have quantitative referents, but nonetheless are fundamentally ambiguous. Dr Blaine Hanson discussed water issues in irrigated agriculture in California at an earlier meeting of the LCFS Sustainability work group, and pointed out many of these ambiguities (http://www.arb.ca.gov/fuels/lcfs/workgroups/lcfssustain/hanson.pdf). Concepts like the replenishment capacity of water tables, drought proneness in irrigated areas, unrealistic measures for users of water with respect to water quality improvement and other concepts that are difficult to define or implement are mentioned. There are many others that are similar.

Rather than creating additional semantic confusion, CARB standards for in-state production of Biofuels should as much as possible be based on concrete examples and case studies within California, and rely on existing state laws and rules to guide sustainable biomass and biofuel production in the state. Based on existing protections and well documented case studies, more effective criteria can be defined, with increasing clarity, greater effectiveness, and public acceptance over time.

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