



National Advisory Council for Environmental Policy and Technology

July 13, 2007

Administrator Stephen L. Johnson
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Strategic Framework for Biofuels Efforts

Dear Administrator Johnson:

The Environmental Protection Agency has requested that the National Advisory Council for Environmental Policy and Technology “recommend a strategic framework around which EPA might plan its work related to biofuels to ensure its contribution to expedient and environmentally sustainable development of energy supplies.” Because developments in the area of biofuels are happening so quickly, NACEPT has chosen to make its recommendations in the form of a series of advice letters to the Administrator.

In our first letter, of February 20, 2007, we recommended that EPA should (1) act promptly to make the high-level appointment to the federal interagency Biomass R&D Board, (2) develop an integrated, collaborative, multi-media biofuel strategy and create a position of Biofuels Coordinator, (3) give this EPA biofuel initiative strong, highly visible support from the top, and (4) use this initiative as a deliberate experiment and apply the lessons learned. We understand – and are appreciative – that you have considered these recommendations and have begun implementing much of them already.

In this second letter, NACEPT recommends the basis for a strategic framework for organizing EPA and interagency biofuel efforts. NACEPT has kept close to its biofuels mandate. However, the Council is mindful that the President’s ambitious “20 in 10” initiative is not likely to be met by biofuels alone, and that alternatives likely will be needed. The framework we are proposing lends itself to easy adaptation for all sources of transportation fuels, thus affording a single mechanism for comparisons of many different options.

The complexity of the biomass challenge and the combined dynamics of the existing agriculture, forestry, energy, waste management and waste-to-energy, chemical, and transportation markets pose many difficulties even for reaching consensus on how to parametrize and model the many different individual operations for making biofuels. These difficulties are compounded by the fact that people in different agencies and different offices within agencies naturally tend to view the biofuels challenge through the lens of their own particular organization charts. As a result,

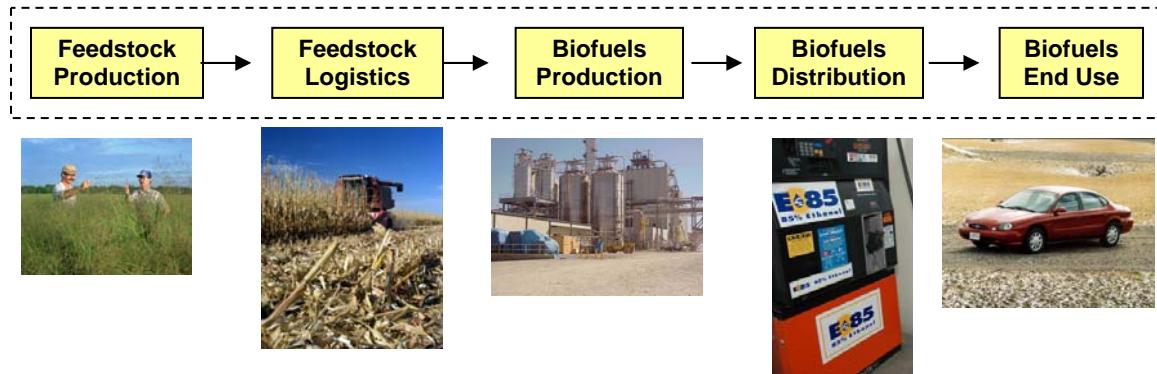
people restrict their vision of what needs to be done, talk past each other, engage in unnecessary turf battles, and miss opportunities for cooperation.

To help overcome these difficulties, NACEPT recommends that a shared high-level systems framework be adopted so that all the programs and media within EPA can envision, analyze, and take steps to assume their proper role in the overall biofuels program and to communicate in a productive way. In fact, given the myriad agencies involved in the national biofuels effort, NACEPT strongly suggests that EPA present this systems perspective to the Biomass R&D Board to facilitate interagency work and cooperation.

Fortunately, an appropriate high-level framework already exists: the operational concept of the **Biofuels Supply Chain**. This supply chain includes five major elements: 1) Feedstock Production, 2) Feedstock Logistics, 3) Biofuels Production, 4) Biofuels Distribution, and 5) Biofuels End Use. This is the way businesses and investors in the biofuels area structure their thinking. This is also the perspective researchers adopt for doing biofuels life cycle assessments (LCA) [1] and therefore has the added benefit of being consistent with well-established analytical methods designed to identify all the flows to and from the environment associated with biofuel production and use.

The biofuels supply chain is the highest-level descriptor of the overall system that needs to be created. Using this as the lens for viewing the biofuels challenge can give everyone a common organizing framework and help all parties see the “big picture” as opposed to the organizationally constrained view. It will act to keep the focus and emphasis on what needs to be done to make the system as a whole work. It will facilitate further systematic decomposition of the overall system until there a level of definition achieved that can be used to define individual pieces of work that can be planned and accomplished.

Figure 1: The Biofuels Supply Chain



Brief functional descriptions of the five elements or subsystems of the biofuels supply chain are provided in Table 1. To achieve the goal announced by the President on January 2007 of replacing 20% of gasoline consumption by 2017, all five of these supply chain systems will have to be developed to the requisite capacity. This 2017 goal and the capacities needed to meet it are now a focus of the Biomass R&D Board.

Table 1: Major Systems within the Biofuels Supply Chain

| Supply Chain Systems | Functional Descriptions |
|-----------------------|--|
| Feedstock Production | Sustainably produce supplies of regionally available herbaceous and woody biomass, including agricultural and forest residues, energy crops and waste materials. |
| Feedstock Logistics | Implement biomass feedstock infrastructure, equipment, labor force, and systems to carry out harvesting, collection, storage, pre-processing, and transportation operations. |
| Biofuels Production | Deploy cost-effective biomass-to-biofuels conversion facilities that meet all safety and environmental regulations to produce biofuels that meet quality standards. |
| Biofuels Distribution | Implement biofuels distribution infrastructure to carry out storage, blending, transportation, and dispensing operations. |
| Biofuels End Use | Deploy publicly available biofuels and biofuels-compatible vehicles with same performance as vehicles operating on conventional petroleum-based fuels. |

Because of the wide diversity of potential biomass feedstocks, conversion technologies, biofuels products and co-products (See Table 2), and the postulated size of the biofuels industry, feedstock resources and conversion technologies will be combined in a multitude of specific biofuels supply chain configurations. Viable biofuels supply options will become clearer as increasing levels of detail evolve about feedstocks (and competing uses for these, such as food, feed and fiber), technologies and profitable co-products are developed and the industry evolves. Using the biofuels supply chain as a strategic framework makes it possible to array these complex options in an easily understandable way and accommodate the rapidly expanding knowledge base.

Table 2: Examples of the Feedstock and Technology Options

| Feedstock Production | | Feedstock Logistics | Biofuels & Co-Product Production | Biofuels Distribution | Biofuels End Use |
|------------------------------|------------------------|----------------------------------|---------------------------------------|-----------------------|----------------------|
| <u>Agricultural Crops</u> | <u>Forest Residues</u> | <u>Harvesting and Collection</u> | <u>Fuel Types</u> | <u>Transportation</u> | -Light Duty Vehicles |
| -Corn | -Logging | -Single-pass | -Ethanol | -Truck | -Light Duty Trucks |
| -Sorghum | -Residues | -Multi-pass | -Biobutanol | -Rail | -Heavy Duty Trucks |
| -Barley | -Forest | -Baled | -Mixed Alcohols | -Barge | -Off Road Vehicles |
| -Oats | -Thinnings | -Bulk | -Biodiesel | -Pipeline | -Locomotives |
| -Wheat | -Fuel | | -Green Diesel | | -Airplanes |
| -Soybeans | Treatments | | -Renewable Diesel | | -Jets |
| -Canola | -Hog Fuel | <u>Storage</u> | -FT Diesel | | -Boats |
| -Rice | -Sawdust | -Dry storage | -FT Gasoline | | -Ferries |
| -Alfalfa | -Paper Sludge | -Wet storage | -Dimethyl Ether | | -Ships |
| -Other Crops | -Black Liquor | -Baled | -Synthesis Gas | | -Handheld Power |
| | <u>Wastes</u> | -Bulk | -Hydrogen | | Equipment |
| <u>Agricultural Residues</u> | -Manure | -Landfills | | | -Generators |
| -Corn Stover | -Fats & Greases | (MSW) | | | -HVAC Units, |
| -Wheat Straw | -MSW | -Floating storage | | | -Etc. |
| -Barley Straw | -Urban Wood | <u>Preprocessing</u> | <u>Biochemical Conversion Ops.</u> | | |
| -Rice Straw | Waste | -Shredding | -Acid Hydrolysis | | |
| -Cotton Lint | -Food | -Pelletizing | -Pretreatment & Enzymatic Hydrolysis | | |
| | Processing | -Briquetting | -Fermentation | | |
| <u>Energy Crops</u> | | -Ensiling | | | |
| -Switchgrass | | -Drying | <u>Thermochemical Conversion Ops.</u> | | |
| -Energy Cane | | -Separation | -Gasification | | |
| -Sweet Sorghum | | | -Pyrolysis | | |
| -Hybrid Poplar | | <u>Transportation</u> | -Hydrothermal Depolymerization | | |
| -Willow | | -Truck | -Fuel Synthesis | | |
| -Other | | -Rail | -Combustion | | |
| Coppicing Trees | | -Barge | | | |
| | | -River/Stream | <u>Anaerobic Digestion</u> | | |
| | | Floating | -Aqueous | | |
| | | | -Dry | | |

The two tables below show how the biofuels supply chain can be used within EPA as a strategic framework for thinking through what EPA is already doing in this area, what else needs to be accomplished, and where within EPA work needs to be done. Table 3 is a framework for EPA regulatory roles and Table 4 for environmental stewardship support roles. (*NACEPT points out that there is no implication that EPA has the legal authority or should be involved in every area. However, each area should be considered to assure that a comprehensive approach is taken to sustainable biofuel production.*)

NACEPT recommends that Tables 3 and 4 be used to structure a comprehensive survey within EPA to determine current or projected future roles in biofuels within the regions, the research organizations and headquarters. The survey should be filled out by heads of all offices within the Agency or people designated by them.

Every person completing the survey should complete the whole form, not just the part of it dealing with their own office. For every task respondents identify, they should specify whether EPA has a sole leading role, a collaborative leading role, or an assisting role to others within the federal family. Respondents should address all of EPA's basic areas of work including:

- Science and technology development in order to assess and mitigate environmental impacts;
- Policy and regulation development to optimize environmental protection and enhancement while minimizing bureaucratic obstacles;
- Regional implementation and oversight of state regulations and enforcement, as appropriate;
- Acceleration of environmental permitting where consistent with environmental protection and enhancement;
- Voluntary program initiatives; and
- Public outreach and communication to states, tribes, industry, other government entities, and the public.

The results of this survey can provide the basis for a comprehensive, strategic biofuels program at EPA which will be well integrated internally and form an essential part of the national effort for a sustainable biofuels program.

Table 3. EPA Regulatory Roles in the Biofuels Supply Chain

(SL= Sole Leading Role, CL=Collaborative Leading Role, AO=Assisting Role to Others)

| EPA Functions and Roles | | Biofuels Supply Chain Elements | | | | |
|--|-------------------------------|--------------------------------|---------------------|---------------------|-----------------------|------------------|
| Basic Functions | Technical Areas | Feedstock Production | Feedstock Logistics | Biofuels Production | Biofuels Distribution | Biofuels End Use |
| Develop Environmental Policies and Regulations | Air | | | | | |
| | Water | | | | | |
| | - Quality | | | | | |
| | - Quantity | | | | | |
| | Solid Waste | | | | | |
| | Pesticides & Toxics | | | | | |
| | Use of Land | | | | | |
| | Energy | | | | | |
| | Policy Decision Tools | | | | | |
| | | | | | | |
| Federal Implementation and Oversight of State Implementation | Air | | | | | |
| | Water | | | | | |
| | - Quality | | | | | |
| | - Quantity | | | | | |
| | Solid Waste | | | | | |
| | Pesticides & Toxics | | | | | |
| | Land and Soil Quality | | | | | |
| | Energy | | | | | |
| | Implementation Decision Tools | | | | | |
| | | | | | | |
| Develop S&T to Assess and Mitigate Environmental Impacts | Air | | | | | |
| | Water | | | | | |
| | - Quality | | | | | |
| | - Quantity | | | | | |
| | Solid Waste | | | | | |
| | Pesticides & Toxics | | | | | |
| | Land and Soil Quality | | | | | |
| | Energy | | | | | |
| | Sustainability | | | | | |
| | S&T Decision Tools | | | | | |

Table 4: EPA Environmental Stewardship Support Roles in the Biofuels Supply Chain

(SL= Sole Leading Role, CL=Collaborative Leading Role, AO=Assisting Role to Others)

| EPA Functions and Areas | | Biofuels Supply Chain Elements | | | | |
|---|-------------------------------------|--------------------------------|---------------------|---------------------|-----------------------|------------------|
| Basic Functions | Technical Areas | Feedstock Production | Feedstock Logistics | Biofuels Production | Biofuels Distribution | Biofuels End Use |
| Develop Voluntary Program Initiatives | Air | | | | | |
| | Water | | | | | |
| | - Quality | | | | | |
| | - Quantity | | | | | |
| | Solid Waste | | | | | |
| | Pesticides & Toxics | | | | | |
| | Land and Soil Quality | | | | | |
| | Sustainability | | | | | |
| | Energy | | | | | |
| | Voluntary Program Tools | | | | | |
| Communication to the Public | Air | | | | | |
| | Water | | | | | |
| | - Quality | | | | | |
| | - Quantity | | | | | |
| | Solid Waste | | | | | |
| | Pesticides & Toxics | | | | | |
| | Land and Soil Quality | | | | | |
| | Sustainability | | | | | |
| | Energy | | | | | |
| | Communication Tools | | | | | |
| Develop S&T to Assess and Improve Environmental Stewardship | Air | | | | | |
| | Water | | | | | |
| | - Quality | | | | | |
| | - Quantity | | | | | |
| | Solid Waste | | | | | |
| | Pesticides & Toxics | | | | | |
| | Land and Soil Quality | | | | | |
| | Sustainability | | | | | |
| | Energy | | | | | |
| | S&T Environmental Stewardship Tools | | | | | |

In summary, NACEPT recommends that you and others you designate take the following actions:

- 1. Formally adopt the Biofuels Supply Chain as a strategic framework for biofuels-related work across the Agency.**
- 2. Present the Biofuels Supply Chain to the intergovernmental Biomass R&D Board as a framework for embracing a full systems approach and helping to clarify roles and priorities among the various Departments and Agencies.**
- 3. Prepare a questionnaire, based on the content of Tables 3 and 4, and send it from you to all Agency Assistant Administrators and Regional Administrators with a request that they complete and return it by a specified deadline; arrange for the results to be collated and used to further the development of a comprehensive strategic biofuels plan and program within the Agency.**

On behalf of NACEPT, we appreciate the opportunity to offer our comments and hope they are helpful. Please let us know if you or others would like to meet to discuss these recommendations at any time.

Sincerely,

John L. Howard, Jr.
Chair

cc: Frank Stewart, Working Group Co-Chair
Bob Olson, Working Group Co-Chair
Marcus Peacock, Deputy Administrator
Charles Ingebretson, Chief of Staff
Ray Spears, Deputy Chief of Staff
George Gray, Assistant Administrator, Office of Research and Development
Robert Meyers, Acting Assistant Administrator, Office of Air and Radiation
John Askew, Region 7 Administrator
Rafael DeLeon, Director, Office of Cooperative Environmental Management
Sonia Altieri, NACEPT Designated Federal Officer

References:

[1] The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model,
<http://www.transportation.anl.gov/software/GREET/>.