Energy Technical Panel

Facilitated Session Results

October 22, 2008

Energy: Future Characteristics/Vision

- What the Future Holds
  - Transportation biofuels are derived from sustainable, domestically produced feedstocks to provide economic and energy security, and reduced environmental impacts
  - Robust national infrastructure to promote expanded use of biofuels
  - Long-term public commitment to biofuels that transcends economics as the sole driver of its development and deployment
  - Integrated biorefineries which biochemically and thermochemically utilize a variety of feedstock to produce a variety of products.

Energy: Highlights of Broad Challenges and Barriers

- Broad Challenges to Reaching our Vision
  - Political Leadership
    - Long-term public commitment to biofuels
    - Long-term research and development funding
  - Public Acceptance
    - Public awareness of key issues based on strong science
  - Infrastructure
    - Infrastructure for the distribution, storage, and transmission of future biofuels, adapting fleets, and enabling regulation and standards

Energy: Highlights of Broad Challenges and Barriers

- Broad Challenges to Reaching our Vision (cont…)
  - Economics
    - Price-enabled products for demand to trigger and sustain research, deployment, test, and evaluation, and ultimately production
  - Methods and Standards
    - Robust life-cycle analysis methodology covering sustainability of feedstocks
  - Technical
    - Improved conversion methods, catalysis, syngas utilization, and genetically engineered crops
    - Optimized and integrated biorefining

Energy: What We Need to Measure and Why

- Process Monitoring
  - On-line chemical composition measurements of process streams to improve quality control, higher yield, efficiency, and profit
- Evolving Thermochemical and Physical Properties
  - Measuring fundamental thermochemical properties- heat of combustion, vapor pressure, vapor-liquid equilibrium, viscosity, etc to provide rational design and optimization
- Finished Fuel Properties
  - Inexpensive and accurate measurements which work in the field to ensure the quality of biofuels at the customer level
- Compliance Measurements
  - Consensus sustainability, land-use, and greenhouse gas methods and standards for comparisons of various fuels

Energy: Selected Priority Measurement & Standards Barriers

- Analytical Measurements
  - Faster, simpler, less expensive field techniques to measure product characteristics
  - Standard reference materials for various forms of biomass
  - Understanding measurement needs of future biofuels (e.g. biodiesel, renewable diesel, and third generation fuels)
- Thermochemical, Physical, and Biological properties
  - Understanding of the molecular events associated with the breakdown of cellulosic materials
  - Comprehensive databases of properties of biochemical substances

Energy: Selected Priority Measurement & Standards Barriers

- Documentary Standards
  - Standards based on performance measurements, irrespective of feedstock
  - Consensus metrics for GHGs, landuse, and sustainability
  - Definition of sustainability in biofuel production
- Harmonization
  - Certified reference materials to ensure accuracy of chemical measurements through international collaboration
  - Development of the pervasive infrastructure for measurements and association techniques (e.g. accredited laboratories and certification schemes)

Energy: Approaches to Selected Priority Measurement & Standards Barriers

- Standard Reference Data for Bioenergy Technologies
  - Objectives: Produce comprehensive and reliable tables of property data
  - Rationale: Process design, optimization, and policy
  - Impacts: Highly important to innovation, competitiveness, society, and energy security
- Consensus Metrics for GHG, Landuse, and Sustainability
  - Objectives: An objective and measurable approach to sustainability
  - Rationale: Allows for marketplace acceptance, business and development planning, land management decisions, and public policy development
  - Impacts: Provides societal benefits and important for environmental protection. The impact on innovation, competitiveness, and energy security is time dependent and relative to which organizations embrace the guidelines.

Energy: Approaches to Selected Priority Measurement & Standards Barriers (cont…)

- (Certified) Reference Materials for Bioenergy Technology
  - Objectives: Acceptance and comparability of measurement results
  - Rationale: Provides customer basis for acceptance, a legal basis for commerce, quality assurance, and fitness for the intended use
  - Impacts: Socially beneficial, enhances competition, and accelerates innovation
- The Breakdown of Cellulosic Materials
  - Objectives: Better understanding of the various mechanisms and interactions of enzymes with lignocellulose leading to more efficient breakdown of lignocellulose to sugar.
  - Rationale: Make the process more cost effective, faster processes, potentially increase yield, and enhance production of biofuels from cellulosic materials
  - Impacts: Accelerates innovation, supports environmental protection, and enhances energy security.

Energy: Approaches to Selected Priority Measurement & Standards Barriers (cont…)

- Accurate, Quick, Affordable, Retail Inspection Test Kit
  - Objectives: Development of screening device, providing results within minutes that would test for compliance with finished fuel standards
  - Rationale: Timeliness of inspection is important for compliance, and overcoming this barrier is important for consumer protection and economics
  - Impacts: Economic, compliance, fair competition, consumer protection, safety, reduce dependence on foreign fuel, consumer pricing, quality product
- Standards Based on Performance Measurements Irrespective of Feedstock
  - Need ultimately for end-use consumers
  - Input is required from engine manufacturers to determine the parameters of the fuel