4th International Conference on Biofuels Standards: Current Issues, Future Trends

November 13 - 15, 2012 ♦ Gaithersburg, MD

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

4th International Conference on Biofuels Standards: Current Issues, Future Trends

November 13 – 15, 2012

National Institute of Standards and Technology
Gaithersburg, Maryland, USA

Welcome

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WELCOME

TO THE

4th International Conference on Biofuels Standards: Current Issues, Future Trends

Organized by

Brazil's National Institute of Metrology, Quality and Technology (INMETRO)
European Commission – Directorate-General for Energy (DG-ENER)
U.S. National Institute of Standards and Technology (NIST)

This international Conference is being held as one of the series of meetings organized to provide a forum for discussion of measurements and standards needed to facilitate the transition of sustainable biofuels to global commodities. The first meeting in the series was a Workshop held in Rio de Janeiro (2006); this meeting set the stage for a series of international conferences held in Brussels (2007, 2009) and in Amsterdam (2010). There was also a Symposium held in Washington, DC (2007) which established the Tripartite Teams of international experts to address harmonization issues for biofuel standards, which was successfully completed in 2008. This Conference is the fourth in the series that brings together key stakeholders from around the world, and provides a venue for open discussion and information exchange on issues of mutual interest as they relate to biofuels.

Welcome

Biofuels are finding expanded utilization in ground transportation systems, and more recently in aviation systems. Biofuels are being produced from different feedstocks, using a wide range of processes. Documentary and measurement standards, and reference data on thermophysical and thermochemical properties of biofuels, play a critical role in assuring consistency and quality of biofuels produced using different processes and feedstocks. Brazil, EU and the US are the three largest producers of biofuels; other countries where biofuel production and utilization is increasing are also expected to participate in this Conference.

The Conference will provide an overview of the state-of-the-art on biofuels used in surface transportation, such as bioethanol, biodiesel, other biofuels and algal biofuels; it will also provide an overview of the more recent developments in utilization of biofuels in aviation, and specific issues and requirements for biofuels that are utilized in commercial and military applications. Documentary and measurement standards needed to facilitate trade and applications in new areas will be identified. Requirements that result from new regulations and applications in different parts of the globe will be discussed. Utilization of biofuels in developing economies will be reviewed, implications for sustainability will be discussed, and future trends that may lead to the need for new biofuels standards will be identified.

Humberto Brandi
INMETRO
Co-Chair

Hratch Semerjian
NIST
Chair

Kyriakos Maniatis
DG-ENER
Co-Chair

National Institute of Metrology, Quality and Technology (INMETRO)

Welcome

INMETRO was created by law in December 1973, and its mission is to provide confidence to Brazilian society in measurements and products, through metrology and conformity assessment, promoting harmonization of trade relations, innovation and the country's competitiveness. Some of the duties of INMETRO are:

- to implement the national policies on metrology and quality set by Conmetro - the National Metrology, Standardization and Industrial Quality Council;
- to maintain the national measurement standards in the country; to establish and maintain their metrological traceability to the units of the International System of Units (SI), by participating in international or regional comparisons establishing their equivalence to internationally accepted standards and or to standards of other countries; to extend the traceability chain to the standards of measurement in the country, turning them internally harmonic and compatible with the international level, envisaging its worldwide acceptance, all of them necessary to assure the quality of goods and services;
- to execute the legal metrology activities within the country, mainly the mandatory control of measuring instruments through verification. Development of conformity assessment programs, in the areas of products, processes, services and personnel, mandatory or voluntary, which involve the approval of regulations;
- to plan and carry out the activities of accreditation of calibration and testing labs, of proficiency test suppliers, of certification bodies, of inspection, drilling and others, all of which are necessary for the development of the infrastructure of technological services in the country;
- to manage the Focal Point for Technical Barriers to Trade, responsible for the Brazilian WTO/TBT Enquiry Point, for providing Brazilian exporters with information on technical requirements, as well as supporting the Brazilian government in all international negotiations on technical barriers to trade;
- to harbor the use of the management technique of quality by the Brazilian enterprises;
- to foster the presence of Brazil in the international activities related to metrology and quality, plus promoting the interchange with international bodies.

INMETRO has been acting as one key element in all recent industrial and technologic policies from the Brazilian government. It employs about 1,800 scientists, engineers, technicians, and support and administrative personnel. It is responsible for a legal metrology network with 4.200 employees in all states of Brazil. INMETRO maintains a strong collaboration with partners from academia, industry, and other government agencies. In December 2011, a modernization process of the Institute's framework has been initiated, and the Institute is now also responsible for: (i) increasing its participation in the control and surveillance of imports; (ii) increasing its scope of certification; (iii) implementing the "Network of laboratories for Innovation and Competitiveness" and has acquired a larger agility concerning partnership and hiring.

www.inmetro.gov.br

Welcome

European Commission Directorate-General for Energy

Under the political guidance of Commissioner Günther H. Oettinger, the Directorate-General for Energy is responsible for developing and implementing a **European energy policy**. Through the development and implementation of innovative policies, the Directorate-General aims at:

- Contributing to setting up an energy market providing citizens and business with affordable energy, competitive prices and technologically advanced energy services.
- Promoting sustainable energy production, transport and consumption in line with the EU 2020 targets and with a view to the 2050 decarbonisation objective.
- Enhancing the conditions for secure energy supply in a spirit of solidarity between Member States.

In developing a European energy policy, the Directorate-General aims to support the Europe 2020 programme which, for energy, is captured in the Energy 2020 strategy.

The Directorate-General carries out its tasks in many different ways. For example, it develops strategic analyses and policies for the energy sector; promotes the completion of the internal energy market encompassing electricity, gas, oil and oil products, solid fuels and nuclear energy; supports the reinforcement of energy infrastructure, ensures that indigenous energy sources are exploited in safe and competitive conditions; ensures that markets can deliver agreed objectives, notably in efficiency and renewable energies; promotes and conducts an EU external energy policy; facilitates energy technology innovation; develops the most advanced legal framework for nuclear energy, covering safety, security and non-proliferation safeguards; monitors the implementation of existing EU law and makes new legislative proposals; encourages the exchange of best practices and provides information to stakeholders.

All this work is aided by expert input from the Executive Agency for Competitiveness and Innovation (EACI), the Euratom Supply Agency (ESA) and the Agency for the Cooperation of Energy Regulators (ACER, operational from March 2011).

ec.europa.eu/dgs/energy

National Institute of Standards and Technology

Welcome

From the smart electric power grid and electronic health records to atomic clocks, advanced nanomaterials, and computer chips, innumerable products and services rely in some way on technology, measurement, and standards provided by the National Institute of Standards and Technology.

Founded in 1901, NIST is a non-regulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. NIST has a century-long tradition of partnering with business and universities, and its main programs support the nation's vast innovation ecosystem:

- the NIST Laboratories, conducting world-class research, often in close collaboration with industry, that advances the nation's technology infrastructure and helps U.S. companies continually improve products and services;
- the Hollings Manufacturing Extension Partnership, a nationwide network of local centers offering technical and business assistance to smaller manufacturers to help them create and retain jobs, increase profits, and save time and money; and
- the Baldrige Performance Excellence Program, which promotes performance excellence among U.S. manufacturers, service companies, educational institutions, health care providers, and nonprofit organizations; conducts outreach programs; and manages the annual Malcolm Baldrige National Quality Award which recognizes performance excellence and quality achievement;
- From 2007 to 2011, NIST provided cost-shared grants through the Technology Innovation Program, and between 1990 and 2007, it managed the Advanced Technology Program.

NIST employs about 2,900 scientists, engineers, technicians, and support and administrative personnel. Also, NIST hosts about 2,600 associates and facility users from academia, industry, and other government agencies. In addition, NIST partners with 1,300 manufacturing specialists and staff at about 350 MEP service locations around the country.

NIST works to extend the limits of today's state-of-the-art measurement and prediction capabilities, setting the stage for the next generation of transformational technologies. In so doing, its scientists have garnered four Nobel Prizes in Physics since 1997 as well other prestigious honors, including National Medals of Science and Technology, and a MacArthur Genius Award.

Whether the job is developing a new, nanotech-based material, creating a secure and reliable computing network, or managing the power grid, NIST is what U.S. industry depends upon for the essential tools and resources it needs to innovate, compete, and thrive in a high-tech, interconnected world. NIST's measurement research, products, and services enable scientific discovery and global competitiveness. NIST test methods, measurement tools, and scientific data are embedded in technologies, products, and services that are produced or used in every sector of the economy. NIST has identified priority areas that tightly align its measurement research, services, and standards-related activities to help solve major national challenges in the areas of manufacturing, information technology and cybersecurity, energy, healthcare, environment and consumer safety, and physical infrastructure.

Welcome

4th International Conference on Biofuels Standards: Current Issues, Future Trends

Organizing Committee

Rosângela Moreira De Araújo
General Manager of Biofuels and Product Quality
ANP- Agência Nacional do Petróleo, Gás Natural e Biocombustíveis
Av. Rio Branco, 65 17° andar
20090-004 - Rio de Janeiro / RJ Brazil
Tel: +55 (21) 2112 8640
E-mail: Rmoreira@anp.gov.br

Ellyn S. Beary
National institute of Standards and Technology
MS 6300
Gaithersburg, MD, USA 20899-6300
Tel: +1 (301) 926-6164
E-mail: esbeary@yahoo.com

Humberto S. Brandi
Diretor de Metrologia Científica e Industrial
INMETRO
Av. N. S. das Graças 50
Xerém - Duque de Caxias - RJ
25.250-020 Brazil
Tel: +55 (21) 2679 9011/9787
E-mail: hsbrandi@inmetro.gov.br

Chuck Corr
Manager, Biofuels Technical Service
Archer Daniels Midland Company
1251 Beaver Channel Parkway
Clinton, Iowa, USA 52732
Tel: +1 (563) 244-5208
E-mail: corr@adm.com

Ortwin Costenoble
Senior Standardization Consultant
NEN Energy Resources
Vlinderweg 6, NL-2623 AX Delft
P.O. Box 5059, NL-2600 GB Delft
Tel: +31 (0) 15 2 690 326
E-mail: Ortwin.Costenoble@nen.nl

Romeu Daroda
INMETRO
Av. N. S. das Graças 50
Xerém - Duque de Caxias - RJ
25.250-020 Brazil
Tel:
E-mail: rjdaroda@inmetro.gov.br

Daniel G. Friend
Chief, Thermophysical Properties Division
Material Measurement Laboratory
National Institute of Standards and Technology
MS 6380
Boulder, CO, USA
Tel: +1 (303) 497-5424
E-mail: dfriend@boulder.nist.gov

Prasad Gupte
Office of Energy Efficiency and Renewable Energy, EE-2E
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
Tel: +1 (202) 586-8943
E-mail: Prasad.Gupte@ee.doe.gov

Zia Haq
Senior Analyst
Office of Energy Efficiency and Renewable Energy, EE-2E
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
Tel: +1 (202) 586-2869
E-mail: zia.haq@ee.doe.gov

Steve Howell
President
MARC-IV Consulting, Inc.
101 E Main Street, Suite 2
Kearney, Missouri, USA 64060
Tel: +1 (816) 903-6272
Email: showell@marciv.com

Emerson Coraiola Kloss
Division Head, New and Renewable Energy Resources
Ministry of Foreign Affairs of Brazil
Palácio Itamaraty, Anexo I, suite 721,
Brasilia-DF 70170-900
Tel: +55 (61) 2030-8610
emerson.kloss@itamaraty.gov.br

Kyriakos Maniatis
Principal Administrator
Directorate C - Renewables, Research & Innovation, Energy Efficiency
Directorate-General for Energy
European Commission
Mail: Rue de la Loi 200, 1049 Brussels , Belgium
Office: Rue Demot 24, 1040 Brussels , Belgium
Tel: +32 (2) 299 0293
E-mail:Kyriakos.Maniatis@ec.europa.eu

Dianne Poster
National Institute of Standards and Technology
Special Assistant to the Associate Director for Laboratory Programs
Office of the Director
100 Bureau Drive, MS 6000
Gaithersburg, MD, USA
USA 20899-6000
Tel: 301-975-8941
Email: dianne.poster@nist.gov

Anders Röj
Volvo Technology Corporation
Fuels and Lubricants
Dept 06150, M1:5
40508 Gothenburg, Sweden
Tel: +46 (31) 66 69 18
E-mail: anders.roj@volvo.com

Mark Rumizen
Aviation Fuels Specialist, ANE-110
Federal Aviation Administration
12 New England Executive Park
Burlington, MA, USA 01803
Tel: +1 (781) 238-7113
E-mail: mark.rumizen@faa.gov

Hratch G. Semerjian
NIST Chief Scientist Emeritus
National Institute of Standards and Technology
MS 6300
Gaithersburg, MD, USA 20899-6300
Tel: +1 (301) 975-8110
E-mail: hratch.semerjian@gmail.com

Eugenio De Simone
ABNT-Associação Brasileira de Normas Técnicas
Brazil
E-mail: Eugenio@abnt.org.br

Klaus-Dieter Sommer
Physikalisch-Technische Bundesanstalt
Head of Division 3 "Chemical Physics and Explosion Protection"
Bundesallee 100
D-38116 Braunschweig, Germany
Tel: +49 531 592-3010
E-mail: klaus-dieter.sommer@ptb.de

Natasha K. Vidangos
Energy & Biofuels Officer
Bureau of Energy Resources
Office of Energy Transformation
U.S. Department of State
Rm 4843, 2201 C Street NW
Washington, DC, USA 20520
Tel: +1 (202) 647-9002
E-mail: VidangosNK@state.gov

Welcome

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4th International Conference on Biofuels Standards: Current Issues, Future Trends

Agenda

November 13 - 15, 2012 ♦ Gaithersburg, MD

NIST
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4th International Conference on Biofuels Standards:
Current Issues, Future Trends
NIST Campus, Gaithersburg, Maryland, USA

Day 1: November 13, 2012

7:30 -8:30 am	**Continental Breakfast**	
Chair: Hratch Semerjian		
8:30 – 10:00 am **1.1 Opening Plenary Session** **Green Auditorium**	8:30 am	**Welcome:** *Hratch Semerjian* *NIST Chief Scientist Emeritus*
	8:35 am	**Opening Remarks:** *Willie May* *NIST Associate Director for Laboratory Programs*
	Conference Perspectives	
	8:45 am	**Brazilian Perspectives on Biofuels** *Emerson Kloss, Brazilian Ministry of Foreign Affairs*
	9:00 am	**European Perspectives on Biofuels** *Günter Hörmandinger, EU Delegation to the US*
	9:15 am	**US Perspectives on Biofuels** *Gary Guzy, White House Council on Environmental Quality*
	9:30 am	**Overview of USDA Biomass Programs and Activities** *Harry Baumes, U.S. Department of Agriculture*
	9:50am	**A Review of DOE Biofuels Program** *Zia Haq, U.S. Department of Energy*
	10:15 am	***Q&A Session***
10:30 – 10:45 am		**Break (Coffee Available)**

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Chair: Humberto Brandi

10:45 am – 12:30 **1.2 Morning Plenary Session** **Green Auditorium**	10:45 am	**Current Trends in the Sustainable Production and Use of Bioenergy in Brazil** *Emerson Kloss, Brazilian Ministry of Foreign Affairs*
	11:05 am	**Automotive Perspective on Biofuels: Quality and Standards** *Anders Röj, Volvo GTT, Sweden*
	11:25 am	**Sugar: The New Crude** *Delane Richardson, Chemtex, Italy*
	11:45 am	**From R&D to the first commercialization plant: Abengoa Bioenergy's experience in 2nd generation bioethanol and its strategy towards the bioeconomy** *Ricardo Arjona, Abengoa Bioenergy, Spain*
	12:00 am	**Fuels that Enable More Efficient Engines** *Robert McCormick, National Renewable Energy Laboratory, U.S. Department of Energy*
	12:20 pm	***Q&A Session***
12:30 – 1:30 pm	Lunch (on-site)	

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Chair: Lyn Beary

1:30 -3:15 pm	Session 1.3A	***Bioethanol***
1.3 Concurrent Afternoon Sessions	1:30 pm	**NRC Study on the Economic and Environmental Impact of RFS** *Jason Hill, University of Minnesota*
Session A Green Auditorium	1:50 pm	**U.S. Ethanol: Today and Tomorrow** *Geoff Cooper , Renewable Fuel Association*
	2:10 pm	**Biofuels Market in the EU** *Gloria Gaupmann, European Renewable Ethanol Assoc.*
	2:30 pm	**Brazilian Experience in Ethanol Fuel: Quality Aspects and Distribution Logistics** *Juliana Belincanta, Petrobras, Brazil*
	2:50 pm	**Water and Corrosion Issues in Ethanol Blends** *Hans Keuken, Process Design Center, The Netherlands*
		Q&A Session
3:15 – 3:45 pm	**Break and Move to Afternoon Plenary (Coffee Available)**	

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Chair: Dan Friend

1:30 -3:15 pm	Session 1.3B	***Biodiesel***
1.3 Concurrent Afternoon Sessions	1:30 pm	**ASTM Biodiesel Standards – Current Status, Recent Progress and Future Activities** *Richard Nelson, National Biodiesel Board*
Session B Lecture Room D	1:55 pm	**Challenges and Perspectives on Biodiesel Standardisation, European Biodiesel Industry Commitment to a Harmonised Market** *Dermot Buttle, European Biodiesel Board*
	2:20 pm	**Density-Temperature and Density-Pressure Relationships for Ethanol and FAME** *Tom Feuerhelm . DIN-FAM, Germany*
	2:40 pm	**Inevitable Changes in Measurements: Redefining What We Mean by "Fit-For-Purpose"** *Tom Bruno, NIST, USA* ***Q&A Session***
3:15 – 3:45 pm	**Break and Move to Afternoon Plenary (Coffee Available)**	

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Chair: Ortwin Costenoble		
3:45 – 5:30 pm **1.4 Afternoon Plenary:** **Measurements & Standards** **Green Auditorium**	3:45 pm	**Development of CRMs for Biofuels** *Valnei Cuhna, INMETRO, Brazil*
	4:05 pm	**European Joint Research Project on Biofuels** *Paola Fisicaro, Laboratoire National de Métrologie et d'Essais, France*
	4:25 pm	**Influence of the Increasing Renewable Energy Production on Instrumentation and Metrology for Oil and Gas** *Peter Ulbig, PTB, Germany*
	4:45 pm	**Exploration of New Cellulosic Microorganisms for 2nd Generation Bioethanol** *Wanderley de Souza, INMETRO, Brazil*
	5:05 pm	**Standards Development Related to Fuel Use of Fast Pyrolysis Bio-Oil** *Fernando Preto, IEA Bioenergy Task 34* ***Q&A Session***
Chair: Chuck Corr		
5:30 pm – 6:15 pm **1.5 Afternoon Panel:** **Sustainability** **Green Auditorium**	***Panelists:*** *Claudio Guerreiro, ABNT, ISO TC 248* *Ortwin Costenoble, NEN, CEN/TC 383* *Keith Kline, Oak Ridge National Laboratory* *Leticia Phillips, UNICA* *Richard Nelson, Kansas State University* *Emerson Kloss, GBEP Rep. Brazil* *Barbara Esker, NASA, USA*	
6:15 – 6:30 pm	**Wrap Up**	
Adjourn	**Bus to Hotel**	

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Day 2: November 14, 2012

7:30 -8:30 am	**Continental Breakfast**	
Chair: Hratch Semerjian		
8:30 – 10:15 am **2.1 Morning Plenary Session:** **Aviation Biofuels Perspectives** **Green Auditorium**	8:30 am	**Welcome:** *Hratch Semerjian, NIST Chief Scientist Emeritus*
	8:35 am	**Keynote: Innovation, Partnership, and Flexibility: BioFuels and the Air Force** *Kevin Geiss, U.S. Air Force Deputy Assistant Secretary*
	9:05 am	**CAAFI and Other Initiatives** *Mark Rumizen, U.S. Federal Aviation Administration*
	9:35 am	**Sustainable Aviation Biofuels in Brazil – SABB Project** *Francisco Emilio Baccaro Nigro, Secretariat of Economic Dev., Sci. & Tech. of Sao Paulo, Brazil*
	10:00 am	***Q&A Session***
10:15 – 10:45 am	**Break and Move to Concurrent Sessions (Coffee Available)**	

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Chair: Mark Rumizen

10:45 – 1:00 pm **Concurrent Morning Sessions** **Session A Green Auditorium**	Session 2.2A	***Aviation – Commercial Approval Process***
	10:45 am	**Alternative Jet Fuel Approval** *Mark Rumizen, U.S. Federal Aviation Administration*
	11:00 am	**ASTM D4054 Qualification and Approval of New Aviation Turbine Fuels and Fuel Additives** *Tedd Biddle, Pratt &Whitney, USA*
	11:20 am	**ASTM Emerging Fuels Subcommittee Activities** *George Wilson, III, Southwest Research Institute, USA*
	11:40 am	**Fit-for-Purpose Properties** *Tim Edwards, USAF, USA*
		Aviation – Government and Military Support
	12:00 noon	**NASA Research on Biofuels** *Dan Bulzan, NASA, USA*
	12:20 pm	**USAF Testing and Certification** *Tim Edwards, USAF, USA*
		Q&A Session
1:00 – 2:00 pm	**Lunch (on-site)**	

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Chair: Dianne Poster

10:45 – 1:00 pm	Session 2.2B	***Other Biofuels***
Concurrent Morning Sessions	10:45 am	**The BioDME Project** *Anders Röj, Volvo GTT, Sweden*
	11:05 am	**Challenges to Accurate Physical and Chemical Measurements in Biomass Processing** *Robert Hebner, University of Texas at Austin, USA*
Session B Lecture Room D	11:25 am	**Biofuel Production via Nano-Emulsion and Polarization Technology** *Zurina Amnan, BIONAS, Malaysia*
	11:45 am	**A Review of Alternative Biofuel Technologies** *Paul Bryan, Consultant, USA*
	12:05 pm	***Q&A Session***
1:00 – 2:00 pm	**Lunch (on-site)**	

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Chair: Nathan Brown

2:00 – 4:00 pm **2.3 Concurrent Afternoon Sessions** **Session A Green Auditorium**	Session 2.3A	***Aviation – User Perspectives***
	2:00 pm	**Airlines' Requirements** *Steve Barker, A4A, USA*
	2:20 pm	**Aircraft Manufacturer's Perspective** *Jim Kinder, Boeing, USA*
	2:40 pm	**Aircraft Manufacturer's Perspective** *Ross Walker, Airbus, EU*
	3:00 pm	**Synthetic Aviation Fuels – Gas Turbine Manufacturer's Concerns** *Stan Seto, Belcan Engineering Group, USA*
	3:20 pm	**Lufthansa Biokerosene Flight Evaluation Results** *Alexander Zschocke, Lufthansa, Germany*
	3:40 pm	***Q&A Session***
4:00 -4:15pm		**Break (Coffee Available)**

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Chair: Humberto Brandi

2:00 – 4:00 pm	Session 2.3B	***Measurements & Standards***
2.3 Concurrent Afternoon Sessions	2:00 pm	**Measurement and Modelling of Alternative and Renewable Turbine Fuels: Application of the ADC Method** *Tom Bruno, NIST, USA*
Session B **Lecture Room D**	2:30 pm	**Update on European Biofuel Specifications and Test Methods** *Ortwin Costenoble, NEN, The Netherlands*
	3:00 pm	**Assessing the Impact of Biofuel Standards** *Taynah Lopes de Souza, INMETRO, Brazil & NIST, USA*
	3:30 pm	**International Standards and Professional Communities – A Social Science Perspective** *Lasse Henriksen, Copenhagen Business School, Denmark*
	3:50 pm	***Q&A Session***
4:00 -4:15pm		**Break (Coffee Available)**

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Chair: Mark Rumizen

4:15 – 6:00 pm	Session 2.4A	***Aviation - Biofuels Pathways***
2.4 Concurrent Afternoon Sessions	4:15 pm	**Amyris-Total Renewable Jet Fuel Program** *Fernando Garcia, Amyris, USA*
	4:35 pm	**"Drop-In" Renewable Jet Fuel Containing Aromatics and Cycloparaffins** *Ed Coppola, Applied Research Associates, USA*
Session A Green Auditorium	4:55 pm	**ATJ – Alcohol to Jet from Isobutanol** *Glenn Johnston, GEVO, USA*
	5:15 pm	**Catalytic Conversion of Sugars to Jet Fuel** *Aaron Imrie, Virent, USA*
	5:35 pm	**Neste Oil Renewable Fuels – Leading the Way Forward** *Neville Fernandes, NESTE OIL, Finland*
		Q&A Session
6:00 – 7:30 pm	**Reception (Cash Bar) – Heritage Room**	
Adjourn	**Bus to Hotel**	

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Chairs: Natasha Vidongas, Robert Fireovid, Magdalena Navarro

4:15 – 6:00 pm **2.4 Concurrent Afternoon Sessions** **Session B Lecture Room D**	Session 2.4B Starts at 4:15 pm	***Biofuel Developments in Emerging Economies*** **Panel Discussion** *China* *Dominican Republic* *El Salvador* *Guatemala* *Honduras* *India* *Jamaica* *Malaysia* *Turkey*
6:00 – 7:30 pm	**Reception (Cash Bar) – Heritage Room**	
Adjourn	**Bus to Hotel**	

4th International Conference on Biofuels Standards: Current Issues, Future Trends

NIST Campus, Gaithersburg, Maryland, USA

Day 3: November 15, 2012

7:30 -8:30 am	**Continental Breakfast**	
Chair: Dianne Poster		
8:30 – 10:30 am **3.1 Morning Plenary Session:** **Applications & Regulatory Issues** **Green Auditorium**	8:30 am	**Welcome:** *Hratch Semerjian, NIST*
	8:35 am	**Keynote: US National Renewable Fuel Standard Program** *Paul Argyropoulos, U.S. Environmental Protection Agency*
	9:05 am	**A Roadmap for Test Methods and Requirements for Future Fuels in Europe** *Ortwin Costenoble, NEN, The Netherlands*
	9:35 am	**Applications and Regulatory Issues: Surface Transport** *Rosângela Moreira de Araujo, Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP), Brazil*
	10:05 am	***Q&A Session***
10:30 – 10:45 am	**Coffee Break**	
Chair: Dan Friend		
10:45 – 12:00 **3.2 Concluding Panel:** **Future Trends** **Green Auditorium**	**Panelists***:* *Ortwin Costenoble, NEN, The Netherlands* *Humberto Brandi, INMETRO, Brazil* *Mark Rumizen, U.S. Federal Aviation Administration* *Rosangelo Araujo, ANP Brazil* *Anders Röj, Volvo GTT, Sweden* *Laurel Harmon, Lanza Tech, New Zealand* *Chuck Corr, ADM, USA*	
12:00 – 12:30 pm	**Wrap Up - Closing Remarks**	
Adjourn	**Depart**	

4th International Conference on Biofuels Standards: Current Issues, Future Trends

Abstracts

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NIST
National Institute of Standards and Technology
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Session 1.1
Opening Plenary Session
Green Auditorium

Opening Remarks
Willie May
NIST Associate Director for Laboratory Programs

Notes:

Conference Perspectives

Brazilian Perspectives on Biofuels
Emerson Kloss
Brazilian Ministry of Foreign Affairs

Notes:

European Perspectives on Biofuels
Günter Hörmandinger
EU Delegation to the US

Notes:

US Perspectives on Biofuels
Gary Guzy
White House Council on Environmental Quality

Notes:

Overview of USDA Biomass Programs and Activities

Harry Baumes
U.S. Department of Agriculture

Notes:

A Review of DOE Biofuels Program

Zia Haq
U.S. Department of Energy

Notes:

Q&A Session

Notes:

Session 1.2
Morning Plenary Session

Current Trends in the Sustainable Production and Use of Bioenergy in Brazil

Emerson Kloss
Brazilian Ministry of Foreign Affairs

Abstract: Brazil has a long tradition of converting biomass into biofuels. The most successful case so far has been ethanol from sugarcane. After a period of low participation in the energy mix in the 1990s, ethanol as an alternative fuel (E100) regained its relevance in 2003 with the introduction of flex-fuel vehicles. This technological breakthrough led to a recovery in ethanol consumption in internal market, opening a new horizon for the expansion of the sugarcane industry in Brazil. Driven by higher demand for ethanol as a fuel, the industry discovered new uses for the sugarcane, such as co-generation of electricity by burning the bagasse, bioplastics and cellulosic ethanol. Biodiesel was also introduced with a mandatory blend to fossil diesel (now in 5%) through public auctions. The biodiesel program has an important social component. The Social Fuel Certificate (SFC) is the mechanism that aims to stimulate the development of small agriculture and include their raw-material in biodiesel production chain. The biodiesel producer that has been granted a SFC is allowed to take part in biodiesel auctions competing for 80% of the total volume. The remaining 20% is opened also to biodiesel producers that do not have the SFC. Aviation biofuels is another avenue to be explored for the conversion of biomass into energy. The Brazilian private sector (airliners, aircraft manufactures and biofuel producers) is leading this effort. Production and use of bioenergy can contribute to the three pillars of sustainable development: economic, social and environmental. Bioenergy combines income generation in rural areas, reduction of the dependence on fossil fuels, incorporation of technologies in agriculture, and mitigation of greenhouse gases (GHG) emissions. Modern bioenergy can help developing countries to increase energy access and diversify their energy matrix, fostering sustainable development.

Notes:

Automotive Perspective on Biofuels: Quality and Standards

Anders Röj
Volvo GTT, Sweden

Notes:

Sugar: The New Crude

Delane Richardson
Chemtex, Italy

Abstract: Chemtex will review the transition from Petro chemistry (Black chemistry) to Biorefining (Green chemistry) which is revolutionizing the chemical industry today. We will contrast the advantages of Metabolic engineering vs conventional petrochemical conversion and when each may be preferred. The new building blocks for biorefining will be discussed as they are converted from C6 sugars feedstocks, often geographically limited and competing with food, to cellulosic sugars available in much larger geographic areas at more reasonable cost. The new challenges that a biomass supply chain has on process selection will also be discussed. Lastly, we will review the status of the start up of the largest cellulosic ethanol facility in the world in Crescentino, Italy.

Notes:

From R&D to the first commercialization plant: Abengoa Bioenergy's experience in 2nd generation bioethanol and its strategy towards the bioeconomy

Ricardo Arjona
Abengoa Bioenergy, Spain

Abstract: The enzymatic hydrolysis is one of the most promising technologies to produce bioethanol from a wider range of raw materials improving the sustainability of the biofuel, and a first step to develop a biorefinery able to generate not just biofuels but a range of bioproducts.

Abengoa Bioenergy, a global biofuel company, has been developing this technology since 2002, and the result is the first commercial facility with this technology being constructed in Hugoton Kansas.

This effort has been managed according to a well-established planning that comprises a pilot plant (in York, NE) and a demo facility (in BCyL, Salamanca, Spain) that have been critical to develop the different unit operations, identify bottlenecks, validate the financial assumptions and define the optimum process conditions to minimize the operational costs.

This plan is complemented with an important effort on enzyme and C5 fermentation developments to assure that each technological chain is optimized to advance in the technology competitiveness.

The support received by the DOE, the European Commission and the Spanish government, represents not just a way to leverage the risk and resources to speed up the technology development but also an external evaluation that has increased our confidence in our work.

The experimental work comprises the effort of more than 140 people, most of them PhDs, Engineers and scientists, more than 26,000 h of pilot and 6,000 h of demo plants operating to provide data and validate the technology, the development of our own enzymes and the testing of different fermentation organisms

Notes:

Fuels that Enable More Efficient Engines

Robert McCormick
National Renewable Energy Laboratory, U.S. Department of Energy

Abstract: Beginning in 2012, federal Corporate Average Fuel Economy (CAFE) regulations will require an approximately 5% increase in fuel economy per year, culminating in a fleet average of 54.5 mpg by 2025. This will be achieved by the implementation of a wide variety of new technologies from better lubricants, to lighter vehicle materials to changes in engine technology. However, some proposed improvements in engine technology are limited by the commercial availability of appropriate fuels. Engine thermal efficiency is limited by compression ratio (CR, ratio of maximum to minimum combustion chamber volume). Increasing CR increases efficiency as well as the tendency of the fuel to auto-ignite, or knock. Fuels with higher octane number enable increase CR. Turbocharging is also limited by engine knock. The efficiency benefits of turbocharging come from engine downsizing. A small turbocharged engine can produce the torque available from a less efficient larger engine. Additional knock resistance comes from direct fuel injection (DI). With DI the fuel evaporates in the combustion cylinder, cooling the air-fuel mixture reducing auto-ignition. Ethanol has a latent heat of vaporization more than double that of a typical gasoline on a weight basis. The effective octane rating of a fuel formulation containing ethanol will be significantly higher in a DI engine than a hydrocarbon only fuel. Clearly fuels with improved knock resistance can enable the development of more efficient engines, and the producers of new vehicles have called for the development of new fuel standards that will meet these requirements.

Notes:

Session 1.3A
Bioethanol

NRC Study on the Economic and Environmental Impact of RFS

Jason Hill
University of Minnesota

Abstract: In the United States, we have come to depend on plentiful and inexpensive energy to support our economy and lifestyles. In recent years, many questions have been raised regarding the sustainability of our current pattern of high consumption of nonrenewable energy and its environmental consequences. Further, because the United States imports about 55 percent of the nation's consumption of crude oil, there are additional concerns about the security of supply. Hence, efforts are being made to find alternatives to our current pathway, including greater energy efficiency and use of energy sources that could lower greenhouse gas (GHG) emissions such as nuclear and renewable sources, including solar, wind, geothermal, and biofuels. The United States has a long history with biofuels and the nation is on a course charted to achieve a substantial increase in biofuels

Notes:

U.S. Ethanol: Today and Tomorrow

Geoff Cooper
Renewable Fuel Association

Abstract: Since the late 1970s, policies supporting increased production and use of biofuels have been enacted in the United States as a means of decreasing fossil fuel consumption, diversifying energy supplies, stimulating economic development, and reducing air pollution and GHG emissions. In response to these policies, U.S. ethanol production has grown dramatically over the past three decades. Today, ethanol satisfies 10 percent of U.S. gasoline demand (volumetrically), and the biofuel has played a prominent role in advancing the aforementioned policy objectives. Currently, the U.S. ethanol industry faces challenges to further expansion, including the E10 “blend wall.” However, moving forward, we believe ethanol’s high octane rating and other unique properties will make the biofuel an attractive option for use in the new generation of internal combustion engines that will be needed to meet increasingly rigid federal fuel economy and tailpipe emissions requirements. New specifications, standards, and norms will be necessary to facilitate the transition to future fuels and engine systems.

Notes:

Biofuels Market in the EU

Gloria Gaupmann
European Renewable Ethanol Association

Notes:

Brazilian Experience in Ethanol Fuel: Quality Aspects and Distribution Logistics

Juliana Belincanta and Monica Teixeira da Silva
Petrobras, Brazil

Abstract: The reduction in the availability of fossil fuel is a growing concern. This fact has made the search for alternative fuel (biofuel) sources increasingly important.
The dominant biofuel in many countries is ethanol. Ethanol produced from renewable resources has been used as blend components in gasoline or as a pure fuel for reduction in petroleum consumption and greenhouse gas emissions. Thus, ethanol quality at the distribution system is routinely required.
In Brazil, the ProAlcool consolidated in 1979 made mandatory to blend (20 ± 2) % anhydrous ethanol into gasoline, and vehicles were built to be compatible with this blend. In 2003 started the flexible fuel vehicles (FFVs) production that can operate with any mixture of hydrated ethanol and gasohol (anhydrous ethanol + gasoline).

Nowadays, at the Brazilian market, light duty vehicles can be fueled with gasohol (18 up to 25 %v/v of anhydrous ethanol + gasoline) and hydrated ethanol. To minimize the risk of water-induced phase separation of ethanol-gasoline blends, anhydrous ethanol is blended into gasoline at the distribution terminal, the closest possible to gas station, rather than distributing it through pipelines.

Pure ethanol can be distributed through pipelines or trucks, and in pipeline cases almost all are not exclusive (for ex. OPASA-99 km, OSRIO-512 km, OPASC-266 km). To monitor the ethanol quality, some fuel sampling points are indicated: storage tanks, pipelines (at pumping units - beginning, middle and end of pumping ethanol), and ship, if applicable. For these samples it is important to evaluate the following parameters indicative of product quality: hydrocarbon and water amount, color, conductivity, acidity, and iron amount.

Monitor ethanol storage, transport and distribution is important to keep the ethanol quality till the final consumer.

Notes:

Water and Corrosion Issues in Ethanol Blends

Hans Keuken
Process Design Center, The Netherlands

Abstract: Ethanol fuel specifications worldwide traditionally dictate use of anhydrous ethanol for gasoline blending. The current maximum water contents in the ASTM, CEN and ANP anhydrous fuel ethanol specifications are not aligned, which complicates further harmonization of the international fuel ethanol standards.

As R&D organization, Process Design Center studied water in ethanol containing gasoline related issues since 2005.

This paper describes the scientific basis of water in ethanol – gasoline mixtures and the effects of water on both wet and dry corrosion from low blends like E5 up to E85 and E100. Next to the influence of small amounts of water on electrochemical corrosion and alcoholate/alcoxide corrosion, the effects of water on the overall emissions and engine performance will be addressed.

Notes:

Session 1.3B
Biodiesel

ASTM Biodiesel Standards – Current Status, Recent Progress and Future Activities

Richard Nelson
National Biodiesel Board

Abstract: The ASTM Biodiesel Task Force was formed in 1993. The first ASTM standard for pure biodiesel (B100) blend stock (ASTM D6751) was approved in 2001, and has been undergoing continual improvement since. ASTM approved standards for B5 and lower in on/off road markets under the traditional petrodiesel specification (ASTM D975), for B5 and lower blends in the traditional heating oil specification (ASTM D396), and for B6 to B20 blends in on/off road petrodiesel (ASTM D7467) all in 2008. This presentation will overview the current status of the biodiesel standards, recent improvement to the standards, and currently planned future activities of the ASTM Biodiesel Task Force.

Notes:

Challenges and Perspectives on Biodiesel Standardisation, European Biodiesel Industry Commitment to a Harmonised Market

Dermot Buttle
European Biodiesel Board

Abstract: The European biodiesel industry has long committed to respond to increasing requirements set by stakeholders. Today, biodiesel products have reached a mature and independent industrial level achieving new heights in the development of quality biofuels.

Support of biofuels started as early as 2003 when the Commission set unbinding targets for biodiesel and biofuels development at European level. In order to ensure market operators of the quality of their products, the industry joined the CEN (European Committee for Standardisation) along with the European Commission (EC), the automotive industry and the fuel industry in working towards the development and continuous improvement of standards for biofuel use in automotive engines.

The valuable contribution of biodiesel in enhanced security and diversification of supply was recognised with the Renewable Energy Directive (RED 2009/28) in which it mandated European Member-States of a 10% use of renewable energy in transport by 2020. Biodiesel is expected to account for 80% of this target. Expanding biodiesel production capacities in many EU countries together with a growing EU mineral diesel deficit definitively makes biodiesel a central product in the transport fuel market.

Beyond the adoption of the Renewable Energy Directive 2009/28/EC, and the Fuels Quality Directive 2009/30/EC the biodiesel industry has continuously demonstrated its commitment to respond to higher norms and standards in order to penetrate the market. The negotiations of Biodiesel standard (EN 14214) and blends (EN590) have demonstrated that technical political and economical challenges exist, which underlines the need for regulatory norms and standards which is the foundation stone of the industries success.

Notes:

Density-Temperature and Density-Pressure Relationships for Ethanol and FAME

Thomas Feuerhelm
DIN-FAM, Germany

Abstract: The presentation discusses recent density measurement results at different temperatures for biofuel components and European biofuel blends like Gasoline E5, E10, E85, biodiesel like B100, B7 and domestic heating oil, including some aspects of D(T) modeling and of compliance to calibration requirements. Several challenges and proposals for the grouping of fuels into common classes of thermal expansion coefficients will be shown with some special focus on the best possible standardization and harmonization of density /temperature modeling for the support of international trade and collaboration between the different diverse involved international parties will also be presented.

Notes:

Inevitable Changes in Measurements: Redefining What We Mean by "Fit-For-Purpose"

Tom Bruno
NIST, USA

Abstract: Testing protocols and procedures that are soundly linked to fundamental theory are more valuable than traditional fit-for-purpose properties for many important reasons. Fundamental properties, when linked to fundamental theory, can be made predictive on the basis of such theory; this is simply not the case with fit-for-purpose properties. Fundamental properties are far more technically defensible. In this respect, there is no comparison between a demonstrable link to fundamental theory, and the assertion of "this is how we've always done it" commonly heard with fit-for-purpose approaches. Strictly empirical measures will have a diminishing role in the future. This is already well known in fluid properties, including gaseous and liquid fuels, working fluids, and refrigerants. In this talk, we will discuss the advantages of fundamental properties, but give detailed description of how such properties may be applied to the characterization of biodiesel fuels. We will specifically discuss the application of the advanced distillation curve method (ADC, at atmospheric pressure and reduced pressure), with its composition and enthalpy explicit data channels. This method goes beyond the traditional volatility measurement techniques used for nearly a century. Biodiesel fuels made from soy and cuphea will be selected for this illustration. The different feedstock composition provides an ideal example, since the additional information provided by the ADC allows for a more complete understanding of the properties.

Notes:

Session 1.4
Measurements & Standards

Development of CRMs for Biofuels

Valnei Cuhna
INMETRO, Brazil

Abstract: The use of biofuels has increased rapidly over the past few years, and it is projected to increase even more in the future. Bioethanol and biodiesel are alternative fuels based on biomass and, in case any by-products are present in the final product, this may cause engine problems. Due to this matter, it is important to have reliable measurements and, industry, therefore, need reference materials for the physical chemical parameters. Reference materials for biofuels with well-characterized property values are essential both for the development and validation of measurement methods. Also, these materials represent an important tool in the quality assurance of routine measurements, and in obtaining reliable, traceable measurement results. The objective of this presentation is to show the development and preparation of CRM for bioethanol and biodiesel as a joint initiative by Inmetro and NIST.

Notes:

European Joint Research Project on Biofuels

Paola Fisicaro
Laboratoire National de Métrologie et d'Essais, France

Abstract: The use of biofuels and other renewable sources for transport is promoted by the Directive 2009/28/EC of the European Parliament and of the Council of April 23, 2009 ("Directive on the Promotion of the use of energy from renewable sources"), while Directive 2009/30/EC article 7b establishes sustainability criteria for biofuels.
The "White Paper on Internationally Compatible Biofuels Standards" published on 31 December 2007 by the Tripartite Task Force (BR, EU, USA) has highlighted that a series of biofuels specifications lack harmonization between geographic regions, as they are method or limit value dependent parameters. The Task Force recommends to "support the development of internationally - accepted reference methods and certified reference materials for improving the accuracy of measurement results that underpin assessment of product quality, and help facilitate trade".

In order to ensure long -term reliability and global comparability of analytical data, complete knowledge o f the traceability chain to the International System of Units (SI) for measurement results is required.

The project "Metrology for Biofuels" aims to provide validated and reliable methods with ensured traceability of the measurement results for physical and chemical parameters of liquid biofuels, focusing on first generation materials. Supplying reliable and robust measurement methods, the

project will promote a worldwide harmonisation of the analytical procedures. Besides, this cooperation program has dedicated tasks for the development of reference materials to be used as tools for method validation and instrument calibration. Moreover, the development of methods for tracing back the geographic and organic origin of biofuels will help to prevent economic subsidy fraud.

Notes:

Influence of the Increasing Renewable Energy Production on Instrumentation and Metrology for Oil and Gas

Peter Ulbig
PTB, Germany

Notes:

Exploration of New Cellulosic Microorganisms for 2nd Generation Bioethanol

Wanderley de Souza
INMETRO, Brazil

Notes:

Standards Development Related to Fuel Use of Fast Pyrolysis Bio-Oil

Fernando Preto
CanmetENERGY, NRCan
IEA Bioenergy Task 34

Abstract: Fast pyrolysis of biomass is a high efficiency method of liquid fuel production. The reason why fast pyrolysis bio-oil may be interesting is that it is the cheapest liquid bio-fuel due to relatively simple production process. Moreover, fast pyrolysis can process lignocelluloses without competition to the food chain. In terms of properties and utilization bio-oil presents a number of challenges. It is not an oil in the conventional sense and is not miscible with fossil fuel oils. Rather it is a complex mixture of, for the most part, oxygenated hydrocarbon compounds derived from the biopolymer structures. It is highly acidic, pungent and typically contains 15-30% water. Under the International Energy Agency (IEA) Bioenergy Agreement, the members of Task 34 on Pyrolysis have undertaken the development of standards for the analysis and utilization of bio-oil. The results from these efforts include round robin testing involving 15 laboratories; the definition of a CAS Number (#1207435-39-9); and ASTM standards (D-7544, d-7579).

Notes:

Session 1.5
Panel on Sustainability

Panelists:

Claudio Guerreiro
ABNT, ISO TC 248

Ortwin Costenoble
NEN, CEN/TC 383

Keith Kline
Oak Ridge National Lab.

Leticia Phillips
UNICA

Richard Nelson
Kansas State University

Emerson Kloss
GBEP Rep. Brazil.

Barbara Esker
NASA, USA

Notes:

Session 2.1

Aviation Biofuels Perspectives

Keynote: Innovation, Partnership, and Flexibility: BioFuels and the Air Force

Kevin Geiss
U.S. Air Force Deputy Assistant Secretary

Notes:

CAAFI and Other Initiatives

Mark Rumizen
U.S. Federal Aviation Administration

Notes:

Sustainable Aviation Biofuels in Brazil – SABB Project

Francisco Emilio Baccaro Nigro
Secretariat of Economic Dev., Sci. & Tech. of Sao Paulo, Brazil

Notes:

Session 2.2A
Aviation – Commercial Approval Process

Alternative Jet Fuel Approval

Mark Rumizen
U.S. Federal Aviation Administration

Notes:

ASTM D4054 Qualification and Approval of New Aviation Turbine Fuels and Fuel Additives

Tedd Biddle
Pratt&Whitney

Abstract: ASTM D4054provides a framework for the qualification and approval of new fuels and new fuel additives for use in commercial and military aviation gas turbine engines. The standard practice was developed as a guide by the aviation gas-turbine engine Original Equipment Manufacturers (OEMs) with ASTM International member support. The OEMs are solely responsible for approval of a fuel or additive in their respective engines and airframes. Standards organizations such as ASTM International (Subcommittee D02.J0), United Kingdom Ministry of Defence, and the U.S. military list only those fuels and additives that are mutually acceptable to all OEMs. The OEMs will consider a new fuel or additive based on an established need or benefit attributed to its use. Upon OEM and regulatory authority approval, the fuel or fuel additive may be listed in fuel specifications such as Pratt & Whitney (P&W) Service Bulletin No. 2016; General Electric Aviation (GE) Specification No. D50TF2; and Rolls Royce (RR) engine manuals. Subsequent to OEM approval and industry (ASTM) review and ballot, the fuel or fuel additive may be listed in fuel specifications such as Specification D1655, Defence Standard 91-91, United States Air Force MIL-DTL-83133, and the United States Navy MIL-DTL-5624. This qualification and approval process has been coordinated with airworthiness and certification groups within each company, the Federal Aviation Administration (FAA), and the European Aviation Safety Agency (EASA).

Notes:

ASTM Emerging Fuels Subcommittee Activities

George Wilson, III
Southwest Research Institute, USA

Abstract: ASTM D7566, the Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons, has become the international standard for preparing commercial semi-synthetic jet fuel. The author, who chairs the Emerging Turbine Fuels Subcommittee, will discuss the current efforts and future plans of the group.

Notes:

Fit-for-Purpose Properties

Tim Edwards
USAF, USA

Notes:

Aviation – Government and Military Support

NASA Research on Biofuels

Dan Bulzan
NASA, USA

Notes:

USAF Testing and Certification

Tim Edwards
USAF, USA

Notes:

Session 2.2B
Other Biofuels

The BioDME Project

Anders Röj
Volvo GTT, Sweden

Notes:

Challenges to Accurate Physical and Chemical Measurements in Biomass Processing

Robert Hebner and Rhykka Connelly
University of Texas at Austin, USA

Abstract: Progress in biomass processing is being impeded by the lack of standardized metrology to characterize the effects of the various processing steps. In addition, there is a lack of fundamental physical data on the mechanical and electrical properties of cell walls and cell membranes in the systems of interest. The lack of measurement reliability and data is costly as it can extend the time required to dismiss inefficient approaches and can lead to the rejection of promising approaches due to measurement errors.

The fundamental reasons for the measurement challenges that have been found in algae and in woody biomass include a lack of precision in dyes and other indicators, inhomogeneity that leads to challenges in characterizing a process from small samples, living material that changes during processing, and dynamic systems that challenge reproducibility in measurements. Specific examples are given of the processes and procedures that have shown themselves to be valuable in achieving meaningful measurements.

Notes:

Biofuel Production via Nano-Emulsion and Polarization Technology
Zurina Amnan
BIONAS, Malaysia

Notes:

A Review of Alternative Biofuel Technologies
Paul Bryan
Consultant, USA

Notes:

Session 2.3A
Aviation – User Perspectives

Airlines' Requirements
Steve Barker
A4A

Notes:

Aircraft Manufacturer's Perspective
Jim Kinder
Boeing

Notes:

Aircraft Manufacturer's Perspective
Ross Walker
Airbus

Abstract: Aviation fuel is a potential single point failure that can result in a catastrophic failure. Commercial aviation requires that the aviation fuel in all countries, meets the same stringent standards for properties and quality. Local variations in fuel standards and quality (e.g. fuel freeze point, thermal stability), can contribute to a catastrophic failure. There is no parking in the sky!

Notes:

Synthetic Aviation Fuels – Gas Turbine Manufacturer's Concerns

Stan Seto
Belcan Engineering Group

Abstract: Since the introduction of gas turbine powered commercial aircraft in the early 1950's, the Jet A and Jet A-1 fuels used were sourced from petroleum crude oil and natural gas liquid condensates. Presentation discusses the Government Requirements and Performance Needs of today's gas turbine engines when facing the introduction of fuels made from non-traditional sources such as coal, natural gas, algae, waste products, vegetable oils and animal fats. Importance of engine operability can not be overstated due to Safety of Flight, but equally important is the hydrocarbon fuel being presented and its possible impact on fuel capability.

Notes:

Lufthansa Biokerosene Flight Evaluation Results

Alexander Zschocke
Lufthansa

Abstract: In 2011 Lufthansa conducted a six-month bio kerosene flight evaluation using an A321 in commercial service. One engine was operated on a 50% HEFA bio kerosene blend (the maximum ratio permissible), the other was operated on conventional kerosene as a reference engine. Engine performance was monitored for both engines and conformed to expectations. After the end of the flight operations, both engines were boroscoped, and major fuel-bearing parts were removed and disassembled. There were no adverse findings on the bio kerosene blend engine in either case; indeed cavitation damage was visibly less than on the conventional kerosene side, which however may be batch-specific rather than due to the general properties of bio kerosene. The bio kerosene blend was regularly monitored for possible unmixing or microbial contamination, with no adverse findings. Development of electrical conductivity of the fuel over time was normal. A full ASTM 1655 analysis of the remaining volumes after the end of the evaluation confirmed that the product still fully met specification requirements. The only adverse finding was found on the SAP material of the filter water separator of the bowser used for fuelling the aircraft. The reasons for this finding, which may be unrelated to the bio kerosene, are still under investigation.

The overall conclusion is that from an aviation safety and operational point of view there are no fundamental obstacles to employing bio kerosene blends in aviation. However, several instances were identified where standards need to be modified to facilitate practical implementation.

Notes:

Session 2.3B
Measurements and Standards

Measurement and Modelling of Alternative and Renewable Turbine Fuels: Application of the ADC Method

Tom Bruno
NIST, USA

Abstract: Diminishing petroleum reserves, the potential of supply disruptions, price volatility, as well as environmental considerations resulting from polluting emissions, has led to the consideration of alternative and renewable liquid fuels to replace or extend conventional petroleum-derived fuels. Most desirable would be a renewable fluid that is produced domestically or in-theater. Because of the complexity of bio-derived fluids, analytical and property characterization methods are limited, yet this is essential. Among the many important properties that are needed, it is critical to characterize the volatility of these fuel mixtures. The volatility is traditionally expressed by the distillation curve, a plot of boiling temperature plotted against volume fraction distilled. We have recently introduced a method (the advanced distillation curve, ADC, method) that can be applied successfully to such fluids to obtain both composition and volatility information. This technique is an improvement of classical approaches, featuring (1) a composition explicit data channel for each distillate fraction (for both qualitative and quantitative analysis), (2) temperature measurements that are true thermodynamic state points that can be modeled with an equation of state, (3) temperature, volume and pressure measurements of low uncertainty suitable for equation of state development, (4) consistency with a century of historical data, (5) an assessment of the energy content of each distillate fraction, (6) trace chemical analysis of each distillate fraction, and (7) corrosivity assessment of each distillate fraction. In this talk, we will present several applications of this method to bio-derived and alternative fuels. Explicit attention will be paid to the variability of fuels, and how alternatives fit within the experience base of current fluids. We will also show how the method can facilitate the development of thermodynamic models for these complex fluids.

Notes:

Update on European Biofuel Specifications and Test Methods

Ortwin Costenoble
NEN - The Netherlands

Abstract: Since the last ICBS conference several developments at CEN and ISO level have taken place. On one hand, these were steered via European Mandates underlying fuel quality requirements and targets towards bio-energy and GHG emission reduction targets. On the other hand, discussion from earlier conferences have been taken forward in harmonizing test methodologies at international level.
The author is secretary of various standardization working groups that have worked on biofuel and their respective blend components. The lecture will provide an update regarding standards for fuels such as FAME, biomass-to-liquid, ethanol, E85, B30, pyrolysis oil and biomethane. The focus will be on CEN and ISO, but links and comparisons towards what is happening in ASTM will be made as well. Finally, an outlook towards future test method requirements will be given.

Notes:

Assessing the Impact of Biofuel Standards

Taynah Lopes de Souza and Stephen Cambell
INMETRO, Brazil & NIST, USA

Abstract: With the aim of greening their energy matrix and of attaining alternative sources for energy supply, countries all over the world have been increasing investments for biofuels production. The emergence of this energy source is relatively recent but has shown an accelerating evolutionary path. On the input side, an important trend is the use of different sources for its production, ranging from sugar cane to corn and algae; on the output side, its usage has been widened for several purposes, from ground transportation to aviation. In order to turn biofuels into fully fledged commodities, some strategies had to be taken to overcome obstacles that hamper global market penetration. In this pursuit of commoditization of biofuels, special attention has been given to the key role played by the standardization process. This paper provides a preliminary assessment of the potential economic impacts of this process – how it affects trade, quality and promotes better usage of this new source of energy. The point of departure for this research is the collaboration between Inmetro and NIST – the national metrology institutes (NMI) of Brazil and USA, respectively – in order to provide standard reference materials (SRM) for biofuels. Through the application of a survey of major industry participants in this sector, some important relationships have been observed .The main contribution of this paper is, therefore, to provide some insights about how the standardization process impacts trade and industry, and to offer some recommendations to increase the

overall efficiency of the evolving strategy.

Notes:

International Standards and Professional Communities – A Social Science Perspective

Lasse Henriksen
Copenhagen Business School, Denmark

Abstract: This presentation argues that transnational professional communities are important players in the global economy. Social scientists should pay more attention to the networks by which professionals coordinate internationally to set rules for the governance of the global economy, instead of assuming that states, companies and civil society organizations are the primary actors in such processes. How are international professional networks established, in what ways does their structure differ and how does this matter for their effectiveness?

Notes:

Session 2.4A
Aviation – Biofuels Pathways

Amyris-Total Renewable Jet Fuel Program

Fernando Garcia
Amyris, USA

Abstract: A start-up from California with extensive operations in Brazil, Amyris offers customers a way to reduce environmental impact with no compromise in performance and availability. Amyris's industrial synthetic biology platform modifies microorganisms and utilizes them as living factories to convert plant-sourced sugars directly into target renewable hydrocarbons. Among the products that Amyris is developing from farnesene is a renewable jet fuel. Amyris' jet fuel program is a joint effort with Total. The Amyris-Total renewable jet fuel is designed to be compliant with Jet A/A-1 fuel specifications and be a drop-in alternative to conventional petroleum-derived fuel in a range of performance metrics, including fit-for- purpose, combustion performance and greenhouse gas emission reduction potential, without compromising on performance quality.

Over the course of the last two years, Amyris has been acquiring data on its renewable jet fuel with major engine and aircraft manufacturers and other industry participants. To demonstrate the renewable fuel's performance, Amyris decided to partner with Brazilian aircraft maker Embraer, its engine supplier GE Aviation, and one of the country's leading airlines, Azul Brazilian Airlines in what became known as the *Azui+Verde Renewable Jet Fuel Program.* On June 19, 2012, Azul made a successful demonstration flight using an innovative, renewable jet fuel produced from Brazilian sugarcane, a highly desirable biomass that can be produced sustainably in large-scale quantities. The *Azui+Verde* demo flight is the first milestone of the goal which is to provide a commercial viable solution of renewable jet fuel in Brazil as soon as regulatory steps are concluded.

The presentation will characterize the Amyris-Total renewable jet fuel qualities and analytical methods developed.

Notes:

"Drop-In" Renewable Jet Fuel Containing Aromatics and Cycloparaffins

Edward Coppola
Applied Research Associates, USA

Abstract: Applied Research Associates, Inc. (ARA) developed a novel process for converting renewable oils into true, 100% "drop-in" jet fuel called ReadiJet®. Neat, unblended ReadiJet® meets ASTM D1655 (Jet A), MIL-DTL-83133G (JP-8), and MIL-DTL-5624U (JP-5) specifications for petroleum-base jet fuels. ReadiJet® can be blended in any proportion with petroleum jet fuels and other aviation fuels containing synthesized hydrocarbons that meet the Alternative Jet Fuel Specification requirements, ASTM D7566 Annex 1 or Annex 2 and does not require changes to fuel infrastructure, engines, or other handling equipment. However, since ReadiJet® is a renewable alternative fuel, it cannot be procured under the current petroleum specifications. And, since ReadiJet® contains aromatics and cycloparaffins it is does not meet the specification for "synthetic blending component" under ASTM D7566 Annex 2, even though it is superior in quality to Annex 1 & 2 blending components and would result in no quality or performance degradation to the "conventional hydrocarbon" component if blended in accordance with ASTM D7566. Therefore, certification pathways are being pursued for both military fuels (JP-8/JP-5) and commercial fuels (Jet A/Jet A-1). A new ASTM Task Force, "HEFA SKA," was formed to address hydroprocessed jet fuels that contain aromatics and cycloparaffins. On 29 October 2012 a very successful flight test was performed on neat, unblended ReadiJet® by the Canadian National Research Council (NRC) Institute for Aerospace Research (IAR). Additional tests on blended and unblended ReadiJet® are ongoing. ReadiJet® properties, performance and other test activities will be discussed.

Notes:

ATJ – Alcohol to Jet from Isobutanol

Glenn Johnston
GEVO, USA

Abstract: Gevo has invested over $180 Million developing its innovative technology to produce isobutanol from biomass and is the first company in the world to begin commercial production of biomass-derived isobutanol. It also is the first and only company to produce and deliver alcohol to ATJ fuel to the USAF for successful engine and flight certification (flown in an A-10 on June 29, 2012). Gevo is working with South Hampton Resources, Inc., and has built a hydrocarbon processing demonstration plant at their facility just outside of Houston in Silsbee, Texas. This demonstration plant has a name plate capacity up to 10,000 gallons of Gevo's isobutanol per month into ATJ fuel for engine testing for product qualification and evaluation. This talk will review Gevo's ATJ technology, review of how it fits into current approved pathways via ASTM 7566, and also provide technical results from testing.

Notes:

Catalytic Conversion of Sugars to Jet Fuel

Aaron Imrie
Virent, USA

Abstract: Carbohydrates are the most widely distributed, naturally occurring organic compounds on Earth, and hold considerable potential to replace petroleum feedstock. Virent's BioForming® process unlocks this potential by enabling the economic production of fuels from biomass-derived carbohydrates using novel heterogeneous catalytic pathways currently being scaled and commercialized. Virent's technology employs solid-state catalyst systems, similar to those used in conventional oil refineries, to produce premium hydrocarbon fuels.

Notes:

Neste Oil Renewable Fuels – Leading the Way Forward

Neville Fernandes
NESTE OIL, Finland

Abstract: Neste Oil Corporation is a refining and marketing company concentrating on low-emission, high- quality traffic fuels, and is the world's leading supplier of renewable diesel. Neste Oil had net sales of EUR 15.4 billion in 2011 and employs around 5,000 people.

NExBTL renewable diesel plants are located in Finland, Singapore, and the Netherlands. All four plants have been designed to produce renewable diesel, and in addition, they also have the potential to produce renewable aviation fuel. NExBTL renewable fuels can be produced by hydrotreating vegetable oils, and animal and vegetable-based waste fats/oils/greases. Neste Oil's procurement chain ensures that all its renewable inputs are produced sustainably.

Neste Oil is a global pioneer in aviation biofuels. The company's NExBTL renewable aviation fuel meets the very stringent quality standards demanded of aircraft fuel, and can be produced at commercial scale. NExBTL renewable aviation fuel can significantly reduce an aircraft's greenhouse gas emissions compared to fossil jet fuel. In addition, NExBTL renewable aviation fuel also offers lower emissions of other pollutants such as NO_X.

Standards defining the quality of jet fuel (ASTM, Defense Standard, JIG) play a key role in renewable aviation fuel production. The most challenging requirements for renewable aviation fuels to meet are: density, flash point, freezing point, distillation temperatures, and metal concentration.

Notes:

Session 2.4B
Biofuel Developments in Emerging Economies

Panel Discussion

China
Dominican Republic
El Salvador
Guatemala
Honduras
India
Jamaica
Malaysia
Turkey

Notes:

Session 3.1

Applications & Regulatory Issues

Keynote: US National Renewable Fuel Standard Program

Paul Argyropoulos
U.S. Environmental Protection Agency

Abstract: The National Renewable Fuel Program is entering its eight year of implementation. The program has been successful on many fronts, with renewable fuels now playing a major role in fueling our nations extensive transportation sector. In 2013, the progression of this program shifts focus more to incremental increases in advanced and cellulosic fuels. This presentation will provide an overview of the current status of the RFS program and the opportunities and challenges the government and industry face attaining the programs goals in future years.

Notes:

A Roadmap for Test Methods and Requirements for Future Fuels in Europe

Ortwin Costenoble
NEN, The Netherlands

Abstract: The European Union is promoting renewable energy use in Europe Additionally, it has put in place stringent tailpipe pollutant emission limits and CO2 targets for new vehicles. It is uncertain at this point how these targets will influence the development of the European fuels market beyond 2020. It is certain that the extension of for instance automotive petrol blended with higher fractions of ethanol and/or other oxygenates or automotive diesel with new types of biodiesel have an impact on European fuel specifications.
For that reason the European Standards Committee, CEN agreed that a detailed assessment of biofuels and blends in Europe over the coming decade was needed that should be prepared through a multi-stakeholder approach. Within CEN/TC 19 all stakeholder partners took part in an assessment in order to outline the possible constraints and advantages of a future petrol. A draft report has been established that outlines factors to be considered and challenges to be addressed. It lists the issues related to the parts relevant to determine fuel quality, namely engine concepts, vehicle techniques, refinery and logistic chain matters and quality test methods.

Notes:

Applications and Regulatory Issues: Surface Transport

Rosângela Moreira de Araujo
Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP), Brazil

Abstract: As the regulatory body for fuels, the Brazilian National Agency for Petroleum, Natural Gas and Biofuels (ANP) is a federal institution responsible for the regulation and supervision of oil, gas and biofuels industries.

The main role of ANP in the downstream sector is to guarantee the petroleum products and biofuels supply, establishment of specification, supervision nationwide. The presentation will show the way ANP strives to enable the expansion of the biofuels sector through regulatory governance after a sequence of discussions with fuel producers, suppliers and engine manufactures, with special focus on consumer and society´s needs regarding environmental, economic and social aspects.

The discussion covers the regulatory commitment to improve biofuels quality, considering the registers of White Paper, the reports of the Fuel Quality Monitoring Program and the problems pointed by the market in a Task Force for biodiesel. The results for the appraisal include convergence of regulatory framework and the implications for private investment. Among the conclusions are:
(i) the ANP's actions for improving the biofuels quality;
(ii) the importance of new biofuels structural regulation as a catalyst for further entrance of new biofuels, as well as the implementation support of the biofuel policy.

Notes:

Session 3.2
Concluding Panel
Future Trends

Panel Discussion

Panelists:

Ortwin Costenoble,
NEN, The Netherlands

Humberto Brandi
INMETRO, Brazil

Mark Rumizen
U.S. Federal Aviation Administration

Rosangelo Araujo
ANP Brazil

Anders Röj
Volvo GTT, Sweden

Laurel Harmon
Lanza Tech, New Zealand

Chuck Corr
ADM, USA

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4th International Conference on Biofuels Standards: Current Issues, Future Trends

November 13 – 15, 2012

National Institute of Standards and Technology
Gaithersburg, Maryland, USA