The 4th International Conference on Biofuels Standards: *Current Issues, Future Trends* hosted three Panel Discussions, in addition to the presentations, to provide opportunities for discussion of broad-based topics and to articulate possible future actions. Brief summaries are provided on each of these Panel Discussions to share some of the overarching issues that were identified.

Panel on Biofuel Developments in Emerging Economies

The **Panel on Biofuel Developments in Emerging Economies** was chaired by Natasha Vidangos (US State Department), Robert Fireovid (US Department of Agriculture) and Magdalena Navarro (White House Office of Science and Technology Policy). Natasha is the Energy and Biofuels Officer, Bureau of Energy Resources at the State Department; Robert is the National Program Leader for Post-Harvest Processing at the Agricultural Research Center at USDA; and Magdalena is a Senior Policy Analyst in the National Security and International Affairs Division in OSTP.

The Panel members were selected based on their personal activities related to development of biofuels, and their leadership in development of the infrastructure in their own countries that would promote expanded biofuels utilization and economic development.

- Francisco Rafael Gomez Dickson (fgomez@cne.gov.do) – Agricultural Engineer, National Energy Commission, Dominican Republic
- Manuel Antonio Cerrato Robredo (mcerrato@cne.gob.sv) Director of Combustibles (Fuels?), National Council of Energy, El Salvador
- Marleny Reyes (marlenval@yahoo.com ; coorambiente@mem.gob.gt) Unidad de Gestion Socio Ambiental, Ministry of Energy and Mines, Guatemala
- Niconor Reece (Niconor.Reece@pcj.com) Project Engineer for Biofuels, Center of Excellence for Sustainable Energy Development, Petroleum Corporation of Jamaica
- Zurina Amnan (zurina@bionas.com.my) is the Group CEO of BIONAS (Bio Oil National Corporation) of Malaysia.

To set the stage for discussions, Robert Fireovid made a brief presentation on "The Bioeconomy: Opportunities and Challenges for Latin America and the Caribbean". The bioeconomy is defined as biobased manufacturing encompassing biofuels and non-food biobased products such as bioplastics, lubricants, super absorbents, natural rubbers, biofuels and soy-based inks.

In order to attract investment capital, biobased products must win over established petroleum- or natural gas-based products manufactured in fully-depreciated assets and other biobased substitutes. This requires a demonstrated, low-cost and sustainable feedstock production, the lowest-cost logistics and conversion processes (including economies-of-scale) and innovative conversion technologies (intellectual property protection).

Future locations for biofeedstock production are defined by net primary productivity (NPP); this is the capacity to capture light and produce biomass. The regions with the greatest amount of NPP are in the tropics. More than twice the NPP occurs in the Brazilian tropics, than in the best NPP region of North America.

The U.S. Department of State is engaged with Latin America and the Caribbean (LAC) for biobased manufacturing. The U.S. Caribbean Basin Economic Recovery Act (CBERA) enables countries in Central America and the Caribbean to export ethanol derived from regional feedstocks to the U.S. duty free. Currently, CBERA countries (e.g., Costa Rica, El Salvador, Jamaica and Trinidad and Tobago) import hydrous ethanol, mainly from Europe and Brazil, and process it into dehydrated ethanol for export to the U.S. However, CBERA countries face U.S. tariff quotas for ethanol derived from non-regional feedstocks (equal to 7% of the U.S. annual ethanol consumption). In addition to CBERA, the U.S.-Brazil Memorandum of Understanding (MOU) on biofuels assists third-party countries to develop domestic biofuels industries. MOU partners include the Inter-American Development Bank (IDB), United Nations Foundation (UNF) and Organization of American States (OAS).

The USDA has several established USDA-LAC collaborations for biobased manufacturing. For example, there is a tri-lateral collaboration on non-grain energy sorghum biomass. This was initiated in 2011 although it is still under development. The parties involved include Argentina: Estacion Experimental Agropecuaria Obispo Colombres (EEAOC), Instituto Nacional de Tecnología Agropecuaria (INTA), Ministerio de Agricultura, and Maizar (corn and sorghum trade association);
Uruguay: Instituto Nacional de Investigacion Agropecuraria (INIA); and the USDA Agricultural Research Service (ARS). Potential research topics include sorghum biomass genetic improvement, developing sustainable production systems, assessing whole system sustainability, increasing biomass processing efficiency for biofuel production and transferring new technologies/information to commercial partners.

After this initial presentation, representatives of each country made a brief presentation, summarizing biofuels related developments in their countries.

Dominican Republic

Dominican Republic is highly dependent on imported fossil fuels (an 87% share of the consumption matrix). Major barriers limiting transition to a more bio-based fuel market include a lack of knowledge and information regarding technologies and information that is needed for decision makers, scarce development of the agricultural side of the production chain, an oligopolistic sugarcane industry, and a lack of inter-institutional integration, including the private sector. It was noted there is a lack of local financing and warranted funds for biofuels projects with limited access to foreign financing and cooperation. In addition, regional integration is needed. A blending mandate would be helpful and is needed to help build a local liquid biofuels market for Dominican Republic. One normative activity includes the authorization of blending up to a 20% of biodiesel (B-20) with diesel, this began January 31, 2010 with an initial blending level of 5%. This should not be confused with a blending mandate, rather this is a blending authorization.

Selected projects under development were discussed, including the granting of a definitive concession to Koar Energy Dominicana for the development of a biomass-based electric generation project with an installed capacity of 1 MW. The biomass conversion technology is gasification using a “Downdraft Gasifier” to produce synthesis gas to generate electricity under the concept of “Distributed Generation”. In addition, there are on-going Bioenergy Program Support Complementary Studies, granted by the Interamerican Development Bank, which are providing valuable input for the development of a sugarcane based biorefinery in the country.

Dominican Republic seeks to focus in the future on strategies to develop or improve the agricultural side of the biofuels production chain, including providing incentives to small-medium farmers. In addition,

the country will seek the creation and encouragement of a local biofuels market, starting with a 5% blending mandate, and pursue the creation of a private-public alliance made up of academic institutions and government institutions such as the Ministry of Agriculture, the State Sugar Consortium, and the Sugar Institute to focus on biofuel issues. The creation of a task force to facilitate the issuance of permits is under consideration. Dominican Republic has selected efforts into switching from fuel oil-based boilers to biomass boilers in the textile industry, distilleries (rum production) and industrial laundry services and will continue to do so to encourage the creation of a local biomass market to possibly support other sectors.

El Salvador

Biofuels are important in El Salvador. The country's National Energy Policy demands a diversified energy matrix, a reduction in the dependence on foreign energy resources, and a decrease to fuel emission contaminants. Similarly, the country's National Socio-Economic Policies demand a balance of trade, the promotion of rural development and job creation, the enabling of private and public sector capacity building, the facilitation of industry development, the stimulation of technology transfer and encouragement of the use of idle land.

There are three plants which produce ethanol and two plants which produce biodiesel in El Salvador. The ethanol plants are: 1) La Cabaña Sugar Mill (31.5K gal/day), 2) a dehydration plant: GASOHOL (35 Million gal/year), and 3) a dehydration plant: ARF (60 Million gal/year). The biodiesl plants are: 1) Bioenergía S.A (5K-25K gal/day) and 2) a pilot plant: CENTA (2.5K gal/year).

Guatemala

The main sources of energy in Guatemala include: mineral carbon, hydroenergy, geoenergy, wood, sugarcane bagasse (biomass), and petroleum derivatives, and petroleum liquid gas. In terms of ethanol, the Law of Fuel Alcohol enabled a distillery to be installed as part of a pilot study in the country for the use of "gasohol". This industry is established and expansion capacity exists. In terms of biodiesel, this is in development for the country. There are current efforts focused on the use of recycled oils and research is being carried out on sweet sorgo. Currently, there are no regulations for the commercialization of biodiesel in Guatemala.

Guatemala is aware of the importance of the combined use of renewable sources of energy and petroleum based fuels. Guatemala is searching for an effective way of introducing the use of biofuels in order to reconcile legal, economical and social aspects corresponding to its reality as a Country.

Jamaica

The National Energy Policy (2009-2030) for Jamaica was approved by the Cabinet and promulgated. Ethanol in gasoline (E10) was established as a national fuel formulation in 2008. Jamaica has suitable lands for the revitalization of the sugar industry and the production of ethanol for 10% blending in gasoline. Some of these lands can support biomass and biodiesel crops for supplemental fuel to ensure economic cogeneration and biodiesel operations. Government has privatized its 71% holdings in the sugar sector. The fluctuation in sugar prices and the changes in quotas and marketing approach related to international trade agreements present an opportunity for sugarcane diversification. Oil price volatility has served to heighten public awareness and interest in pursuing alternative energy options.

The energy supply matrix is to transition from a predominantly petroleum-based sector (2008) to a diversified mix of petroleum, natural gas, petcoke/coal, renewables and other by 2030, such that the percentages are 30, 42, 5, 20 and 3, respectively. By 2015, it is anticipated that renewable energy will be 12.4% of Jamaica's barrels of oil equivalents portfolio, with the remaining fraction coming from oil imports. Renewable energy will include E10 and B5 (16%), fuelwood (38%), solar (2%), bagasse cogen (26%), hydro (5%), wind (2%) and WTE (11%).

Next steps for Jamaica include seeking additional funding for Biodiesel Development Initiatives, expanding the varietal trials and using the best varieties, incorporating waste vegetable oil processing into demonstration projects, collecting cost information to support financial analyses, meeting with associations of small farmers to share best practice information and to seek support to develop biofuel quality testing capacity.

Malaysia

The proven concept and implementation model in jatropha cultivation and biofuel production via nano-emulsion and polarization technology were discussed by BIONAS. The company began an effort within the country by providing for free Jatropha Seeds for 4 hectares per person/farmer to gain access for free land and workers. The company guaranteed buy back of harvests; this has increased the number of farmers planting on their own land, enabling a sustainable supply of feedstocks. The capability to buy back the harvests at a competitive price has been enabled due to the BiONAS' capability to produce biofuels via polarization and using a nano-emulsion technology (which is very cost effective). There was also no requirement for investment to set up a refinery; and BIONAS made use of existing infrastructures, i.e., blending and storage facilities at existing refineries, ports and airports (as applicable). It is important to note these are all key success factors and can be a modeled for other companies in other countries.

Discussion

The following discussion focused on five main themes:

- Investment
- Need for good policy
- Importance of local capacity building
- Price mechanism approach
- Public acceptance

It was noted that partnerships are very important, especially those based on public/private sector models. The cultural factor needs to be considered individually country by country; farmers and investors are not always willing to join forces and work together.

The Inter-American Metrology System (SIM) was noted. The SIM resulted from a broad agreement among national metrology organizations from all 34 member nations of the Organization of American States (OAS). Created to promote international, particularly Inter-American, and regional cooperation in metrology, SIM is committed to the implementation of a Global Measurement System within the Americas, in which all users can have confidence. The quality infrastructure needed for biofuels may need to tap into this resource. SIM had organized proficiency tests for bioethanol; it was gratifying to see Jamaica and El Salvador participate in these activities. The SIM offers a model to meet metrological training needs for biofuels. It was noted farms, industrial companies, and government entities all have

different needs and not all are related to metrology. However, metrology facilitates trade, and ensures there are buyers, profits to be had and jobs are created.

The need to find funds for legal metrology in each country was noted. Legal metrology and scientific/industrial metrology are different and this needs to be considered. The biofuel industries in each country are different, with different goals and objectives. The role of farmers in each case is often different. Vegetable oils and the use of these in straight applications, for example, are different in each case or not allowed in some cases.

Government-run companies and privatized companies have different needs. Government stability is often an issue too. How much the government is committed to buying is an important issue. Learning from countries where success is demonstrated is important.

The University of Texas, where many South Americans receive their education, receives many calls regarding making and using biofuels and biofuel opportunities and challenges. It is important for people to know right away who their customers are. That way, efforts can be tailored to meet the needs of the customers upfront and success comes from this approach.

BIONAS noted that they are in many countries and the buy back guarantee is important to their success. Farmers will not grow crops if there is no buyer. However, the government-run Petronas now sees BIONAS as a competitor to its own products since the cost of the biofuels is lower than the subsidized petroleum fuel prices. This becomes very political and issues have to be worked out on a case by case basis.

In summary, to take advantage of the tremendous biodiversity offered in these emerging economies and to meet the need for stable and secure energy sources, problems associated with lack of political and market incentives, food vs. fuel concerns, and feedstock uncertainties need to be addressed to overcome barriers to entering/growing the local biofuels market. However, as illustrated in this conference, there are several success stories that could serve as examples for other countries.