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Global Renewable Energy Forum Bulletin

A Summary Report of the Global Renewable Energy Forum

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GLOBAL RENEWABLE ENERGY FORUM: 18-21 MAY 2008

The Global Renewable Energy Forum was held at the Bourbon Cataratas Hotel, in Foz do Iguaçu, Brazil, from 18-21 May 2008. The Forum, which was jointly organized by the United Nations Industrial Development Organization (UNIDO), the Brazilian Ministry of Mines and Energy, Eletrobras and Itaipu Binacional, brought together over 1400 participants and 80 accredited media from more than 50 countries, including high-level representatives and experts in energy and industry from Latin American, African and other countries, as well as representatives from UN agencies, bilateral organizations, the private sector, academia and regional and international non-governmental organizations.

The overall objective of the Forum was to create a suitable environment to promote dialogue on strengthening inter-regional bonds and to set up joint actions between countries and regions that aim to reduce poverty and enhance energy security through the use of renewable energy sources. The Forum also aimed to foster business and commercial relationships at the intra- and inter-regional level, and promote the development of renewable energy sources and related infrastructure in Latin America and in the Caribbean.

The four-day Forum consisted of three plenary sessions, two debates and seven roundtables, as well as site visits to the Itaipu Hydropower station, a local sewage treatment station and a technology park. During the Forum, UNIDO and some participating countries and institutions developed bilateral agreements and memoranda of understanding.

This report provides background information on renewable energy meetings under UNIDO and other processes, and summarizes the discussions and outcomes of the Forum.

BRIEF HISTORY OF RENEWABLE ENERGY MEETINGS UNDER UNIDO AND OTHER PROCESSES

UNIDO

Energy Security in Latin America: The Iberoamerican Ministerial Meeting on “energy security in Latin America: renewable energy as a viable alternative” took place from 26-27 September 2006, in Montevideo, Uruguay. The meeting provided a forum for discussions on energy security and regional cooperation to harness the potential of renewable energy technologies. The main outcomes of the meeting were a Ministerial Declaration, which encouraged governments to assess the feasibility of establishing an Observatory for Renewable Energy in Latin America and the Caribbean, and a proposal to organize the Global Renewable Energy Forum jointly by the Ministry of Mines and Energy of Brazil and UNIDO in 2008.

International Conference on Biofuels: This meeting took place in Kuala Lumpur, Malaysia, from 5-6 July 2007, and addressed issues such as: global developments in biofuels; supply, demand, economics and sustainability of biofuels; production of feedstock; technology and applications from biofuels from oils, fats and biomass; and the sustainability and viability of biofuel businesses.

High-level Biofuels Seminar in Africa: This seminar was held at the African Union headquarters in Addis Ababa, Ethiopia, from 30 July-1 August 2007, under the theme of “sustainable biofuels development in Africa: opportunities and challenges.” The seminar explored possibilities for developing biofuels in Africa, while ensuring a balance between its potential, risks and trade-offs. The meeting resulted in the Action Plan for Biofuels Development in Africa and the Addis Ababa Declaration on Sustainable Biofuels Development in Africa. The Declaration calls for, *inter alia*: developing enabling policy and regulatory frameworks; participating in global sustainability discussions; formulating guiding principles on biofuels to enhance Africa’s competitiveness; minimizing the risks of biofuels development for small-scale producers; North-South and South-South cooperation; and the establishment of a forum to promote access to biofuels information and knowledge. IISD RS coverage of this meeting can be found at: <http://www.iisd.ca/africa/biofuels/html/arc0901e.html>

Regional Workshop on Sustainable Biofuels Production and Use In Central & Eastern Europe: This workshop was held in Dubrovnik, Croatia, on 12-13 November 2007, with the objective of promoting the sustainable production and use of biofuels, capturing the environmental and economic benefits of biofuels, and increasing the security of energy supply. Participants discussed, *inter alia*: drivers and concerns about the production and use of biofuels; country-specific biofuels-related issues in Central and Eastern European countries; sustainable biofuels; regional and international trends; and industrial and technological development.

International Conference on Renewable Energy in Africa: This meeting was held in Dakar, Senegal, from 16-18 April 2008, under the theme “making renewable energy markets work for Africa: policies, industries and finance for

IN THIS ISSUE

Brief History of Renewable Energy Meetings Under UNIDO and Other Processes	1
Report of the Meeting	3
Upcoming meetings	10

scaling up." The conference resulted in a Plan of Action on Scaling-Up Renewables in Africa and the Dakar Declaration on Scaling-Up Renewables in Africa. In the Declaration, participants, *inter alia* agreed: to an African continental target for governments, with support from development partners, to scale up annual renewable energy investments to US\$10 billion between 2009-2014; to adopt the Plan of Action on Scaling-Up Renewables in Africa, which calls upon African governments, their international development partners, non-governmental organizations and the private sector to support implementation of the Plan of Action with adequate resources; and recommend that the African Union, UNIDO and other relevant development partners establish a ministerial-level policy advocacy group, to be supported by a coordination unit. IISD RS coverage of the meeting can be found at: <http://www.iisd.ca/ymb/sdrea/>

Regional Workshop on Renewable Energy in the Carpathians: This workshop was held in Lviv, Ukraine, 6-7 May 2008, with the aim of: preparing a base-line report on renewable energy policies and financial instruments in countries of the Carpathian Convention; identifying a regional cooperation programme to promote renewable energy development; and promoting a regional-level network of institutions and agencies involved in renewable energy.

UN-ENERGY

UN-Energy is an interagency mechanism on energy that was established to help ensure coherence in the UN system's multi-disciplinary response to the World Summit on Sustainable Development (WSSD) and to ensure the effective engagement of non-UN stakeholders in implementing WSSD energy-related decisions. UN-Energy aims to promote system-wide collaboration in the area of energy with a coherent and consistent approach since there is no single entity in the UN system that has primary responsibility for energy. In August 2007, the group elected Kandeh Yumkella, Director-General, United Nations Development Organization (UNIDO), as Chair and Olav Kjorven, Assistant Administrator, United Nations Development Programme (UNDP) as Vice-Chair. The United Nations Department of Economic and Social Affairs (UN DESA) provides secretariat services.

UN COMMISSION ON SUSTAINABLE DEVELOPMENT (CSD)

In April 2001, CSD-9 adopted Decision 9/1 (E/CN.17/2001/19) on "Energy for sustainable development." This Decision included recommendations to encourage the role of the private sector in energy provision, strengthen research and development and institutional capacities, develop and use indigenous sources of renewable energy, and strengthen financial support to developing countries. It also addressed issues of energy accessibility and rural energy, noting that access to affordable energy services is a prerequisite to halving the proportion of people living on less than US\$1 per day by 2015. IISD RS coverage of CSD-9 can be found at: <http://www.iisd.ca/csd/csd9/index.html>

CSD-15, at its May 2007 meeting, also addressed energy issues, although delegates did not reach consensus on any decisions. IISD RS coverage of CSD-15 can be found at: <http://www.iisd.ca/csd/csd15/>

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

At the 25th meeting of the Intergovernmental Panel on Climate Change (IPCC-25) in April 2006, in Port Louis, Mauritius, the Panel agreed to hold a scoping meeting on a

Special Report on Renewable Energies. This scoping meeting took place in January 2008, in Lübeck, Germany, where issues such as the mitigation potential of renewable energies, policies and different renewable technologies were considered. The meeting resulted in a document that suggested a structure for a special report. IISD RS coverage of IPCC-28 can be found at: <http://www.iisd.ca/climate/ipcc25/>

IPCC-28, in Budapest, Hungary, in April 2008, agreed to the preparation of a Special Report on Renewable Energy, which is to be completed by 2010. IISD RS coverage of IPCC-28 can be found at: <http://www.iisd.ca/climate/ipcc28/>

GLOBAL FORUM ON SUSTAINABLE ENERGY

The Global Forum on Sustainable Energy (GFSE) was launched by Austria's then Foreign Minister in 1999. The initiative stems from outreach efforts of the World Energy Assessment, which was organized by UNDP, UN DESA and the World Energy Council. The GFSE provides a platform for multi-stakeholder dialogue aimed at facilitating decision-making on energy policy issues in relevant fora. It also seeks to foster public-private partnerships.

GFSE-5: The Fifth Meeting of the GFSE convened from 11-13 May 2005, in Vienna, Austria, under the theme "Enhancing International Cooperation on Biomass," and put special emphasis on strengthening the institutional capacity to promote South-South cooperation. Participants also addressed topics such as: the potential for, and challenges to, increasing biomass use; synergies and risks between food and biofuel crops; biofuels for sustainable transport; and biomass for electricity production and household heating. IISD RS coverage of the meeting can be found at: <http://www.iisd.ca/sd/gfse5/>

GFSE-6: The Sixth Meeting of the GFSE convened from 29 November - 1 December 2006, in Vienna, Austria, under the theme "Africa is Energizing Itself," and focused on sustainable energy in Africa, with particular attention to sub-regional issues, biofuels, hydropower, Clean Development Mechanism (CDM) opportunities in Africa, CSD-15, and financial engineering for energy in Africa. IISD RS coverage of the meeting can be found at: <http://www.iisd.ca/ymb/gfse6/>

GFSE-7: The Seventh Meeting of the GFSE convened from 21-23 November 2007 in Vienna, Austria, under the theme "Energy Efficiency for Developing Countries - Strong Policies and New Technologies," and considered policies, case studies, and initiatives related to improving and promoting energy efficiency in developing countries, as well as opportunities, barriers, and the way forward. IISD RS coverage of the meeting can be found at: <http://www.iisd.ca/ymb/gfse7/>

INTERNATIONAL RENEWABLE ENERGY CONFERENCE

WIREC 2008: The Washington International Renewable Energy Conference convened from 4-6 March 2008, in Washington D.C., US, and addressed four themes: market adoption and finance; agriculture, forestry and rural development; state and local authorities; and research and development. IISD RS coverage of the meeting can be found at: <http://www.iisd.ca/ymb/wirec2008/>

BIREC 2005: The Beijing International Renewable Energy Conference was held from 7-8 November, 2005, in Beijing, China, and addressed practical measures, success stories and effective legislative and policy measures to create institutional and technical infrastructure and to make market forces work more effectively. Officials adopted the Beijing Declaration,

which recognizes the need for significant public and private financial resources and for investment in renewable energy and energy efficiency.

BONN RENEWABLES 2004: The first International Conference on Renewable Energy took place in June 2004, in Bonn, Germany. Delegates adopted three outcomes: policy recommendations; an international action programme; and a political declaration. The declaration called for the establishment of a global policy network, which led to the creation the Renewable Energy Policy Network for the 21st Century (REN21). IISD RS coverage of this meeting can be found at: <http://www.iisd.ca/sd/ren2004>

G8 AND RENEWABLE ENERGY

In July 2000, the Group of Eight (G8) leading industrialized countries established a Renewable Energy Task Force to identify actions to promote change in the supply, distribution and use of renewable energy in developing countries. In 2001, the Task Force concluded that renewable energy resources can sharply reduce local, regional and global environmental impacts, as well as energy security risks. At its Gleneagles Summit in July 2005, the G8 issued a joint statement in which the leaders announced a global dialogue on climate change, clean energy and sustainable development. The results of this global dialogue will be reported at the G8 summit in Hokkaido, Japan, in 2008.

REPORT OF THE MEETING

The Forum opened on Sunday evening, 18 May, with an opening ceremony followed by a reception. On Monday morning, delegates attended a plenary session on trends in the global energy scenario. In the afternoon, there were two debate sessions—one on linkages between climate change, energy security and renewable energy, and the other on market conditions for renewable energy versus fossil fuels.

On Tuesday, 20 May, delegates participated in seven roundtable sessions, three of which took place in the morning, while three others took place in the afternoon. Each addressed different aspects of hydropower, biofuels, biomass, solar and wind energy.

On Wednesday, 21 May, delegates attended a roundtable on the financial scenario for renewable energy. The Forum concluded just before noon with a closing ceremony.

This report summarizes, in chronological order, the keynote presentations and discussions that occurred during the opening ceremony, plenary sessions, debates and roundtables.

OPENING CEREMONY

Paulo Mac Donald Ghisi, Mayor of Foz do Iguaçu, welcomed participants to the meeting. He highlighted global environmental problems and noted that solutions will come from sharing knowledge and ideas on wind, water, plants, and the sun. He said that this meeting would inaugurate a new phase for finding solutions in the energy sector, and underscored public and private sector partnerships.



Paulo Mac Donald Ghisi, Mayor of Foz do Iguaçu

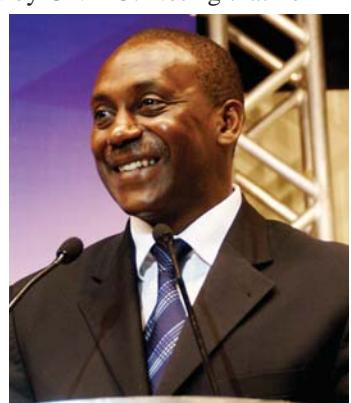


L-R: Paulo Mac Donald Ghisi, Mayor of Foz do Iguaçu; Edison Lobão, Minister of Mines and Energy of Brazil; Kandeh Yumkella, Director-General, United Nations Development Programme (UNIDO); José Antonio Muniz Lopes, President of Eletrobras

Jorge Miguel Samek, Brazilian Director-General of Itaipu Binacional, said that Itaipu is the biggest hydropower station in the world and is co-owned by Brazil and Paraguay. He highlighted the importance of this meeting and collaboration between Itaipu and the United Nations Industrial Development Organization (UNIDO). He also highlighted UNIDO's capacity to internationalize Itaipu's experience with power generation and environmental measures, and the Observatory on Renewable Energy joint program. He underscored that energy is fundamental for development, and said that 91% of Brazil's energy supply comes from hydroelectricity. Samek highlighted the need to expand the Brazilian energy matrix, and cited the crucial role played by Itaipu Hydroelectric. He welcomed the work of many municipalities surrounding Itaipu in developing renewable energy, including methane production from animal waste and sewage. He said Brazilian biodiesel provokes debates about food security, but noted that in Brazil there is no connection between food production and biodiesel production.

José Antonio Muniz Lopes, President of Eletrobras, the Brazilian electric utility, labeled Itaipu a "temple of electricity," highlighted its high standards and noted that it will soon lose its rank as the largest hydropower plant in the world. He described Eletrobras's first priority as contributing to the Brazilian Federal Government Programme for Acceleration of Growth (PAC). Lopes noted that Brazil's electricity matrix is hydropower-based, outlined future plans for windpower and biomass expansion and stated that high oil prices change the parameters for energy planning. Lopes also highlighted the reformulation of Eletrobras as a whole, and its goals for international expansion. He concluded by inviting ministers and other representatives from Africa and Latin America to explore possibilities for collaboration.

Kandeh Yumkella, Director-General, UNIDO, highlighted other related events organized by UNIDO. Noting that no development is possible without modern energy, he stressed the links between energy poverty and human poverty. Yumkella compared his visit to Itaipu to a "first visit to the Pyramids," and, highlighting integration of renewable energy sources, expressed hope that developing countries will take a second look at renewable energy sources. He emphasized that Africa has the worst energy poverty and the world's largest number of Least Developed Countries (LDCs). Yumkella also highlighted: the integration of renewable energy technologies and systems to allow



Kandeh Yumkella, Director-General, UNIDO

communities to have access to modern energy; technology acquisition and development; policies and regulations to provide the enabling environment to unleash the potential of renewables; the need for financing; and South-South cooperation. He noted UNIDO's chairmanship of UN-ENERGY and UN-ENERGY's objectives regarding energy and poverty, energy efficiency, and renewable energies. He underscored the challenges of climate change, record energy prices and increases in food prices. He said some countries are struggling

to cope with those combined problems, and stated that high energy prices will have fundamental impacts on industry and industrialization.

Edison Lobão, Minister of Mines and Energy, Brazil, noted some criticisms about Brazil's ethanol policy, which he said is a major success, not just as an alternative to fuel supply, but also as a project to reduce greenhouse gas emissions and combat climate change. He noted the flexible engines found in Brazilian automobiles, which can use either ethanol or gasoline. He said the accusation that the ethanol programme is damaging food security is misguided. He underscored high petroleum prices, which he said are responsible for the world's food crisis, and said Brazil's ethanol project should be congratulated rather than criticized. He summarized the history of Itaipu's joint construction between Brazil and Paraguay, and noted the integration of energy projects in South America, including those between Brazil and Argentina, Venezuela, Ecuador and Peru. He described a new joint project between Brazil and Peru to build hydroelectric generating capacity, which will provide energy and reduce energy costs for both Brazilians and other South Americans, and another project between Ecuador and Brazil to build a gas pipeline in South America.

Following these presentations, delegates saw a live performance by the Orquestra de Câmara do Paraná and the Choir of Itaipu, and then attended a welcome reception.

TRENDS IN THE GLOBAL ENERGY SCENARIO

This plenary session took place on Monday morning and was moderated by Altino Ventura, Secretary for Energy and Energetic Planning and Development, Ministry of Mines and Energy, Brazil. He said renewable energy has been increasing around the world as an alternative to fossil fuels, the latter now representing 81% of world energy consumption. He noted that oil price increases have also impacted prices for renewable energy. He emphasized that the switch from fossil fuel to renewable energy is important for reducing GHG emissions, and noted that many countries do not have the option of any energy sources other than fossil fuels.

Dimitri Piskounov, Managing Director, Programme Development and Technical Cooperation Division (PTC), UNIDO, highlighted that 2.4 billion people rely on traditional biomass for cooking, which results in deforestation, desertification, other negative environmental impacts and health problems, and said that 1.6 billion people, most



Edison Lobão, Minister of Mines and Energy, Brazil

of whom live in rural areas and LDCs, have no access to electricity. He discussed the growth of renewable energies, stating that renewable investments surpassed US\$ 70 billion in 2007. He underscored how climate change and high oil prices impact industry, as increased transportation costs offset the comparative advantage of low labor costs in some countries. Piskounov underscored the effects of post-harvest waste on food supply, noting the need for infrastructure and access to modern energy. He cited work on industrial energy efficiency from a system optimization approach, access to energy for productive use, and renewable energy for industrial activities.



Dimitri Piskounov, Managing Director, PTC-UNIDO

Carlos Arturo Flórez Piedrahita, Executive Secretary, Latin American Energy Organization (OLADE), explained OLADE's history and institutional arrangements. He noted that only 21% of hydropower potential and 4.2% of other renewable potential are used in Latin America and the Caribbean. Flórez noted diversification in the Latin American energy matrix in recent years and said that global factors determining energy trends are oil prices, improving living conditions, and environmental impacts. He underscored the importance of regional energy integration, democratization of energy services, economic and policy stability and legal frameworks at the regional level, and said that biofuels will contribute to economic diversification and create permanent employment.

Thomas Stelzer, Assistant Secretary-General for Policy Coordination and Inter-Agency Affairs, UN Department of Economic and Social Affairs (UN DESA), noted the Forum's objective of increasing access to energy and reducing poverty. He underlined the importance of increasing access to energy, which is key to achieving sustainable development and the Millennium Development Goals (MDGs). Stelzer said that there is currently a renewed appreciation of hydropower, with growing awareness that building dams requires planning and the

participation of affected individuals and groups, minimizing environmental impacts, and compensating where such impacts are unavoidable. He noted increasing South-South cooperation, including various joint venture agreements on transfer and diffusion of renewable energy technologies.

Anil Kane, President of the World Wind Energy Association, said wind is the fastest growing energy industry in the world, with installed capacity projected to reach 160000 MW over the next three years. He underscored differences between per capita energy consumption among developed and developing countries, highlighted projections for rapid growth in energy



Thomas Stelzer, Assistant Secretary-General for Policy Coordination and Inter-Agency Affairs, UN DESA

consumption and said that there are only three ways to meet this growing demand: fossil fuels; nuclear; and renewables. Noting climate change, other environmental problems caused by the consumption of fossil fuels and costs and proliferation problems with nuclear energy, he concluded that renewables, and in particular wind, are well positioned to meet humanity's growing energy demands.

Angus Friday, Chairman of the Alliance of Small Islands States (AOSIS), noted that climate change is a key driver for policy and actions to increase the use of renewable energy. He noted that the unsustainable pattern of consumption and production will need to change because the culture of consumption clashes with the culture of citizenship. He underscored that higher fuel prices are causing unrest in a number of nations, and highlighted the need for energy that is cleaner, safer, cheaper, and that can be accessed by all.

Christine Lins, Secretary General of the European Renewable Energy Council (EREC), outlined Europe's experience with energy and the possibility of moving to a more sustainable energy system. She said EREC is an umbrella group for a variety of renewable energy industries. She noted that the European Union's (EU) energy policy is based on three pillars: security of supply, competitiveness and sustainability. Lins stressed that countries with an energy supply based on renewable energy are less vulnerable to fluctuating oil prices and less dependent on imported energy. She noted the EU's target of having 20% of its energy production from renewable energy by 2020, and concluded that renewables will be the mainstream energy source of the future, contributing to security of supply, reducing climate change impacts and generating jobs.

DEBATE 1: LINKAGES BETWEEN CLIMATE CHANGE, ENERGY SECURITY AND RENEWABLE ENERGY

This debate took place on Monday afternoon and was moderated by Rodney Smith, World Business Review, BBC. The session included presentations by the panel members, followed by a panel discussion.

Rodney Smith noted that \$126 for a barrel of oil was not even imagined until recently and highlighted the ongoing deployment of renewable and energy efficiency technologies. Smith emphasized that it was very appropriate to hold this conference in Brazil, which took the lead in biofuels in the 1970s. He said that Brazil has huge reserves of both natural resources and intellectual skills.

Stephen Karekezi, Director of the African Energy Policy Research Network, said the rationale for renewables in Africa is security and the possibility for a new growth industry. He noted that environmental concerns in Africa are more at the household and local level than at the global level. He said that the renewables versus food debate is misguided in Africa, because in many African countries renewable energies are key to producing more food and income, and cited examples from the sugar, tea and vegetable/flowers industries. He recommended three policy measures to promote renewables: feed-in tariffs for renewable electricity; pre-established prices for biofuels; and a mandatory blending ratio for liquid biofuels.

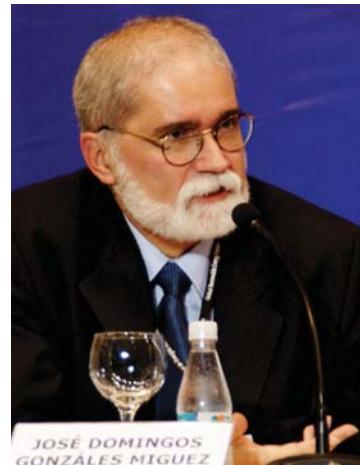
Katja Lautar, State Secretary, Government Office for Growth, Slovenia, said that past industrial revolutions were fuelled by fossil fuels, but that we now need a new industrial revolution based on renewables. She said it should be a global revolution, with collaboration between developed and developing countries. She underscored the

need to restrain energy consumption as quickly and cost-effectively as possible. She highlighted the EU commitments on energy efficiency, use of renewables and greenhouse gas emissions. Noting the Bali roadmap mapping out the way forward for UN climate change negotiations, she emphasized the need for a global agreement, and underscored that climate

change cannot be addressed only by policies and technology, but that a change in people's mindsets is needed.

Jaume Margarit, Director for Renewable Energy at the Institute for Energy Saving and Diversification (IDAE), Spain, underscored IDAE's role in the demonstration and deployment of energy technologies and in raising public awareness. He highlighted high uncertainty in the energy sector due to high oil prices and unclear alternatives. Margarit emphasized the need for energy efficiency and noted that energy efficiency comprises both technology and how technology is used.

José Miguez, Ministry of Science and Technology, Brazil, outlined the importance of renewable energy, and stressed the unequal worldwide distribution of per capita GHG emissions.



José Miguez, Ministry of Science and Technology, Brazil

He noted that Brazil's production of ethanol is concentrated in the São Paulo State, far away from the Amazon. He cited opportunities for biodiesel, said that food security is a false dilemma for Brazil since the country still has available farming land, and explained that increasing pasture productivity results in the expansion of ethanol and biodiesel. Miguez also said that higher food prices for Brazil are linked to higher oil prices, increased demand for food, and speculating on financial markets.

Discussion: Smith asked participants about the linkage between food security and biofuel/biodiesel production. Miguez noted that there is a considerable amount of land available for biodiesel production in both Latin America and Africa. Stephen Karekezi noted that in Brazil there is no land-use change from growing food compared with producing ethanol. He underlined that Africa depends on American food production due to imposed policies, which removed farming subsidies and resulted in the destruction of local capacity for food production. Katja Lautar said energy efficiency is very important and should be combined with renewable energy, which depends on local conditions. Jaume Margarit said the use of biofuels for transport will help with food security, and highlighted the great potential of using windpower and geothermal energy. Stephen Karekezi said Africa can use biofuels to fulfill Africa's own energy needs, and said the



Katja Lautar, State Secretary, Government Office for Growth, Slovenia

Brazilian model is a good example of fulfilling national needs. Miguez said hydropower and biodiesel are part of the solution for the energy sector rather than part of the problem.

DEBATE 2: MARKET CONDITIONS FOR RENEWABLE ENERGY VERSUS FOSSIL FUELS

This debate, which took place on Monday afternoon, was also moderated by Rodney Smith. Smith noted that investment in renewables is above US\$100 billion annually, and highlighted that the greatest challenge for renewables remains the possibility of cheap oil. He underscored that while developed countries can afford to support long-term investment in renewables, this is not the case for most developing countries, and emphasized the inertia of global energy markets, which are dominated by transnational corporations whose main interests are trading in fossil fuels and centralized energy systems.

Abeeku Brew-Hammond, University of Science and Technology, Ghana, elaborated on success stories and failures for renewables in Africa. He emphasized increasing



Abeeku Brew-Hammond, University of Science and Technology, Ghana

ethanol exports from African countries, noting that growth is due to private investment from established industries, with little or no government support. He underscored the importance of biofuels to the promotion of economic growth and job opportunities.

Herbert Greisberger, Secretary-General of the Austrian Society for Environment and

Technology (OGUT), said energy demand is increasing worldwide. He said industrialized countries are most responsible for causing climate change, and that cooperation with developing countries is needed to respond. He underscored increased investments in renewables by industry and utilities, noting that large corporations have the capacity to remove some trade barriers and level the playing field with fossil fuels. He concluded that market conditions for renewables would continue to improve.

Nebojsa Nakicenovic, International Institute for Applied Systems Analysis (IIASA), said the debate should be framed in terms of sustainable energy versus non-sustainable energy. He outlined global energy challenges, including sustainable access to food and energy, increased security and reliability for energy systems, and tackling climate change. He said that one of the few technologies that can generate negative emissions is sustainable biomass coupled with carbon sequestration. Nakicenovic emphasized insufficient investments in sustainable energy research and development.

Raúl Sendic, President of the National Administration for Fuels, Alcohol and Portland of Uruguay (ANCAP), said that the world's energy system is in crisis given oil high prices, climate change and lack of access to modern energy by one third of the world's population. He noted that despite dramatic increases in oil prices, demand has not decreased, while oil consumption is increasing at a rate six times higher than new supplies are being discovered. He underscored the need for a

new model based on energy and food sovereignty, and called for increased consideration of integrated production of energy and food. He said the emerging market for biofuels should ensure sustainable production of biofuels through the use of sustainability certificates.

Fábio Rosa, Special Representative for the Renewable Energy and Energy Efficiency Partnership (REEEP), noted that REEEP is a Global Type II Partnership, and focuses on generating green energy and promoting energy savings. He underscored that the energy sector is highly regulated, with institutional paradigms and large-scale models that are centralized and replicated worldwide. He highlighted the differences between renewable energy and traditional technologies, and the need for new models for financing, legislation and administration.

Discussion: Rosa said that energy companies should not be expected to democratize energy access by themselves, because they have a culture of centralized generation and distribution. Greisberger said greenhouse gas emissions are still increasing despite changes taking place in the energy industry, and stressed the need for more investment in renewable energy. Greisberger noted that changing technology is easier than changing unsustainable individual behavior. Sendic said that the energy industry needs to deal with new actors, including farmers. Brew-Hammond said energy companies have benefited from privileged regulations. Smith asked about the possibility of establishing a global fund for renewable energy. Brew-Hammond said that for Africa, the key to promoting renewable energy is to strengthen regional institutions and develop standardized policy guidelines. Nakicenovic noted the need to establish long-term rules across regions that would help to promote small businesses.

ROUND TABLE 1: LARGE HYDROPOWER – POTENTIAL AND OUTLOOK

This roundtable took place on Tuesday morning and was moderated by Albert Geber de Melo, Electric Energy Research Centre (CEPEL), Brazil. He underscored the role of hydropower in reducing greenhouse gas emissions, producing cheap electricity and fighting poverty. He said energy should be a vector for, and not a barrier to, sustainable development.

Richard Taylor, Executive Director, International Hydropower Association, said there is no discontinuity



Richard Taylor, Executive Director, International Hydropower Association

between small- and large-scale hydropower, as the important issue is the sustainable use of the resource. He said that despite a very high energy payback ratio and the long life of generating equipment, financing hydropower can be difficult due to differences in revenue and financing cycles. He said that greenhouse gas emissions from hydropower are due to the IPCC considering reservoirs as managed lands, and underscored that hydropower does not consume the water it uses.

Shree Govind Shah, Technical Manager of Binational Project Pancheshwar, India and Nepal, described the Nepal hydropower region, including electricity demand, generation potential, projects and agreements among the five countries in the region. He also noted the impacts of hydropower, such as submersion of villages and displacement of people, and social resistance to high dams in India and Nepal.

N. P. Singh, Ministry of New and Renewable Sources of Energy, India, described the history of hydropower in India and the Indian electricity sector, including institutional arrangements. He underscored India's basin-wide hydropower state policies.

Jorge Miguel Samek noted that Brazil has an integrated electricity system, in contrast with other countries of similar size.



Jorge Miguel Samek, Brazilian Director-General of Itaipu Binacional

He cited the Growth Acceleration Programme (PAC), which includes over US\$156 billion in investment in energy, 1.2GW of new installed power capacity and 13826 km of new power lines. Samek highlighted Itaipu as a feat not only of civil engineering, but also of legal and economic engineering. He said the value of Itaipu in the market today is US\$60 billion and that after 2023 it will

be completely paid for and will become a main driver for development of Brazil and Paraguay.

ROUND TABLE 2: SOLAR ENERGY – POTENTIALS IN INDUSTRIAL APPLICATIONS AND PRODUCTIVE USES

This roundtable took place on Tuesday morning and was moderated by Laura Porto, Director, Department of Energy Development, Ministry of Mines and Energy, Brazil.

Mohamed Gamal, New & Renewable Energy Authority, Egypt, described renewable energy activities in Egypt. He noted the high solar potential in Egypt and advances in solar thermal technology, with over 14 solar-water heating companies and 500,000m² of installed capacity. He described demonstration projects on solar heating, solar photovoltaic, solar thermoelectric and windpower.

Shirish Garud, Tata Energy Research Institute (TERI), presented on India's experience with solar thermal technologies for industrial applications. He underscored the high potential and recent growth of the solar thermal industry in India, which now includes more than 60 companies. He highlighted barriers to renewables including site constraints, awareness and willingness to invest, and technical capacity, and also noted the importance of South-South cooperation.

Diego Martínez Plaza, Director of the Solar Platform of Almería, Spain, explained solar thermoelectric technology and highlighted its capacity to provide peak power in the summer with no water requirements. He emphasized the role of Spain's feed-in tariff policy in creating a wealth of new projects in Spain. He said tower technology is more efficient than cylindrical concentrators, noted the possibility of thermal storage for power generation at night, and stressed that size matters regarding power facilities, because of economies of scale in the electricity sector.

Xi Wenhua, Director, UNIDO International Solar Energy Center for Technology Promotion and Transfer, presented on the status of solar energy research and development in China. He said China has built 13 million square meters of solar buildings over the past several years and has deployed more than 800,000 solar cooker sets, mostly in Northern China. He also highlighted the role of UNIDO in the Solar Energy International Center.

Hamilton Moss, CEPEL, Brazil, highlighted the Forum's objective of promoting dialogue and collaboration. He stressed the great potential to increase solar heating for residential and commercial use. He underscored the role of photovoltaics for rural electrification, stressing its appropriateness for small communities, and noted the current economic feasibility of smaller systems.

ROUND TABLE 3: BIOENERGY - LIQUID BIOFUELS AS A VIABLE ALTERNATIVE TO FOSSIL FUELS

João José de Nara Souto, Ministry of Science and Technology, Brazil, moderated this roundtable on Tuesday morning. He emphasized that over the last 30 years the use of ethanol in Brazil has saved the use of 1.2 billion barrels of oil. Souto underscored that the sugar and ethanol industry in Brazil generates jobs in rural areas.

Dan Arvizu, Director of National Renewable Energy Laboratory, US, outlined world biomass energy flows. He compared biodiesel with ethanol, noting differences in productivity, and highlighted the US focus on reducing cellulosic ethanol costs. He noted that the promise for renewables could be realized if we, *inter alia*, aggressively seek a global sustainable energy economy and accelerate investment in technology.

José Turbino, UN Food and Agriculture Organization (FAO), outlined the opportunities and risks associated with the use of bioenergy for food security in Latin America and the Caribbean. He compared the expansion of sugar cane, soy and corn in Brazil, and noted that food security, poverty and inequality are the main problems for Latin America, with 10% of its population in a situation of chronic malnutrition. He said massive production of biofuels could negatively impact food production, and noted that subsidies can also damage food security.

Ricardo de Gusmão Dorneles, Director of the Department of Biofuels, Brazil, noted that the production of biofuels, *inter alia*: promotes diversification of the energy matrix; increases domestic energy security; favors food security by structuring and developing agricultural activities; generates income in a sustainable manner, especially in rural areas; and motivates economic development at national and regional levels.



L-R: Ricardo de Gusmão Dorneles, Director of the Department of Biofuels, Brazil; Dan Arvizu, Director of National Renewable Energy Laboratory, US; João José de Nara Souto, moderator, Ministry of Science and Technology, Brazil; José Turbino, FAO; Thomson Sinkala, Chair of the Biofuels Association of Zambia; and Helena Chum, National Renewable Energy Laboratory, US

Thomson Sinkala, Chair of the Biofuels Association of Zambia, identified reasons for Zambia's efforts to develop biofuels, including: energy security; high oil prices; energy shortages; and poverty reduction. He noted the importance of stakeholder participation in choosing where biofuels would be developed in Zambia.

Arturo Infante Villarreal, National Coordinator of the Sustainable Development of Biofuels, Colombia, outlined Colombia's national policy guidelines for the feasibility of developing biofuels, and noted that domestic policy is oriented to promote sustainable production of biofuels and diversify Colombia's energy matrix.

Helena Chum, National Renewable Energy Laboratory, US, underscored the importance of innovation in biofuels, as well as sustainability considerations. She stressed that trade was required to sustain biofuels expansion, noting possible regional interdependence as a consequence of such trade.

ROUND TABLE 4: WIND ENERGY - OVERALL POTENTIAL AND OPPORTUNITIES

This roundtable was moderated by Alberto Geber de Melo, CEPEL, on Tuesday afternoon. He underscored that there is 53GW of potential for windpower in Brazil, and, noting that integration is key, said there is no need for competition among renewable energy sources.

Jens Peter Molly, Executive Director, German Wind Energy Institute (DEWI), underscored technical issues and other aspects of offshore windpower applications in Germany. He noted commercial hub heights of up to 160m, and predicted that 10MW turbines would be available by 2010. Regarding small wind turbines for rural areas, he said there is no real market, just market potential. He noted that the world's windpower capacity was 94,000MW at the end of 2007.

Stefan Hantsch, Secretary General of Austrian Wind Energy Association, underscored high co-ownership of wind farms by local populations in Austria. He emphasized political support for renewables in Europe and explained feed-in tariffs, which include a fixed price, a purchase obligation and guaranteed and regulated grid access. Noting that wind energy is increasingly competitive, he said that the prospects for wind power in the future are bright.

Ildar Utyamyshev, Russian Academy of Natural Sciences, noted the small penetration of windpower in the Russian Federation. He outlined Russian wind projects, including a wind-powered water desalination project.

Erico Spinadel, President of the Argentinean Association of Eolic Energy (AAEE), noted that there are over 600,000 wind water pumps in use in the Pampa region. He underscored



Jens Peter Molly, DEWI Executive Director, noted commercial hub heights of up to 160m, and predicted 10MW turbines by 2010

that Germany's installed windpower capacity is larger than all of Argentina's electric capacity, highlighted the vast wind resource potential of the region of Patagonia, and explored the idea of possible future exports of wind-generated hydrogen.

Telmo Gabarain Astorqui, Iberdrola, said civilization is based on an unsustainable energy model. He said low windpower development in Latin America is due to the large hydroelectric potential, which is cheaper. He said political will to promote renewables in the region needs to be translated into policies with quantitative targets and timeframes, and with a clear allocation of enforcement and monitoring responsibilities.

Lauro Fiúza, President of Brazil Wind Energy Association, said Brazil is only 27th in world windpower production, despite having a large resource potential. He highlighted seasonal complementarity between hydropower and windpower.

ROUND TABLE 5: BIOENERGY – POTENTIALS AND CHALLENGES IN INDUSTRY

Carlos Cristo, Ministry of Industrial Development, Brazil, moderated this roundtable on Tuesday afternoon. He underscored the importance of certificates, noting that certification could promote transparency and consolidation of common interests, ensuring respect for the environment and labor regulations.

Pradeep Monga, Chief of the Renewable and Rural Energy Unit, UNIDO, said there are immense untapped opportunities and challenges to promoting renewables for productive use and industrial applications. He identified drivers for biomass development, including: high and volatile oil prices; climate change; agricultural and trade policies; sustainability issues; and technological advances and efficiency. He also said that the future lies in an integrated bio-refinery approach.



Pradeep Monga, Chief of the Renewable and Rural Energy Unit, UNIDO

Arnaldo Walter, Campinas University (UNICAMP), noted that the share of biomass in the industrial sector for energy purposes is more relevant in Africa and in Latin America, and compared biomass use in the industrial sectors of the US, Sweden, Brazil, India and Finland. Walter described state-of-the-art technologies, including direct combustion, gasification, co-firing, charcoal, and combined heat and power.



Semida Silveira, School of Industrial Engineering and Management, Sweden

Semida Silveira, School of Industrial Engineering and Management, Sweden, addressed the issue of reinventing rural areas to realize bioenergy potential. She highlighted the importance of modernizing the agricultural sector, the

existence of trade-offs in bioenergy. Silveira said Africa and Latin America are the regions with the largest potential for producing bioenergy.

Hubert Seiringer, Chairman of Austrian Compost and Biogas Association, noted that biogas will play a larger role in the future energy mix, and underlined the importance of making biodiesel a sustainable industry. He noted that upgrading to biogas is very efficient, generates minimal air pollution, and increases energy security.

Ricardo de Gusmão Dorneles, Director of the Department of Biofuels, Brazil, noted the variety and capacity of biofuels to serve decentralized demand. He outlined Brazil's distribution and resale of biofuels.

ROUND TABLE 6: SMALL HYDRO – POTENTIALS AND OPPORTUNITIES

Antônio Otelo Cardoso, Technical Director of Itaipu Binacional, moderated this roundtable on Tuesday afternoon. He outlined the role of small hydropower in the Brazilian energy matrix, and said small hydropower is complementary to large hydropower, promotes social and environmental benefits, and permits the participation of companies of various sizes.

Mentor Poveda, OLADE, outlined the potential for small hydropower in the Latin America region, described many



Mentor Poveda, OLADE

installations in the region, and described small hydropower advantages, including reduced costs and financial risks, and greater social and environmental benefits. He noted the importance of including energy efficiency in national plans.

Firmino Mucavele, New Partnership for Africa's Development (NEPAD), outlined the problems and challenges faced by African countries, which include: low

economic development; low financial investments in the energy sector; a high concentration of the population living in rural areas; and high oil costs that increase food insecurity. Mucavele stated that strategies to solve such problems include partnerships and promotion of economic growth and sustainable development.

Arun Kumar, Head of the Alternate Hydro Energy Centre, India, said the biggest issue for small hydropower is policy support for integration. He also noted barriers to the development of small hydropower, including inventory of sites and master plans, financing and commercial issues.



L-R: Antônio Otelo Cardoso, ITAIPU Binacional; moderator, Firmino Mucavele, NEPAD; Geraldo Lúcio Tiago Filho, Secretary-Executive, National Centre of Small Hydroelectric Plants, Brazil; and Tong Jiandong, Director-General, International Network on Small Hydro Power

Geraldo Lúcio Tiago Filho, Executive-Secretary of the National Centre of Small Hydroelectric Plants, Brazil, highlighted some difficulties with small hydropower, such as developing appropriate turbines, using non-conventional turbines, establishing mobile dams, and identifying fish-friendly turbines. He noted that the biggest Brazilian energy challenge is supplying isolated communities, such as the ones in the Amazon, where two million people do not have access to electricity.

Tong Jiandong, Director-General, International Network on Small Hydro Power, outlined the development of small hydropower in China and related challenges. He explained that there are many variable definitions of small hydropower around the world. He noted the difficulty in realizing small hydropower potential and noted that low energy demand in rural areas often does not foster investment.

ROUND TABLE 7: FINANCIAL SCENARIO FOR THE RENEWABLE ENERGY

Ubirajara Meira, Eletrobras, Brazil, moderated this roundtable on Wednesday morning. He highlighted projects managed by Eletrobras across Brazil.

Mauricio Garrón, Andean Development Corporation (CAF), described the evolution and development of renewable energy in Latin America. He noted types of financing mechanisms for renewables, including government programmes, private capital, and the Kyoto Protocol's Clean Development Mechanism (CDM). He said that hydro and geothermal energy have high initial costs and long amortization periods compared with fossil fuel sources.

Michel Bachelier, CEO of Trellis Capital Ltd., described public-private partnership models for financing. He underscored the emergence of dedicated financial players in the renewable energy industry and stressed that the risk profile of any project will be not be lower than the risk profile of the hosting country. He identified financing issues, including foreign exchange risk, sensitivity to interest rates and political risk.

Steve Dore, CEO of International Innovation Services Limited, United Kingdom, underscored renewable energy as a platform for economic growth, and cited the case of Shellfield in the UK. He noted that in some cases, external investment does not benefit locals, and stated that to promote development, local involvement is needed. He also outlined a biomass project proposal for East Africa using jatropha plants.

Debashish Majumdar, Chairman of the Indian Renewable Energy Development Agency Limited (IREDA), presented on the power scenario in India and on IREDA's activities. He underscored the importance of long-term and stable policies to promote renewable energies, stressed feed-in tariffs and emphasized that renewable energy provides a hedge against future changes in energy prices.

CLOSING SESSION

Jorge Miguel Samek noted the importance of increasing energy production in a sustainable manner, and thanked everyone who helped to make this Forum happen.

Kandeh Yumkella, Director-General of UNIDO, highlighted future collaboration with Brazil. He underscored the fruitful exchange of information at the Forum, noting that it fulfilled the UN role to act as honest information broker. He said that a regional approach is critical to success, and announced that the next Forum will likely be hosted by Mexico.

Ubirajara Meira, Eletrobras, highlighted the negative impacts of climate change, emphasized the need to reduce the use of fossil fuels and to deeply change the behavior of societies, especially in the developed world. He closed the Forum at 11h58m.

UPCOMING MEETINGS

INTERNATIONAL COOPERATION ON ENERGY EFFICIENCY: WORKING TOGETHER FOR A LOW-CARBON ECONOMY: This meeting will take place in Geneva, Switzerland, on 28 May 2008. Organized by the Energy Charter Secretariat in cooperation with the Energy Efficiency 21 Project of the UN Economic Commission for Europe and the International Energy Agency, it will bring senior governments and industry experts together with officials from international bodies to discuss ways to improve energy efficiency outcomes through enhanced international cooperation. For more information, contact: Energy Charter Secretariat; tel: +32-2-775-98-51/98-54/98-00; fax: +32-2-775-98-34; e-mail: Geneva2008@encharter.org; internet: <http://www.encharter.org/index.php?id=285&L=0>

FIFTH INTERNATIONAL CONFERENCE ON THE EUROPEAN ELECTRICITY MARKET: This conference will take place in Lisbon, Portugal, from 28-30 May 2008, and will address issues related to renewable energies and distributed generation. For more information, contact: ISEL/DEEA Power Systems Unit; tel: +35-1-218-31-70-09; fax: +35-1-218-31-70-09; e-mail: info@eem08.org; internet: http://www.eem08.org/index.php?option=com_frontpage&Itemid=1

FOURTH TOKYO INTERNATIONAL CONFERENCE ON AFRICAN DEVELOPMENT: This conference will take place in Yokohama, Japan, from 28-30 May 2008, and seeks to promote high-level policy dialogue between African leaders and development partners. For more information, contact: Japanese Ministry of Foreign Affairs; tel: +81-3-3580-3311; internet: <http://www.mofa.go.jp/region/africa/ticad/ticad4/>

G8 ENERGY MINISTERS' MEETING: This meeting of the eight leading industrialized nations' (G8) energy ministers will take place in Aomori City, Japan, from 7-8 June 2008. The meeting will convene in preparation for the 2008 G8 Summit, to be held 7-9 July 2008 in Hokkaido, Japan. For more information, contact: internet: <http://www.do-summit.jp/en/about/summary02.php>

TWENTY-EIGHTH SESSIONS OF THE UNFCCC SUBSIDIARY BODIES: These sessions will take place in Bonn, Germany, from 2-13 June 2008. They include the second meeting of the *Ad Hoc* Working Group on Long-Term Cooperative Action under the Convention and the resumed fifth session of the *Ad Hoc* Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol. For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; internet: <http://www.unfccc.int>

HIGH-LEVEL CONFERENCE ON WORLD FOOD SECURITY AND THE CHALLENGES OF CLIMATE CHANGE AND BIOENERGY: This conference will take place in Rome, Italy, from 3-5 June 2008. Organized by the UN Food and Agriculture Organization, the conference will address food security and poverty reduction in the face of climate change and energy security. A series of expert

meetings and stakeholder consultations will take place during the January-April 2008 period as part of the preparatory process. For more information, contact: Office of the Assistant Director-General, Natural Resources Management and Environment Department; tel: +39-06-570-53-51; fax: +39-06-570-53064; e-mail: cccb-secretariat@fao.org; internet: http://www.fao.org/foodclimate/home.html?no_cache=1&L=7

SEVENTH WORLD WIND ENERGY CONFERENCE

AND EXHIBITION: This conference will take place in Kingston, Ontario, Canada, from 24 June-26 June 2008. The theme of the conference will be "Community Power," reflecting issues relating to ownership and development of renewable energies. It will focus on renewable energy technologies for electricity generation. An exhibition and training sessions on project management, financing, governance and community engagement will also be held. For more information, contact: Ontario Sustainable Energy Association; tel: +1-416-977-44-41; fax: +1-416-977-21-57; e-mail: info@wwec2008.com; internet: <http://wwec2008.com>

G8 SUMMIT: This summit of the eight leading industrialized nations (G8) will convene in Hokkaido, Japan, from 7-9 July 2008. For more information, contact: Japanese Ministry of Foreign Affairs; tel: +81- 3-03-580-33-11; internet: <http://www.mofa.go.jp/policy/economy/summit/2008/info/index.html>

TENTH WORLD RENEWABLE ENERGY

CONGRESS: This Congress will be held in Glasgow, Scotland, UK, from 19-25 July 2008. For more information, contact: A. Sayigh, World Renewable Energy Congress/Network; tel: +44-1273-625-643; fax: +44-1273-625-768; e-mail: asayigh@netcomuk.co.uk; internet: <http://www.wrenuk.co.uk/wrecx.html>

2008 EU PRESIDENCY RENEWABLE ENERGY

POLICY FORUM: This forum will take place from 17 - 22 November 2008, in Paris, France. This event will be a major platform for discussions on the European Renewable Energy Directive. For more information, contact: Sophie Liberatore; tel: +32-2-546-19-33; fax: +32-2-546-19-34; e-mail: sophie.liberatore@ec.europa.eu; internet: <http://www.erec.org/nc/calendar-of-events/>

FOURTEENTH CONFERENCE OF THE PARTIES

TO THE UNFCCC AND FOURTH CONFERENCE OF THE PARTIES SERVING AS MEETING OF THE PARTIES TO THE KYOTO PROTOCOL: These meetings are scheduled to take place in Poznan, Poland, from 1-12 December, 2008. They will coincide with the 29th meetings of the UNFCCC's Subsidiary Bodies. For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; internet: http://unfccc.int/meetings/unfccc_calendar/items/2655.php?year=2008



Participants and organizers at the closing session of the Forum, which ended at 11h58m on Wednesday, 21 May 2008