World Future Energy Summit Bulletin

A Summary Report of the World Future Energy Summit (WFES) 2012

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SUMMARY OF THE WORLD FUTURE ENERGY SUMMIT 2012: 16-19 JANUARY 2012

The Fifth World Future Energy Summit (WFES) 2012 took place in Abu Dhabi, United Arab Emirates (UAE), from Monday, 16 to Thursday, 19 January 2012, hosted by Masdar. WFES was attended by over 25,000 participants, including 3,000 summit delegates from 148 countries, three heads of state, ministers, the UN Secretary-General, heads of intergovernmental agencies, and over 700 exhibitors.

The Summit was convened around a high-level segment focusing on policy and strategy, and three forums on: business and policy; technology and innovation; and finance and regulation. Issues considered by WFES participants included: wind power; solar power; natural gas; energy efficiency; cities; transportation; China; rural development; and capacity building; technology; energy storage; energy-smart infrastructures; carbon capture and storage (CCS); bioenergy; nuclear power; regulations and trade; venture capital; and innovation on financial products for sustainable energy.

In addition to the Summit sessions, WFES 2012 included an exhibition, the Project Village, roundtable discussions, Innovate @ WFES, the Young Future Energy Leaders programme, corporate meetings and social events. Many WFES participants attended the award ceremony for the Zayed Future Energy Prize for long-term vision and leadership in renewable energy and sustainability, which was awarded to Schneider Electric, Ashok Gadgil, and the Carbon Disclosure Project.

The following report contains a summary of the WFES sessions, as well as a sample of the side events. Summaries of the plenary sessions are grouped in chronological order, followed by summaries of the parallel sessions and side events. More detailed information and photographs can be found at: http://www.iisd.ca/ymb/energy/wfes/wfes2012/.

A Brief History of Multilateral Processes on Renewable Energy

Renewable energy is an essential element for addressing energy security, economic recovery, climate change, and poverty reduction. Therefore, there is a growing international dialogue on the need to scale-up sustainable and renewable energy both regionally and globally. Since the UN Conference on Environment and Development (UNCED) in 1992, in Rio de Janeiro, Brazil, various UN and international organizations and agencies have been active on these issues, and numerous related international conferences and fora have convened, as summarized below.

HH General **Sheikh Mohamed bin Zayed Al Nahyan**, Crown Prince of Abu Dhabi, visits the booth of the UAE Department of Municipal Affairs

WFES

Since its inception in 2008, WFES has evolved as the world's foremost annual meeting for the renewable energy and environment industry. Abu Dhabi, UAE, has hosted WFES annually to promote innovation and investment opportunities surrounding renewable energy and environment. WFES brings together project owners and solution providers with investors and buyers from both the public and private sectors. Held from 17-20 January 2011, the fourth WFES brought together 26,391 attendees from 137 countries.

UN CONFERENCES AND SUMMITS

The international community's first major attempt to develop a strategy for the use of alternative fuels was the 1981 Resolution by the 36th UN General Assembly (UNGA 36) (A/RES/36/193) on the outcomes of the UN Conference on New and Renewable Sources of Energy which had convened in

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http://wfes.iisd.mobi/

Nairobi, Kenya in August 1981). UNCED, which met in 1992 in Rio de Janeiro, Brazil, then adopted Agenda 21, an action plan for implementing sustainable development. Agenda 21 addresses sustainable energy in Chapter 9, which notes the increasing need to rely on environmentally-sound energy systems, particularly new and renewable sources of energy.

In April 2001, in New York, US, the ninth session of the UN Commission on Sustainable Development (CSD 9) adopted Decision (E/CN.17/2001/19) on "Energy for Sustainable Development," addressing issues such as the role of the private sector, research and development, institutional capacities, financial support, energy accessibility, and rural energy. IISD Reporting Service's (RS) coverage of CSD 9 can be found at: http://www.iisd.ca/csd/csd9/index.html

The World Summit on Sustainable Development (WSSD), held in August-September 2002 in Johannesburg, South Africa, adopted the Johannesburg Plan of Implementation (JPOI), which addresses renewable energy in several of its chapters, including on poverty eradication (Chapter II), sustainable consumption and production patterns (Chapter III), small island developing states (Chapter VII), and Africa (Chapter VIII). IISD RS coverage of WSSD can be found at: http://www.iisd.ca/2002/wssd.

Held in New York, US, in May 2007, CSD 15 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.

In December 2010, UNGA 65 adopted Resolution 65/151 proclaiming 2012 as the International Year for Sustainable Energy for All.

IREC PROCESS

At the WSSD, German Chancellor Gerhard Schröder invited the international community to a Conference on Renewable Energy. The International Renewable Energy Conference (IREC), "Renewables 2004," took place from 1-4 June 2004, in Bonn, Germany, and launched the series of IREC meetings. The conference led to the creation of the Renewable Energy Network for the 21st Century (REN21). IISD RS coverage of Renewables 2004 can be found at: http://www.iisd.ca/sd/ren2004.

The Beijing International Renewable Energy Conference (BIREC), hosted by China in November 2005, adopted the Beijing Declaration. The Washington International Renewable Energy Conference (WIREC) convened from 4-6 March 2008, in Washington DC, US, and resulted in the Washington International Action Programme, comprising over 100 pledges by countries and organizations. IISD RS coverage of WIREC 2008 can be found at http://www.iisd.ca/ymb/wirec2008/.

The Delhi International Renewable Energy Conference (DIREC 2010) took place from 27-29 October 2010, in New Delhi, India, and concluded with the DIREC Declaration and 30 new pledges by governments and civil society under the Delhi International Action Programme. IISD RS coverage of DIREC 2010 can be found at http://www.iisd.ca/ymb/energy/direc2010. The next IREC, Abu Dhabi Renewable Energy Conference (ABIREC), is scheduled to take place in Abu Dhabi, UAE, in January 2013, alongside WFES 2013.

IRENA

The International Renewable Energy Agency (IRENA) was established on 26 January 2009. IRENA's statute entered into force on 8 July 2010. As of January 2012, 148 countries and the European Union (EU) are signatories of IRENA, with 84 states and the EU having ratified its statute. The first session of the IRENA Assembly was held from 4-5 April 2011, in Abu Dhabi, UAE, and was attended by over 50 ministers. IISD RS coverage of the first Assembly can be found at: http://www.iisd.ca/irena/irenaa1/

The second session of the IRENA Assembly took place from 14-15 January 2012 in Abu Dhabi, UAE, attended by over 750 delegates from 74 member states, 50 signatories and accession states, 13 other non-member states, and 70 observer organizations. The meeting resulted in strengthening IRENA's institutional structure, and an expansion of its budget for 2012. IISD RS coverage of the second Assembly can be found at: http://www.iisd.ca/irena/irenaa2/

REPORT OF THE MEETING

PLENARY SESSIONS

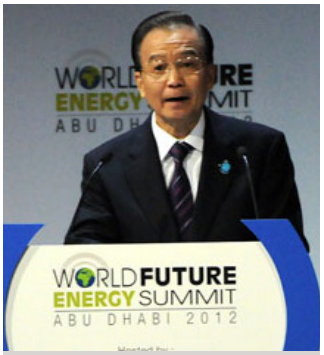
The opening ceremony took place on Monday, followed by plenary ministerial panels in the afternoon. Plenary sessions were held on Tuesday, Wednesday, and Thursday morning. The closing ceremony was held on Thursday afternoon.

OPENING CEREMONY

Sultan **Ahmed Al Jaber**, CEO, Masdar

Sultan Ahmed Al Jaber, CEO, Masdar, opened the Summit. Describing the World Future Energy Summit (WFES) as a platform for sharing experience and vision, Al Jaber offered examples of innovation and growth in the renewable energy sector, including increases in wind power, greater solar capacity, and cost reductions accompanied by technology improvements. He noted that, despite budgetary cuts due to the global financial crisis, the renewable energy industry and green economies are important contributors to economic activity and growth. He highlighted the importance of regulatory frameworks to improve the efficiency of renewable energy technologies and reduce their costs, adding that renewable energy makes strategic sense.

Wen Jiabao, Premier, China, stressed the historic connection between harnessing energy and human progress. He explained China's efforts to drive sustainable economic development, including: reducing greenhouse gas emissions despite already lower emissions per capita than developed countries; reducing energy consumption across several sectors; creating new jobs; developing and installing clean and efficient energy facilities; launching national energy conservation projects; and advocating low-carbon lifestyles. He said China's energy consumption per unit of GDP fell by about 20% between 2005 and 2010, and there are plans to cut energy and carbon intensities by 16% and 17%, respectively, between 2010 and 2015. Wen said China plans to gradually increase the contribution of renewable and nuclear energy. He said



Wen Jiabao, Premier, People's Republic of China

that China would continue to strengthen exchanges and cooperation with the International Renewable Energy Agency (IRENA).

Kim Hwang-sik, Prime Minister, Republic of Korea

Kim Hwang-sik, Prime Minister, Republic of Korea, described Korea's low-carbon, green growth strategy. He underscored that Korea invests 2% of its GDP annually in green technologies and aims to become the world's fifth-largest producer of green energy by 2030. He emphasized accelerating the worldwide spread of renewable energy and the replacement of fossil fuels. He commended the role of IRENA in promoting renewable energy technology and said Korea will continue to work with the UAE to further promote the use of renewable energy.

Nassir Abdulaziz Al-Nasser, President, UN General Assembly, highlighted the UN 2012 International Year of Sustainable Energy for All. He described providing low-cost energy as a tool to limit poverty, increase welfare, improve quality of life, and realize sustainable development. He encouraged capacity building and technology transfer for limiting greenhouse gas emissions and combatting climate change. He identified the United Nations Conference on Sustainable Development (UNCSD or Rio+20) meetings as an opportunity to promote the use of clean and renewable energy to create a more peaceful, sustainable world.

UN Secretary-General Ban Ki-moon stressed the need to end energy poverty to ensure equal opportunities. He underscored the need for universal energy access and innovation to scale-up clean energy and energy efficient technologies. He stressed reducing greenhouse gas emissions and improving energy efficiency. He described Rio+20 as the beginning of a multi-year mission to achieve sustainable energy for all, and called for a new energy future that harnesses the power of technology and innovation in the service of people and the planet.

Ban Ki-moon, UN Secretary-General

Bertrand Piccard, President, Solar Impulse, highlighted the flight of a manned solar airplane over a day-night cycle requiring no fossil fuel. He said the goal was to create a revolution in the way people think about renewable energy. He underscored that innovation and clean technologies are profitable and create jobs. Piccard noted that while renewable energy has a higher price, it has a lower cost than fossil fuels because the price of fossil fuels does not include their environmental or geopolitical costs. He stressed that political courage is needed to create regulatory frameworks that minimize energy waste.

Aiden Dwyer, a 14-year-old American innovator, shared that when he learned tree branch growth followed the Fibonacci Sequence, a common pattern in nature, he applied this concept to improving the efficiency of solar panels.

MINISTERIAL PANELS

Ministerial-level panels were held on Monday afternoon.

Kandeh Yumkella, Director General, United Nations Industrial Development Organization (UNIDO)

Ministers' Panel on Sustainable Energy for All: Kandeh Yumkella, Director-General, United Nations Industrial Development Organization (UNIDO) moderated this panel.

Ban Ki-moon and Kandeh Yumkella discussed energy access. Ban Ki-moon underlined that energy is a key tool to achieve the Millennium Development Goals (MDGs), and lamented that large portions of the world still lack decent and reasonable access to energy. Underlining linkages between energy poverty and achieving the MDGs, Ban Ki-moon announced his energy access initiative targets for 2030: providing universal energy access; doubling energy efficiency; and 30% energy from renewable sources.

Farooq Abdullah, Minister of New and Renewable Energy, India, said his ministry is using renewable energy in villages to provide jobs in rural areas to slow migration into urban areas. He noted that his country is creating a stable environment to promote private investment in renewables to provide the energy India needs to sustain its growth.

Adnan Amin, Director General, International Renewable Energy Agency (IRENA)

Adnan Amin, Director-General, IRENA, noted that although the targets of the UN Secretary-General's 2030 Initiative seem ambitious, significant cost reductions in technologies like solar photovoltaics (PV) have made renewables cost-competitive with fossil fuels. Amin highlighted developing countries, including Senegal and South Africa, which are proactively adopting renewable energy. He described initiatives where countries are positioning themselves for transitions in the global energy system, including the UAE's focus on renewables and sustainable cities, and Japan's investment in research and development to reduce transmission line losses and boost energy storage technology.

Maria van der Hoeven, Executive Director, International Energy Agency (IEA), explained that IEA gathers and translates information into practical solutions. She identified funding and political will as crucial for removing barriers to universal energy access. She added that IEA provides the building blocks to determine effective policies and solutions for Organisation for Economic Co-operation and Development (OECD) countries and, increasingly, non-OECD countries. She also encouraged the implementation of geographically-relevant green technologies, and underscored the need for both large companies and small and medium enterprises (SMEs) to finance energy solutions.

Andrew Steer, Special Envoy for Climate Change, World Bank, emphasized the need to triple the present level of financing for renewable energy. He said that large investors

Ministers' Panel on Action towards Universal Energy Access

are seeking opportunities with low risks and "decent" returns. He described the importance of injecting public money strategically and into projects to attract larger private investment. He added that countries must learn from one another to establish an appropriate balance of political power, financial muscle, and technical expertise.

Charles Holliday, Chairman of the Board of Directors, Bank of America

Charles Holliday, Chairman, Bank of America, stressed the role of the private sector in sustainable energy. He identified market opportunities for the next decade, including: electrical and mechanical engineering; sustainable natural resource use; and turning data into information for communication to the public. He said banks are interested in taking calculated risks, particularly in partnership with international agencies.

Ministers' Panel on Action towards Universal Energy Access: Helen Clark, Administrator of the United Nations Development Programme (UNDP) moderated this panel. Clark said that many countries without universal access to energy have good strategies and plans, but business as usual is not sufficient; she instead called for "business unusual."

Daniel Johansson, Vice-Minister of Energy, Sweden, emphasized that sustainable energy is a moral and political question related to democracy. He described Swedish-funded energy projects, including installation of solar panels in households in Mozambique and Bangladesh. He also called attention to local, functional solutions, and noted the importance of maintenance services throughout the equipment's lifecycle.

Helen Clark, Administrator, United Nations Development Programme (UNDP)

Carlos Pascual, Special Envoy and Coordinator for International Energy Affairs, US, stressed the importance of creating an environment that attracts investors and stimulates private, commercial activities. For grid solutions, he said countries need to create a policy environment that allows the electricity sector to be run as a business. He said that the poor often pay the highest price for electricity, noting this as a business opportunity for the renewable sector.

Andris Piebalgs, Commissioner for Development, European Commission, stressed the importance of universal access to sustainable and renewable energy. He added that developed countries have relied heavily on energy from fossil fuels, a mistake that developing countries can bypass by creating sustainable energy goals from scratch, which would grant them a competitive advantage. Describing 2030 as a realistic deadline, he encouraged governments to develop comprehensive policies for universal energy access.

Alex Salmond, First Minister, Scotland, noted the importance of: investing in grid technology to decrease transmission losses over long distances; narrowing the gap between technological breakthroughs and the broad use of these technologies; and facilitating access for those who lack or cannot afford energy. He described certain islands on the west coast of Scotland that have become entirely energy self-sufficient with micro-hydropower, a notion that may be applicable to numerous developing countries with significant marine resources.

Mitsuyoshi Yanagisawa, Vice Minister of Economy, Trade and Industry, Japan, said steady progress has been made in Japan's recovery efforts following the 2011 earthquake and Fukushima disaster. He underlined that Japan is reconsidering its energy policy "from scratch" to incorporate more renewables. He said Japan intends to share its state-of-the art technologies with the international community in appreciation of their generous support in the earthquake's aftermath.

In a keynote address, Bjørn Lomborg, Copenhagen Consensus Center, said that the current focus on fossil fuel subsidies is not sustainable, and global warming, green jobs, and energy security have all been misrepresented. Lomborg recommended focusing on innovation that will lead to technology breakthroughs.

Ministers' Panel on the Role of Government Institutions in Accelerating the Transition to a Global Clean Energy Economy: This panel was moderated by Achim Steiner, Executive Director, UN Environment Programme (UNEP).

José María Figueres, former president, Costa Rica, said governments must focus their efforts on tackling poverty and climate change over this decade. He added that governments should take the lead by harvesting "low-hanging fruit" such as

S. Iswaran, Minister in the Prime Minister's Office, Singapure

demand-side management; reversing bad policies such as perverse subsidies on fossil fuels; and sending signals to industry by reducing taxes on green technology.

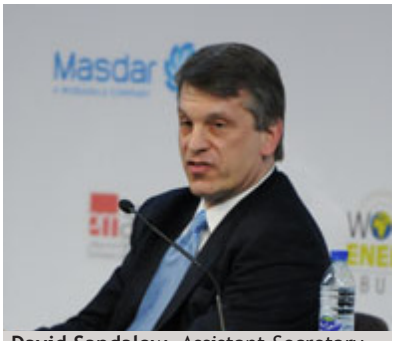
Jordy Herrera, Minister of Energy, Mexico, described a government programme to reduce domestic energy consumption in Mexico by swapping inefficient home appliances for new energy-efficient appliances, noting that this change also saves the government money in energy subsidies.

Lord Howell of Guildford, Minister of State, UK, noted that the world's energy situation has changed significantly over the last 30 years. He highlighted the UK's investment in low-carbon technology, including £2.5 billion in renewable energy research, incentivizing efficient home energy consumption and development, and planning for an additional 16 gigawatts (GW) of nuclear capacity by 2025 that would provide 30,000 jobs. He said governments have the responsibility to provide an environment that promotes clean technologies.

Jordy Herrara, Minister of Energy, Mexico

S. Iswaran, Minister in the Prime Minister's Office, Singapore, highlighted the importance of balancing and integrating public policy, government research, and private sector initiatives to achieve energy goals. He noted that Singapore has: liberalized its electricity market; used price as a clear signal of the cost of energy to the consumer; offered targeted assistance to low-income households; avoided subsidizing consumption; worked with the petro-chemical sector to reduce its carbon footprint; and cultivated itself as a test bed for research, development, and new energy ideas.

David Sandalow, Assistant Secretary for Policy and International Affairs, US, used the example of refrigerators being four times more efficient now than in the 1970's to demonstrate the importance of standard-setting and government regulation. He added that because energy transitions take time, visionary leaders willing to chart a new course are crucial for achieving clean energy initiatives.



David Sandalow, Assistant Secretary for Policy & International Affairs, US

Georg Schütte, State Secretary, Germany, described Germany's energy revolution and long-term perspective on research and innovation. He said Germany aims to reduce its greenhouse gas emissions by 80-90% from 1990 levels by 2050, while simultaneously transforming its energy supply system to increase renewable energy generation to 80% by 2050. He stressed that Germany hopes to be the first modern advanced economy to reinvent itself as a green society.

Walter Steinmann, State Secretary for Energy, Switzerland, stressed the importance of clear, ambitious targets, compromise and consultation. He explained that Switzerland encourages citizens, municipalities, and cities to make progress at the local level every year, and said one of slogans driving change in Switzerland is "you have to do more every year."

BUSINESS LEADERS IN FUTURE ENERGY

This session took place on Tuesday morning. In his keynote address, Fatih Birol, IEA, underlined that the global financial crisis and Fukushima nuclear disaster have affected government energy policies and demoted climate change on the political agenda. He said that trajectories plot a 6°C change in climate, and that immediate action and urgent investment in clean energy are needed.

Panelists agreed on the need to continue investing in emerging markets, with Tulsi Tanti, Chairman of Suzlon, saying this can transform obstacles into opportunity. Juan Araluce, President, Vestas, and Frank Wouters, Director, Masdar Power, emphasized economies-of-scale and scalability. Bjørn Haugland, DNV, highlighted investments in research and development as companies transition from renewable pilot projects, and the importance of carbon capture and utilization. Steve Bolze, General Electric, said investments in new technologies will be critical in the longer-term, and that centralized generation for vast geographic areas may be possible, though expensive. Mark Carne, Shell, emphasized changing energy portfolios, pointing out that 2012 will be the first year that Shell produces more gas than oil. Noting the

Business Leaders in Future Energy Panel

volatility of gas prices, Jim Brown, First Solar, said that supply stacks, including PV and renewable energy, could insulate the market from risk. Steve O'Rouke, Sun Edison, said addressing engineering issues is the next challenge for PV technology. Jean-Pascal Tricoire, President, Schneider Electric, emphasized the need for low-cost energy that communities without electricity can deploy and maintain.

INSIGHTS FROM THE INTERNATIONAL AGENCIES

This session took place on Tuesday morning. Keynote speaker Jacob Wallenberg, Chairman, Investor AB, Sweden, said businesses must accept they are not currently doing enough to contribute to sustainability. He underscored the need for strong incentives for innovation and risk-taking, and changes in investment mentality. He emphasized collaboration among academia, business, and non-governmental organizations (NGOs), citing events such as WFES and projects such as Masdar as examples of such collaboration.

Rajendra Pachauri, Chairman, IPCC

Keynote speaker Rajendra Pachauri, Chairman, Intergovernmental Panel on Climate Change (IPCC), said no limits exist to the potential for renewable sources of energy, including solar, geothermal, and hydropower, but that economies-of-scale are not yet well understood.

Adnan Amin, Director-General, IRENA, suggested governments create an environment that encourages private sector investment in renewables. Fatih Birol expressed concern about certain governments slowing support for renewable energy, and explained the importance of reducing fossil fuel subsidies. S. Vijay Iyer, World Bank, said governments can justify using renewable energies across numerous sectors, and encouraged applying funds to leverage the private sector. Jim Leape, Director-General, WWF International, stressed the importance of: renewable energy efficiency; using arguments beyond climate change to attract public action; and easing consumer access to renewable energy.

Mohammed El-Ashry, Chairman, REN21 and Senior Fellow, United Nations Foundation

Mohamed El-Ashry, Chairman, REN21, emphasized increased research and development support, and public and private support for innovation to enter the marketplace. Marcel Engel, World Business Council for Sustainable Development, said business needs predictability, such as a predictable price for carbon, to scale-up. Timothy Wirth, President, UN Foundation, suggested incentives for energy-efficient appliances as an example of complementary approaches for sustainable energy and economic growth. Carlos Dora, World Health Organization, stressed complementarities in environment, energy, and health, saying people need to understand concrete benefits from change.

TECHNOLOGY LEADERS IN FUTURE ENERGY

This session was held on Wednesday morning. In a keynote address, Alex Burns, CEO, Williams Formula One (F1), explained that the entrepreneurial and engineering culture of Williams F1, one of the world's lead car-racing teams, delivers rapid and evolving solutions to complex technical challenges. He described how the flywheels that Williams F1 is developing for hybrid racing cars are being adapted to improve energy efficiency in public buses, sports cars, and metro trains.

Jason Pontin, Editor-in-Chief, Massachusetts Institute of Technology's (MIT) Technology Review, chaired the session. Panelists agreed that smart grids need to store and deliver high amounts of renewable energy. Jan Mrosik, Siemens, emphasized smart metering and smart response. Kazuo Furukawa, Chairman, New Energy and Industrial Technology Development Organization (NEDO), said energy storage remains a large gap. Santiago Arias, Torresol, emphasized that energy can be stored and converted according to environmental conditions and demand for electricity. Ben Kortlang, Amonix, described the challenges for clean technologies to be economically viable at a large scale without subsidies. Kathy Pepper, ExxonMobil, explained the potential for producing biofuels from algae. Bill Sims, CEO, Joule Unlimited, said his company's engineered microorganisms represent a low-cost, fungible, and modular renewable fuel platform. Charles Soothill, Alstom Power, explained that a mixed renewable portfolio can address power generation intermittency, and underscored, among others: carbon capture and storage (CCS); transmission grids; and energy efficiency, storage, and density. Andrew Beebe, Suntech, proposed the development of a five-year roadmap for eliminating all energy subsidies.

Jacob Wallenberg, Chairman, AB, Sweden

INSIGHTS FROM THE ENTREPRENEURS

Chris Hartshorn, Lux Research, moderated this session on Wednesday morning. He described the panel's goal as identifying the benefits and challenges for entrepreneurs in the clean technology sphere.

Noting that favorable government policies are key for clean technology entrepreneurship to thrive, Eric McAfee, Chairman and CEO, Aemetis, called for strong regulatory frameworks to enable entrepreneurs to make short-term technology development commitments, and long-term financial commitments.

Jennifer Holmgren, CEO, LanzaTech, spoke on innovation to create a new energy future, explaining the importance of entrepreneurial companies in furthering clean technologies globally.

Stressing that clean energy is the greatest entrepreneurial opportunity of this generation, Steve Crane, CEO, LightSail Energy, welcomed non-traditional funding sources to provide capital to start-ups and entrepreneurs. He noted that obstacles to introducing renewables include numerous regulatory issues.

Christine Gulbranson, Symphony Equity Partners, described the energy innovation cycle, highlighting potential "valleys of death" in both technological development and commercialization phases, before moving into maturity and price competitiveness.

In the ensuing discussion, participants considered, among others, the: advantages of start-ups in managing early-stage innovation; capital-intensive nature of energy companies; influence of the regulatory environment; need to offer energy products that will help companies expand their markets; and

Richenda Van Leeuwen, United Nations Foundation

value of an "accelerator" approach, enabling start-ups to access networks and strategic partnerships.

FINANCING SUSTAINABLE ENERGY FOR ALL

On Thursday morning, moderator Nathaniel Bullard, Bloomberg New Energy Finance, led a panel on the state of financing for renewables.

Keynote speaker Plutarchos Sakellaris, Vice-President, European Investment Bank, identified three instruments governments can use to attract technology investment: fixed price approaches, such as feed-in tariffs; market-based approaches, such as renewables certificates; and targeted approaches. He said the EU investment bank target is for 25% of overall lending to support climate action projects, a target exceeded in both 2010 and 2011. Noting that the biggest challenge facing the industry is technology risk, Ravi Suri, Standard Chartered Bank, called for better understanding of financing renewables by both the banking and insurance sectors.

Speaking on the opportunities for financing in the Middle East and North Africa, Ben Warren, Ernst & Young, stressed that for greater market growth, new sources of capital need to enter renewable energy financing, including pension funds.

Richenda Van Leeuwen, UN Foundation, highlighted a SME perspective on financing, describing opportunities for customers unable to fully finance renewables technology, and underscoring the potential for telecommunication companies to enter the market. Alex O'Cinneide, Director, Masdar Capital, with Jorge Ramos, Citigroup, stressed that financers would like to see consistent renewable energy policy rather than fluctuating government attitudes and inconsistency.

CLOSING PLENARY: FUTURE ENERGY FUTURE STRATEGIES

The closing plenary took place on Thursday afternoon, moderated by Richenda Van Leeuwen, UN Foundation. She stressed the need to keep energy at the top of the global agenda and reminded participants of Secretary-General's Ban Ki-moon's energy access for all initiative.

Rob Bradley, Ministry of Foreign Affairs, UAE, described the UAE's historic and ongoing leadership in environmental protection and conservation. He said that the UAE is working to move from being the second highest per capita emitter of carbon dioxide (CO2) towards achieving green growth grounded in: energy efficiency standards; clean urbanization; increasing use of renewable energy; investing in public transportation and green jobs; carbon mitigation in aviation; incorporating environmental messaging into the educational system; and technology incubation and implementation in Masdar City and elsewhere.

Christiana Figueres, Executive Secretary, UN Framework Convention on Climate Change, noted that energy contributes to climate change and is a major part of the solution. She said that an aggressive energy revolution is beginning, with record-breaking investment in renewable energy. She stressed that the Durban climate change conference delivered beyond expectations, noting it demonstrated universal political will and increased ambition in the global climate regime in three ways: a second commitment period for the Kyoto Protocol that continues and validates its legally-binding framework; an increase from 10-15% to 80% of global emissions included under the Protocol; and an agreement among all countries to negotiate a legally-binding agreement.

Christiana Figueres, Executive Secretary, United Nations Framework Convention on Climate Change (UNFCCC)

Robert Swan, Voyage for Cleaner Energy, described his personal voyage in sustainability, and walking expeditions to both the North and South poles. He highlighted his work in promoting sustainability in rural areas, major climate conferences, and charting an annual mission to Antarctica with international youth. He said "the greatest threat to our planet is the belief that someone else will save it."

Fiona Watson, Summit Director for WFES 2012

Summit Director Fiona Watson announced that plans are underway for the 2013 WFES, which will run in tandem with an International Water Summit next year, supported by the International Water Association.

PARALLEL SESSIONS

Parallel sessions took place on Tuesday and Wednesday afternoon, and on Thursday morning into the early afternoon. In addition, on Wednesday afternoon, summit delegates were offered a networking visit of the exhibition.

WIND: POWERING UP - SEIZING OPPORTUNITIES

Steve Sawyer, Secretary General, Global Wind Energy Council, chaired this session on Tuesday afternoon.

Luis Adão da Fonseca, EDP Renewables, stressed the importance of long-term regulatory frameworks to facilitate sustained growth in the sector. Iñigo Sabater Eizaguirre, Vestas, warned against viewing renewable energy solutions as a short-term goal, and emphasized robust partnerships to increase uptake of renewables.

Andrew Garrad, President, GL Garrad Hassan, noted that although there has been dramatic growth in wind energy in emerging markets, there was still more overall growth in OECD member countries than elsewhere.

Discussing the potential for shale gas and its effect on renewable investment, Eddie O'Connor, CEO, Mainstream Renewable Power, said that although shale gas has slowed renewables in the US, it is "a big, gigantic bubble" that will disappear. Aart Schreij, London Array, highlighted the interests of India, China, the UK, and Germany in offshore wind energy, noting that the associated costs will be reduced in the next decade.

TRANSFORMING CITIES: ESTABLISHING SUSTAINBLE COMMUNITIES

Peter Sharratt, Deloitte LLP, moderated this session on Tuesday afternoon.

Mary Walsh, London Sustainable Development Commission, UK, highlighted initiatives on retrofitting London's aging building stock to be energy efficient, using solid waste for district heating and cooling, and placing sustainability at the core of the 2012 Olympics planning.

Rex Parris, Mayor, Lancaster, California, lamented that cities are not sufficiently active. He said Lancaster is attempting to become the first NetZero city, and attributed its success to partnering with industry and creating a fertile environment for new technology adoption.

Alan Frost, Director, Masdar City, spoke on passive urban design principles to make Masdar City cooler and pedestrian-friendly, including: building orientation and design for maximizing shade, and harnessing natural wind corridors. He noted that Masdar City works with technology partners to implement clean technology solutions.

Rutu Dave, World Bank, highlighted that cities are both the causes and victims of climate change and called for a paradigm shift towards smart city planning. She highlighted the city-wide approach methodology developed by the World Bank to assist cities in reducing emissions and attracting green funds.

COUNTRY FOCUS – CHINA

Chris Hartshorn, Lux Research

Chaired by Chris Hartshorn, Lux Research, on Tuesday afternoon, this session focused on China as a growing business partner, innovator, manufacturer, and market in the renewable sector. Andrew Beebe, Suntech, explained that other nations could look to China for guidance on making and meeting long-term energy goals. He praised China's production capacity and capabilities. Steven 'Mac' Heller, Executive Chairman, CODA Automotive, said that China and the US must work together to reduce high fossil fuel consumption and CO2 emissions. He noted China is the world's largest car producer and consumer.

Mark Ma, China Construction Bank, said that China has large market opportunities and rising labor costs, and its economy will benefit from energy efficiency and energy savings. He said investors care about business models, management, and financial returns. Tom Zhao, BYD, said that China's 12th five-year plan offered direction on increasing energy efficiency. He highlighted the importance of stabilizing the quality of renewable resources, and relationships between businesses and government.

Haiyun Sun, Trina Solar, elaborated on green growth as the focus of China's new key performance indicator, the importance of globalizing innovation, and China's tougher intellectual property laws. The ensuing discussion focused on Africa as a potential renewable energy market, and capital-raising opportunities in China.

ENERGY EFFICIENCY: THE KEY TO CARBON REDUCTION

This session was moderated by Ramon Baeza, Boston Consulting Group, on Tuesday afternoon. He asked speakers to consider how to fully realize energy efficiency gains.

Morten Mauritzen, Exxon Mobil, stressed the growth potential of renewables, projecting a 30% increase in demand from 2010-2040. Sascha Brozek, Siemens, highlighted intelligent design in buildings and construction. Pejman Norastehfar, Bayer MaterialScience, addressed sustainable production processes. Benoit Dubarle, Schneider Electric, recommended smart grids to optimize distribution among consumers. Frank Ackland, General Electric, supported the installation of household smart meters to modify consumer behavior.

Hiroshi Ogawa, Mitsubishi Heavy Industries, described sustainable transportation design including electric vehicles as a key to efficiency, highlighting their use in Masdar City. Kornelis Blok, Utrecht University, recommended removing fuel subsidies, tightening efficiency standards to reflect state-of-the-art technology, and educating industry professionals on implementation.

THE ROLE OF GAS IN THE FUTURE ENERGY MIX

During this Tuesday afternoon session, moderated by Ruud Weijermars, Delft University of Technology, panelists addressed topics including: competition between liquefied natural gas (LNG) and long distance pipeline gas; power generation competition between coal and gas; energy security in Europe; and Australia's increasing role in LNG supply from offshore shale gas. Panelists emphasized the role of gas in a faster transition to renewables. Rob Gardner, ExxonMobil, explained that global energy demand will grow by 30% over the next 30 years and gas will grow by 60%, with much of this gas coming from unconventional supplies. Michael Ladwig, Alstom, added that renewables already contribute 20-30% of electricity production in some countries. Bernard Esselinckx, CEO, Al Suwadi Power Company, Ernie Moniz, Massachusetts Institute of Technology, and Gardner, agreed that substantial time is necessary to change energy infrastructure. Moniz recommended balancing electricity and natural gas infrastructures through high-level integration of regulatory systems. During a discussion on pipeline leakage, Evgeniy

Panel session on China (L-R): David Eaglesham, First Solar; **Rhone Resch**, Solar Energy Industries Association; **Robert Seiter**, Ernst & Young; **Eicke Weber**, Fraunhofer-Instituts für Solare Energiesysteme ISE; **Haiyun Sun**, Trina Solar; **Adrian Wood**, Siemens

Alain Flausch, Secretary-General, International Association of Public Transport (UITP), moderating the panel discussion: Sustainable Transportation: Systems, Policies and Technologies

Nadezhdin, Russia Energy Agency, described the Russia Federation's programme to decrease gas flaring by 95%, while Crispian McCredie, Alboran Energy Strategy Consultants, cautioned that such measures would not be possible for countries like Nigeria or Angola.

SUSTAINABLE TRANSPORTATION: SYSTEMS, POLICIES, AND TECHNOLOGIES

This session was held on Tuesday afternoon. Alain Flausch, Secretary General, International Association of Public Transport, moderated the session and said urban sprawl and increased private car ownership were driving up urban CO2 emissions and oil consumption.

Iwao Matsuoka, Institution for Transport Policy Studies, said that complete transport system solutions are needed to offer good alternative transport methods to the public, and not merely adding new technologies into existing systems.

Robert Olivier, Montreal Transport Company, underlined that transport is responsible for an increasing share of Quebec's greenhouse gas emissions. He added that the province aims to have 95% of public transit trips be electric by 2030, and detailed the development of Montreal's metro network.

Gunnar Heipp, Munich Public Transport Company, stressed that transit-oriented land-use planning is key to developing an effective low-carbon transportation system. He presented the Munich transport masterplan that requires urban planning to adhere to transportation plans.

Abdulrahman Al Shizawi, Abu Dhabi Department of Transport, noted long-term infrastructure plans for Abu Dhabi government vehicles and taxis to run on compressed natural gas, and to make provisions for multi-modal integrated public transit networks, intercity rail systems, and walking and cycling facilities.

ENERGY AND RURAL DEVELOPMENT

This session, held on Tuesday afternoon, was moderated by Ralph Sims, Massey University. He described a UN Food and Agriculture Organization (FAO) initiative on energy-smart and climate-smart food systems to be launched in 2012.

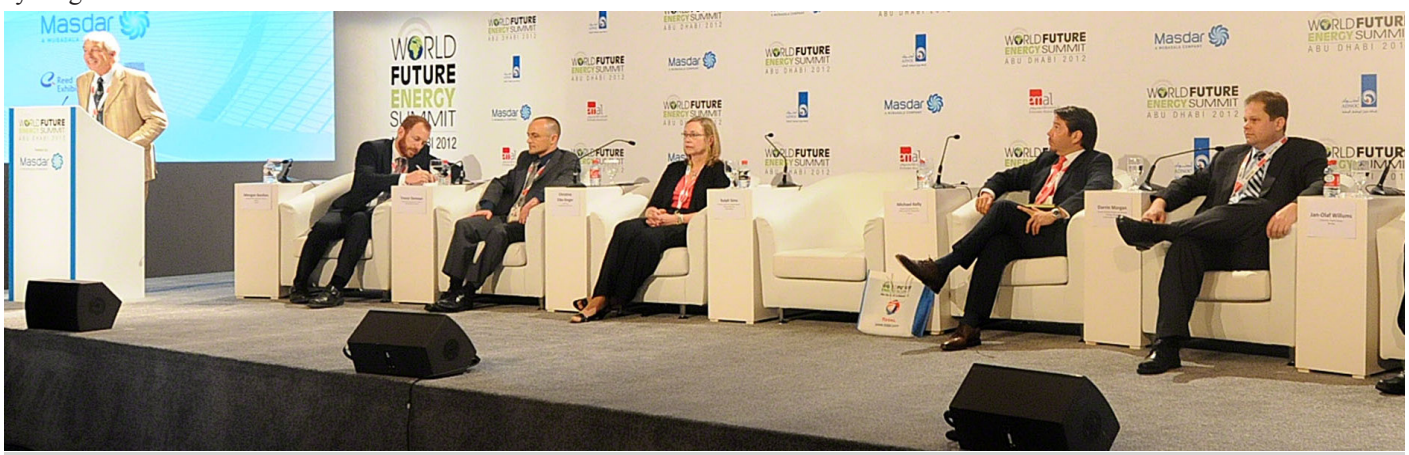
Lamenting the percentage of the world using firewood as a primary energy source, Michael Kelly, World Liquefied Petroleum Gas Association, highlighted the benefits of transitioning to liquefied petroleum gas.

Darrin Morgan, Boeing, described an integrated seawater agriculture system that could produce food and green energy in non-arable lands. Trevor Demayo, Chevron, stressed the provision of affordable, economically-viable, culturally-appropriate, and proven sustainable technologies. Andre Zeijseink, KEMA, spoke on ensuring availability, affordability, reliability, portability, and sustainability of energy systems in rural areas. Jan Olaf Willums, Chairman, InSpire Group, described an initiative linking the declining cost of batteries with solar energy that benefits both local entrepreneurs and end-users.

Christine Eibs Singer, CEO, E+Co, explained her organization's work to assist renewable energy entrepreneurs and provide long-term capacity building. Morgan Bazilian, UNIDO, noted the importance of both governments and the private sector in meeting the universal access to energy target.

EDUCATION, TRAINING, AND DEVELOPMENT

Moderated by Fred Moavenzadeh, President, Masdar Institute of Science and Technology, this session took place on Tuesday afternoon and focused on the roles that education and research and development can play in transforming the UAE into a knowledge-based economy.



Moderator **Ralph Sims**, Director, Centre for Energy Research, Massey University, New Zealand, speaking during the Energy and Rural Development panel 2009 Nobel Memorial Prize in Economic Sciences

Panel session on Innovation in Solar Technologies (L-R): **Eicke Weber**, Fraunhofer-Instituts für Solare Energiesysteme; **Simon Bransfield-Garth**, Eight19; **Daniel Calderon**, Masdar Power; **Matteo Codazzi**, CESI; **Sami Khoreibi**, Enviromena; **Paul van Son**, Dii GmbH (Desertec)

Keynote speaker Eesa Bastaki, CEO, Information and Communication Technology Fund, discussed building a robust research and development infrastructure, and creating a culture of research across academic, private, industry, and government sectors.

Rafic Makki, Abu Dhabi Education Council, described the knowledge-based economies of Singapore and South Korea, and the importance of improving elementary and high-school education to enhance and sustain higher education. Peter Heath, Chancellor, American University of Sharjah, explained that the UAE's new economy will require financing the high cost of graduate education, and stressed the urgency of cultivating young Emiratis. Rory Hume, Provost, UAE University, underlined the importance of comprehensive primary and secondary education reform and of doctoral research and mentorship. Tod Laursen, President, Khalifa University, emphasized the role of human capital in creating a knowledge-based economy and the importance of academic mentorship in developing independent thinkers. Larry Wilson, Provost, Zayed University, underlined the need for visionary leadership and long-term resource commitment to create a new economy.

INNOVATION IN SOLAR TECHNOLOGIES

This parallel session on Wednesday afternoon was moderated by Eicke Weber, Chairman, Fraunhofer Institute, and shed light on emerging technologies and financial innovations in the solar energy system.

Highlighting China's strength in the solar market as manufacturing cost-effective, affordable solar panels, Haiyun Sun, Trina Solar, explained that business and open minds are necessary for innovation in solar technology to be successful. Robert Seiter, Ernst & Young, noted that the solar technologies currently drawing the highest levels of investment are concentrated solar power (CSP), copper indium gallium (di) selenide (CIGS), and concentrated photovoltaics (CPV). David Eaglesham, First Solar, highlighted drivers to increase photovoltaics (PV) penetration in the energy mix, including longer-term strategic partnerships between suppliers and grid operators, and plant energy output that is forecastable, controllable, and "smooth-ramping."

Adrian Wood, Siemens, pointed out the challenges of getting the energy mix "right," including the complexity of PV, CPV, and CSP systems, their costs, and the capacity of existing grids. He described his company's commitment to meeting the universal energy access targets. Noting the decreasing costs of technologies and comparing the conditions for PV-uptake in the US, Germany, and Saudi Arabia, Rhone Resch, President, US Solar Energy Industries Association, urged countries in the Middle East to tap into solar energy on a larger scale.

Calling for a new business model for solar power, Simon Bransfield-Garth, CEO, Eight19, described the IndiGo Pay-As-You-Go Solar Initiative, which merges mobile phone and solar technology to create low cost energy solutions for populations in East Africa. Paul van Son, CEO, Desertec, described three phases to link renewable energy production in the deserts of North Africa and the Middle East to European markets in the next 25 years. Matteo Codazzi, CESI, presented on high CPV technology, noting its suitability for Africa, Latin America and parts of Asia.

Sami Khoreibi, CEO, Enviromena, informed participants that many countries in the Middle East are committed to a 7% or higher renewable energy target, including PV. Speaking on the future of PV and CSP, Daniel Calderon, Masdar Power, emphasized that PV has the capacity to "solve people's problems" at lower costs than current alternatives in several locations around the world.

WHAT'S NEXT FOR CARBON CAPTURE AND STORAGE?

Simon-Pierre Monette, Booz & Company, moderated this panel on Wednesday afternoon. Panelists discussed education, knowledge transfer, projects, and technology related to CCS.

Liv Stubholt, CEO, Aker Clean Carbon, said carbon capture will remain an available, feasible, and viable option for decades to come. John Barry, Shell, highlighted three challenges of CCS demonstration projects: financing, public acceptance, and high costs. Bernd Holling, Linde Group, described three technologies for scaling-up CCS pilot projects to demonstration projects, related to the fuel, pre-commercial, and post-commercial stages.

Bader Al Lakmi, Director, Masdar Carbon, noted the potential of CCS to qualify for funding under the Clean Development Mechanism as an incentive to continue pursuing CCS technologies as a mechanism for carbon reduction. Saif Al Sayari, Abu Dhabi National Energy Company, described CCS as an important avenue for mitigating fossil fuel contributions to global warming.

Panelists discussed the need for greater education on CCS, noting that the public lacks understanding of the technology. Holling described public resistance to onshore storage. He said collaboration with academia could boost public opinion. Lakmi proposed joint education efforts between governments and project developers.

Panel session on Nuclear Energy in a Sustainable Energy Future (L-R): **Ahmed Al Mazrouei**, Emirates Nuclear Energy Corporation; **Homam Albaroudi**, The Cooperation Council for the Arab States of the Gulf; **Matt Brown**, Pöyry Management Consulting; **Ibrahim Babelli**, King Abdullah City for Atomic and Renewable Energy (KA CARE); **Mike Waite**, Westinghouse Electric Company

ENERGY STORAGE – TECHNICAL CHALLENGES: MARKET OPPORTUNITIES

Jürgen Weiss, Brattle Group, moderated this session on Wednesday afternoon. He explained that pumped hydropower dominates overall energy storage capacity, while battery storage technology still accounts for a small portion. Timothy Patey, ABB, said energy storage provides more control for electric grids. He described using energy storage systems to complement fixed electricity infrastructure, and emphasized matching storage technologies with applications. Jarl Pedersen, Xtreme Power, presented a lead acid battery technology that is highly efficient and 98% recyclable. He noted projects in Hawaii where battery storage technology has been used to stabilize integration of wind and solar generation into the grid.

Tom Zhao, BYD, said China's renewable electricity generation targets provide a fertile market for storage technologies, noting that his company's battery technology is produced inexpensively and can be used in both small- and large-scale applications. Alex Katon, International Power-GDF Suez, highlighted that significant storage technology will be required to stabilize 18,000 MW of renewable energy capacity in the region by 2020. He noted that barriers to renewable energy also limit energy storage system uptake.

THE ROLE OF NUCLEAR ENERGY IN A SUSTAINABLE ENERGY FUTURE

Matt Brown, Director, Pöyry Management Consulting, chaired this session on Wednesday afternoon, which focused on nuclear energy potential in the Gulf region.

Ibrahim Babelli, King Abdullah City of Atomic and Renewable Energy, cited future energy demand in Saudi Arabia based on generational demographics, growth in manufacturing and service industries, and a shift away from fossil fuels.

Homam Albaroudi, Gulf Cooperation Council, presented a joint study on the possibility of shared regional nuclear power development, noting concerns regarding transboundary responsibilities.

Mike Waite, Westinghouse Electric Company, highlighted increased interest in "passive" response systems to improve plant safety; for example, through utilizing gravity-fed water-cooling systems. Ahmed Ateeq bin Rubea Al Mazrouei, Emirates Nuclear Energy Corporation, said that the lessons of the Fukushima disaster are being incorporated into current designs for nuclear power plants.

Anselm Eisentraut, International Energy Agency (IEA)

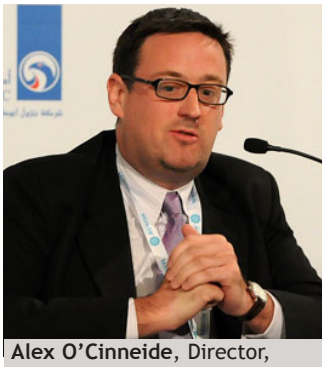
BIOENERGY: BIOMASS FOR POWER GENERATION

Ausilio Bauen, E4tech, moderated this session on Wednesday afternoon. Anselm Eisentraut, IEA, noted bioenergy supplies about 10% of the world's primary energy demand, but it is generally used inefficiently. He said biomass would potentially play a large part in curbing future greenhouse gas emissions in ambitious mitigation scenarios. Bart Dehue, Vattenfall, described his utility's substitution of coal with biomass chips for combined heat and power generation. He said biomass is an ideal CO2 reduction strategy as many coal-fired power stations can be modified to use woodchips in addition to coal. Ralph Sims, Massey University, noted the reference of the IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation to WFES discussions. He said that biomass with CCS may be an important mitigation option in the future.

Olivier Dubois, FAO, spoke on bioenergy and food security criteria and indicators developed by FAO and UNEP to support government knowledge and policy. He said that biofuels are "neither good, nor bad, what matters is the way they are managed." Raffi Balian, US Department of State, noted that the US is the world's largest producer of bioenergy, which he said is an important component for diversifying energy supply.

DIGITAL ENERGY: SMART INFRASTRUCTURE

Chaired by José Alberich and Jörg Schrottke, A.T. Kearney, this Wednesday afternoon session focused on the role of smart grids and infrastructure in optimizing energy efficiency and consumption. Edward Abbo, President, C3, defined digital energy as the cyber-infrastructure used to gather, interpret, and utilize data along the energy supply chain to improve utility-customer interactions. He also described C3's collaboration with Masdar City, calling it a live experiment of the smart grid. Eyad Alqadi, Cisco Systems, presented the multi-tiered security measures to safeguard against cyber-attacks aimed at crippling energy infrastructure and causing blackouts. He added that smart infrastructure could help traditional and renewable energy sectors. Sjaak Antheunisse, Alcatel-Lucent, commented on the challenge of engaging the end user in a new age of responsible energy consumption, and emphasized multi-stakeholder solutions to infrastructure



Alex O'Cinneide, Director, Masdar Capital

problems. Gianluca Marini, CESI, stressed the importance of incentivizing customers to shift their energy consumption from peak to off-peak demand load, and described the role of transmission system operators in managing power flows. Stephan Singer, WWF, said that investment and policy are required to encourage and sustain a decentralized and distributed smart grid.

THE ROLE OF VENTURE CAPITAL IN FUTURE ENERGY FINANCING

Alex O'Cinneide, Director, Masdar Capital, moderated this session on Thursday morning. Roger Ammoun, Credit Suisse Asset Management, explained that venture capitalists are honing strategies for sub-sectors of renewables in a market which is correcting itself in response to the initial "feeding frenzy" of capital injection into renewables. Anup Jacob, Virgin Green Fund, underlined green technology as attracting good management teams, and carbon pricing to level the energy playing fields. Nikunj Jinsi, International Finance Corporation (IFC), noted IFC's role in boosting innovation and capitalizing nascent markets. He said that the typical venture capital path might not match renewables' longer gestation periods. Wayne Keast, CEO, Consensus Environment, noted success in capitalizing existing companies that are already earning returns. Keast added that investment trends follow signals from government policy. Eswar Mani, Masdar Capital, said insights into sales and market adoption cycles were needed for more strategic venture capital, and identified opportunities for distributed, off-grid energy in emerging markets. Michael Sears, Siemens Venture Capital, identified building management systems as a high growth area. Marcelo Carvalho de Andrade, Earth Capital Partners, said public-private partnerships remain important for "de-risking" investment in emerging green technology.

INNOVATION IN FUTURE ENERGY FINANCIAL PRODUCTS AND SERVICES

Dima Rifai, Paradigm Change Capital Partners, moderated this panel on Thursday morning. Panelists focused on innovation and capital sources, identifying the right vehicles for investors to innovate, and considering both equity and debt.

Adam Bruce, Mainstream Renewable Power, described the value of grouping corporations with concern about energy security risk and price volatility to fund energy infrastructure. He added that mobile telephony is a new financing trend.

Simon Currie, Norton Rose, underscored financing driven by long-term yields and returns over regulation and tax because incentive-based tax increases long-term risk. He said traditional financing vehicles and equity models persist, but identified innovative partnerships and carbon investors moving into the renewable energy sector as two new trends.

Emma Matebalavu, Clifford Chance, described the UK "Green Deal" to make old housing stock more energy efficient by incentivizing loans for home efficiency, which distributes risk in the capital market and provides benefits of scale.

Margaret Stephens, KPMG, said performance regimes for green targets would attract investors and explained that the infrastructure community adapts to new projects, such as green energy, and will invest if they make good business sense.

INTERNATIONAL REGULATIONS AND TRADE: GLOBAL NETWORKS TO FACILITATE A SUSTAINABLE ENERGY WORLD

Rakesh Radhakrishnan, Navigant Consulting moderated this session, on Thursday morning. He opened with remarks on the impacts of international trade regulations on the clean technology sector.

Jamie Carstairs, Linnfall Consulting, noted energy was formerly delivered by place-based, state-owned public utilities, using planning as a basis for investment, whereas today's competitive utility markets rely on price signals. He described a high level of policy risk affecting investment in renewables.

Stefano Besseghini, Ricerca sul Sistema Energetico, Italy, stressed the physical aspect of electricity markets, as they rely on the capacity and stability of distribution grids and interconnections. He recommended technology exchange and information, as innovations have great potential to alter returns on investment.

Ruzgar Barisik, IFC, highlighted the IFC's role as a catalyst for further private investment and its goal to ensure 20% of its investments are in renewables.

Michelle Davies, Eversheds, noted the impact of a UK domestic subsidy on overseas-based generation. She also described company efforts to have sustainability criteria recognized in other countries. She recommended governments tailor tax regimes to favor investment in renewables.

Abengoa exhibit and presentation

Siemens exhibit

NETWORKING VISITING EXHIBITION

The WFES Exhibition took place alongside the Summit sessions. Delegates were offered the opportunity to tour the WFES Exhibition late Wednesday afternoon, viewing the offerings of several hundred exhibitors who filled the venue with booths, working models, video displays, and giveaway items.

Electric cars, including one currently being tested at Masdar City, drew a steady stream of interest. One educational display on smart transportation offered participants the opportunity to "drive" using a video-monitor racetrack.

Other eye-catching installations included the wind turbine rotating high above the IRENA booth, a water sprinkler system displaying lighting and logo effects, and an oil corporation's demonstration of carbon capture and storage using Lego blocks.

Technology went hand-in-hand with human resource development as students and young people thronged the lecture spaces and special events, including participants in Masdar's Young Future Energy Leaders (YFEL) initiative.

While the focus at WFES was on technological innovation, many government agencies ran pavilions promoting investment opportunities and country products, from solar panels to carbon markets and coastal monitoring. Conference and specialized publishing industry representatives also worked the hallways, offering information on and overviews of the renewables market through publications and organized events.

SIDE EVENTS

In addition to the plenary and parallel sessions, delegates attended numerous events throughout WFES, including: roundtable discussions; the Project Village; discussions at the YFEL Pavilion; displays at Innovate@WFES; presentations at the Masdar Theatre; and numerous other side events, meetings, and workshops at national, institutional, and company pavilions.

The YFEL is a Masdar Institute programme that seeks to engage young people via alternative energy and sustainability activities. The initiative supported students and young professionals to attend the WFES, and hosted numerous presentations and debates in its dedicated conference area. The WFES Project Village enabled companies to showcase a centerpiece project in a "village" setting, which included networking space. The roundtables enabled small group discussions on a variety of popular and emerging energy issues. Innovate@WFES provided a hub for startup companies on clean technology.

A sample of side events at WFES 2012 is summarized below.

MASDAR CITY

This side event was held every day at the Masdar Theatre. Assem Kabesh, Masdar City, presented information on this planned, state-of-the-art "sustainable city," highlighting the UAE's policy to move from a commodities-based to knowledge-based economy. The six kilometer-square Masdar City area aims to attract renewable energy and clean technology industries, and will be equipped to visualize and track resource use patterns. As an incentive, foreign-owned businesses and employees in Masdar City will be tax-exempt for a period of 50 years. He said that Masdar aims to shift the UAE from an oil-based, consumption economy to a knowledge-based economy.

SHOULD TARIFFS BE IMPOSED ON SOLAR PANELS FROM CHINA?

This side event was held on Tuesday afternoon at the YFEL Theater. Youth teams debated the US (pro-tariff) and Chinese (anti-tariff) positions on solar panels. China accounts for 60% of the world's solar panel industry and exports 95% of its production. The pro-tariff team claimed there is unfair competition. The anti-tariff team argued the success results from good manufacturing processes and cheap labor. The motion against tariffs narrowly won the debate.

INTELLIGENCE IN FUTURE ENERGY SYSTEMS

During a Wednesday morning side event at the Siemens Pavilion, Ulrich Eberl, Siemens presented a vision of an urban energy system resembling the Internet, connecting smart energy-producing and consuming devices. He said exponential increases in computing will result in more smart devices and applications for device interactions, and optimized consumer lifestyles.

SOLAR POWERED WATER DESALINATION

During an early afternoon round table on Wednesday, Tom Joseph, President, Epiphany Solar Water Systems, described his company's use of CSP to power seawater desalination and purification through flash distillation. He said it is safe, scalable, affordable, and accessible, and the target markets include: governments; municipal plants; and NGOs and local micro-entrepreneurs in the developing world.

CARBON CONSCIOUS CORPORATIONS

During a Wednesday afternoon side event at the Vestas Pavilion, Vestas presented WindMade, a certification scheme for organizations that produce a minimum of 25% of their energy from renewable sources. The Vestas representative said

Masdar Pavillion

his company had invested half their winnings from the 2011 Zayed Future Energy Prize into developing WindMade. He noted that Bloomberg New Energy Finance, Lego, Method, Motorola, and others are also working towards certification.

ASSEMBLE YOUR OWN SOLAR CAR

Throughout the week, the Japan Pavilion sponsored Emirati students to learn about generating electricity from non-conventional sources and building and driving mini-solar powered cars. Ikuko Ukaji, George P. Johnson Experience Marketing, said, "We thought it could be a good opportunity to share [the Japanese] strategy on education [with the Emiratis]."

EXXON MOBIL: WOMEN ADVANCING SOLUTIONS

Hanaan Yahya, Exxon Mobil, spoke on Thursday morning at the ExxonMobil Pavilion on the opportunities for appropriately trained women in the oil and gas industry. Lamya Mohamed, Emirates Foundation, underscored the importance of empowering female youth through scholarships spanning the arts, environment and scientific research. Sulaf Al-Zu'bi, CEO, INJAZ-UAE, urged the energy sector to market itself to attract more brilliant, young minds.

ZAYED FUTURE ENERGY PRIZE

The fourth annual Zayed Future Energy Prize award ceremony was held on Tuesday evening at the Emirates Palace Hotel. The Prize, named after the late founding father of the UAE, Sheikh Zayed Bin Sultan Al Nahyan, celebrates achievements in the fields of renewable energy and sustainability that reflect three criteria: innovation, long-term vision, and leadership. Submissions were assessed by a jury composed of diverse members including Olafur Ragnar Grimsson, President of Iceland, Mohamed Nasheed, President of the Maldives, tennis player Andre Agassi, and actor Leonardo di Caprio.

The winners of the Zayed Future Energy Prize 2012 were: Schneider Electric (France) in the Large Corporations category for providing safe, reliable, and efficient energy; Ashok Gadgil in the Lifetime Achievement category for his work in reducing fuel wood consumption in Darfur through efficient cooking stoves; and the Carbon Disclosure Project (UK) in the small and medium enterprises (SME) and NGO category for motivating 3,000 of the world's largest companies to disclose their carbon and water use.

Upcoming Meetings

Initial Discussions on the Zero Draft of UNCSD Outcome Document: The initial discussions on the "zero draft" of the Outcome Document for the UN Conference on Sustainable Development (UNCSD, or Rio+20) will take place from 25-27 January 2012, and will be based on a compilation of the input received by the UNCSD Secretariat from member States and other stakeholders. **dates:** 25-27 January 2012 **location:** New York, US **contact:** UNCSD Secretariat **email:** uncsd2012@un.org **www:** http://www.uncsd2012.org/rio20/index.php?page=view&nr=409&type=13&menu=23

World Economic Forum Annual Meeting 2012: The World Economic Forum Annual Meeting 2012 will convene under the theme "The Great Transformation: Shaping New Models" in late January 2012. **dates:** 25-29 January 2012 **location:** Davos, Switzerland **phone:** +41-22-869-1212 **fax:** +41-22-786-2744 **email:** contact@weforum.org **www:** http://www.weforum.org/events/world-economic-forum-annual-meeting-2012

Transforming Transportation: The ninth annual "Transforming Transportation" event will take place at the World Bank in Washington DC, US, in late January 2012, and will focus on big ideas to scale-up sustainable transport best practices in cities worldwide. **dates:** 26-27 January 2012 **location:** World Bank, Washington, DC, US **contact:** EMBARQ **phone:** +1-202-729-7600 **fax:** +1-202-729-7610 **email:** embarq@wri.org **www:** http://www.embarq.org/en/transforming-transportation-2012

Dialogue on Energy and Climate Change Governance: This seventh meeting in a series of dialogues organized by the Organization of American States (OAS) will seek to generate recommendations for UNCSD on improving the normative framework for energy sustainability and climate change mitigation. **dates:** 28 February 2012 **location:** OAS headquarters, Washington, DC, US **contact:** Mark Lambrides **phone:** +1-202-458-6261 **fax:** +1-202- 458-3560 **email:** MLambrides@oas.org **www:** http://www.oas.org/en/sedi/dsd/rio+20/default.asp

Winners and runners-up of the Zayed Future Energy Prize (L-R): Jean-Pascal Tricore, Schneider Electric; Ashok Gadgil, University of California; Paul Dickinson, Carbon Disclosure Project; HH General Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi; Damian Miller, Founder and CEO of Orb Energy; Eric Pooley, Environmental Defense Fund; Sultan Ahmed Al Jaber, Director-General, Zayed Future Energy Prize.

CIF SREP Pilot Countries Meeting: The Climate Investment Funds (CIF) Scaling-Up Renewable Energy Program (SREP) will hold a meeting of its pilot countries, to evaluate progress and discuss tasks ahead. **dates:** 7-10 March 2012 **location:** Nairobi, Kenya **contact:** Zhihong Zhang **phone:** +1-202-458-1801 **email:** zzhang2@worldbank.org **www:** http://www.climateinvestmentfunds.org/cif/content/srep-pilot-country-meetings

Third Intersessional Meeting for UNCSD: The final intersessional meeting for the UNCSD will be convened in March 2012. **dates:** 26-27 March 2012 **location:** UN Headquarters, New York **contact:** UNCSD Secretariat **email:** uncsd2012@un.org **www:** http://www.uncsd2012.org/rio20/

Second IEA Energy Training Week: This interactive training event is delivered by a large team of International Energy Agency (IEA) experts who will take government officials and private sector experts from non-IEA countries through a mix of focused lectures, practical exercises, and field trips. **dates:** 2-6 April 2012 **location:** IEA, Paris, France 33 **fax:** +33-1-40576509 **email:** training.programme@iea.org info@greenorbis **www:** http://www.iea.org/training/etw12.asp

International Congress on Energy Security: This conference will cover a wide range of issues, such as: standard and alternative energy sources and policies, renewable energies, climate changes, and geopolitics. **dates:** 4-5 April 2012 **location:** Geneva, Switzerland **contact:** Global Bioenergy Partnership Secretariat **phone:** +41-32-422-59-33 **fax:** +41 32 422 59 07 **email:** info@greenorbis.ch **www:** http://energysecuritycongress.com/

Sustainable Biomass for Electricity Conference (SB4E): This conference, organized by UN-Energy in cooperation with the Global Bioenergy Partnership (GBEP) and other partners, will consider the role of biomass technologies in decarbonizing the global energy system. **dates:** 18-20 April 2012 **location:** Austria **contact:** Global Bioenergy Partnership Secretariat **phone:** +39-06-57052834 **fax:** +39-06-57053369 **email:** GBEP-Secretariat@fao.org **www:** http://www.un-energy.org/stories/1577-upcoming-sustainable-biomass-for-electricity-conference

Clean Energy Ministerial 3 (CEM3): The meeting will discuss progress made by the 11 CEM clean energy initiatives, explore ways to enhance collaboration between participating governments, and develop strategies to drive public-private engagement to support clean energy deployment. **dates:** 25-26 April 2012 **location:** London, UK **contact:** CEM Secretariat **email:** a.flammini@unido.org **www:** http://www.cleanenergyministerial.org/cem3/index.html

Resilient Cities 2012: Organized by ICLEI, this meeting will focus on the following themes: urban risk and the issue of urban infrastructure as a key element in building resilient cities; resilient integrated urban design; resilient urban renewable energy; resilient urban logistics; and financing the resilient city. **dates:** 12-15 May 2012 **location:** Bonn (Nordrhein-Westfalen), Germany **contact:** Resilient Cities 2012 - Congress Secretariat **phone:** +49–(0)228 / 976 299-28 **fax:** +49-(0)228 / 976 299-01 **email:** bonn2012@iclei.org **www:** http://resilient-cities.iclei.org/bonn2012/home/

Joint Japan-IRENA workshop for promoting renewable energy in the Pacific Island region: This workshop aims to further strengthen cooperation between the International Renewable Energy Agency (IRENA) and Pacific Island countries in the field of renewable energy. It will take place late May 2012, taking advantage of the 6th Pacific Islands Leaders Meeting (PALM6) in Okinawa, Japan. **dates:** late May 2012 **location:** Okinawa, Japan **contact:** Ms. Kotono HARA, Economic Security Division, Economic Affairs Bureau, Ministry of Foreign Affairs **phone:** +81-3-5501-8339 **email:** kotono.hara-2@mofa.go.jp **www:** http://www.mofa.go.jp/region/asia-paci/palm/palm6/index.html

7th Clean Asia Energy Forum 2012: This annual flagship event of the Asian Development Bank (ADB) serves as a knowledge sharing platform for learning and exchange of experiences on key issues and latest developments in clean energy. **dates:** 4-8 June 2012 **location:** Manila, Philippines **contact:** Aiming Zhou, ADB **email:** azhou@adb.org www: http://beta.adb.org/news/events/7th-asia-clean-energy-forum-2012

Third PrepCom for UNCSD: The third meeting of the Preparatory Committee for the UNCSD will take place in Brazil just prior to the Conference. **dates:** 13-15 June 2012 **location:** Rio de Janeiro, Brazil **contact:** UNCSD Secretariat **email:** uncsd2012@un.org **www:** http://www.uncsd2012.org/

G20 Summit 2012: This meeting will consider: economic stability and structural reform for growth and employment; strengthening of financial systems and procurement of financial inclusion for economic growth; improving international financial architecture in an interconnected global economy; mitigating negative effects on price level and volatility of commodities, in particular those affecting food security; and promoting sustainable development with a focus on infrastructure, energy efficiency, green growth, and financing the fight against climate change. **dates:** 18-19 June 2012 **location:** Los Cabos, Mexico **contact:** Aiming Zhou, ADB **email:** azhou@adb.org **www:** http://www.g20.org/index.aspx

Rio+20/UN Conference on Sustainable Development: The UNCSD will mark the 20th anniversary of the UN Conference on Environment and Development (Earth Summit), which convened in Rio de Janeiro, Brazil in 1992. **dates:** 20-22 June 2012 **location:** Rio de Janeiro, Brazil **contact:** UNCSD Secretariat **email:** uncsd2012@un.org **www:** http://www.uncsd2012.org/

Africa Energy Forum: This gathering is Africa's premier annual power and gas investment and business forum, where governments and state utilities address the international energy community on opportunities available in Africa's power and gas sectors. **dates:** 26-28 June 2012 **location:** Berlin, Germany **contact:** Rod Cargill **phone**: +44-(0)20-7370-8406 **email:** cargill@energynet.co.uk **www:** http:// http://www.energynet.co.uk/

IUCN World Conservation Congress 2012: The Congress will explore many of the most pressing environmental and development challenges and how strong and resilient nature is intricately linked to solving these issues, including nature+climate, nature+livelihoods, nature+energy and nature+economics. **dates:** 6-15 September 2012 **location:** Jeju (Cheju-Do), Republic of Korea **contact:** Enrique Lahmann **phone:** +41 22 999 0336 **fax:** +41 22 9990002 **email:** congress@iucn.org **www:** http://www.iucn.org/2012_congress/about/

Asia Future Energy Forum & Exhibition: This meeting promotes leading-edge sustainable energy governance, business, investment, finance, and technology that enable the smart delivery of clean energy solutions. **dates:** 22-24 October 2012 **location:** Marina Bay Sands, Singapore **contact:** Rachel Low **email:** rachel.low@reedexpo.com.sg **www:** http://www.afef.com.sg/

The International Workshop on Advances in Energy Studies 2012: This meeting is dedicated to advances, innovation and visions in energy and energy-related environmental and socio-economic issues. **dates**: 25-27 October 2012 **location:** Mumbai, India **contact:** Conference Secretariat **email:** karthikeya@igidr.ac.in **www:** http://www.igidr.ac.in/

UNFCCC COP18: The 18th session of the Conference of the Parties (COP 18) to the UN Framework Convention on Climate Change (UNFCCC) and the eighth Conference of the Parties serving as the Meeting of Parties to the Kyoto Protocol (COP18/MOP 8), are scheduled to take place in Doha, Qatar. **dates:** 26 November - 7 December 2012 **location:** Doha, Qatar **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **email:** secretariat@ unfccc.int **www:** http://unfccc.int

Third Session of the IRENA Assembly: The third session of the IRENA Assembly is scheduled to take place in January 2013. **dates:** 13-14 January 2013 **location:** Abu Dhabi, UAE **contact:** Stephanie Roesch **phone:** +971-2-4179001 **email:** secretariat@irena.org **www:** http://www.irena.org

World Future Energy Summit 2013 / ABIREC: The sixth World Future Energy Summit is scheduled to take place in 2013. It will host the Abu Dhabi International Renewable Energy Conference (ABIREC), the fifth installment of the "IREC" series, the world's highest level political conference series dedicated to renewable energy policy worldwide. The meetings are intended to created additional momentum for the advancement of renewable energy and energy efficiency policies as well as energy access, partnerships, and technologies through dialogue of government and industry stakeholders. **dates:** 15-17 January 2013 **location:** Abu Dhabi, UAE **contact:** Fiona Watson **phone:** +44-1451-830129 **email:** wfes@elsevier.com **www:** http://www.worldfutureenergysummit.com

ACRONYMS

ABIREC	Abu Dhabi Renewable Energy Conference
ADB	Asian Development Bank
BIREC	Beijing International Renewable Energy Conference
CCS	Carbon capture and storage
CDM	Clean Development Mechanism
CO2	carbon dioxide
CPV	concentrated photovoltaics
CSD	UN Commission on Sustainable Development
CSP	concentrated solar power
DIREC	Delhi International Renewable Energy Conference
FAO	UN Food and Agriculture Organization
GW	gigawatt
IEA	International Energy Agency
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IREC	International Renewable Energy Council
IRENA	International Renewable Energy Agency
LNG	Liquefied Natural Gas
MW	megawatt
OECD	Organisation for Economic Co-operation and Development
PV	photovoltaics
REN21	Renewable Energy Policy Network for the 21st Century
RIO+20/ UNCSD	UN Conference on Sustainable Development
SRREN	IPCC Special Report on Renewable Energy Sources and Climate
UNCED	UN Conference on Environment and Development
UNDP	UN Development Programme
UNEP	UN Environment Programme
UNIDO	UN Industrial Development Organization
UNFCCC	UN Framework Convention on Climate Change
UNGA	UN General Assembly
WFES	World Future Energy Summit
WIREC	Washington International Renewable Energy Conference
WSSD	World Summit on Sustainable Development
YFEL	Young Future Energy Leaders

Video presented to delegates during the Opening Ceremony and Policy Forum