



WORLD FUTURE ENERGY SUMMIT 20-22 JANUARY 2014

The World Future Energy Summit (WFES) took place in Abu Dhabi, United Arab Emirates (UAE) from 20 to 22 January. The International Renewable Energy Agency (IRENA) organized and participated in a range of events at the Summit. This report summarizes discussions at select IRENA events.

OPENING CEREMONY

The opening ceremony of the World Future Energy Summit took place on Monday morning.

Sultan Ahmed Al Jaber, Masdar, called for a collective effort to transform economies to become more resilient, productive and efficient, making it possible to achieve “the tremendous potential” for sustainable energy and development.

IRENA Director-General Adnan Amin welcomed a panel of Heads of State from Africa to discuss harnessing Africa’s great potential.

President Macky Sall, Senegal, emphasized the need for private and public partnerships and creating an enabling environment to attract foreign investment to send the message that investments in Africa are secure, safe and ready.

Prime Minister Hailemariam Desalegn, Ethiopia, identified Africa as a conducive environment for investment. He drew attention to climate-resilient green growth strategies in place in order for Ethiopia to achieve middle-income status by 2025, urging for continued global cooperation.

President Ernest Bai Koroma, Sierra Leone, underscored that Africa has changed into “an engine for economic growth,” cautioning against defining the continent based on the past. Highlighting Sierra Leone’s abundance of natural resources, he invited partnerships in the energy sector, saying these will power other sectors, such as the mining industry.

GLOBAL ATLAS FOR RENEWABLE ENERGY

The side event on the Global Atlas for Renewable Energy took place on Monday afternoon, moderated by Nicolas Fichaux, IRENA.



Adnan Amin, Director-General of the International Renewable Energy Agency (IRENA) moderated a discussion with Macky Sall, President of Senegal, Hailemariam Desalegn, Prime Minister of Ethiopia, and Ernest Bai Koroma, President of Sierra Leone.

Fichaux highlighted that 65 countries currently participate in the initiative that includes all six renewables covered by IRENA’s mandate. He explained that the Atlas provides an open access and full dataset for a variety of user groups.

Referring to ongoing activities in the Economic Community of West African States (ECOWAS) region, Nicola Bugatti, ECOWAS Centre for Renewable Energy and Energy Efficiency, highlighted efforts to provide regional and country-level data on renewable energy, including country profiles, interactive maps, analyses and trends.



Sultan Ahmed al Jaber, CEO, Masdar.

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Global Renewable Energy Atlas Side Event

Jake Badger, Technical University of Denmark, described the Wind Atlas, emphasizing, *inter alia*: micro-scale modeling; wind resource data accounting with high-resolution effects; unified methodology for benchmarking among different countries and regions; and aggregated data and upscaled analyses for energy planners and policymakers.

Lionel Menard, MINES Paris Tech, discussed a data catalogue which conducts “metadata exercises” to gather information, serving as a brokering machine to describe energy resources in a unified, open, standard and interoperable format.

Thomas Wanderer, German Aerospace Centre, stressed linking socioeconomic data within the Atlas, including technical implications, country profiles, energy-use statistics and policy relevant information.

Jacinto Estima, Masdar Institute, and Xabier Nicuesa, National Renewable Energy Center, Spain, presented the universal data reader to make wind and solar energy data visible and comprehensive, expressing the need for scalable data sets and data about relevant time and seasonal variation.

Daniel Getman, National Renewable Energy Lab (NREL), US, referred to NREL’s participation in the Atlas’s initial design and development, emphasizing the importance of sharing data and using standardized data in order to be compatible with IRENA’s Atlas.

During discussion, participants addressed: dissemination plans for the Atlas; a focus on data quality; and collaboration with relevant partners.

FINANCING THE AFRICA CLEAN ENERGY CORRIDOR

The side event on financing the Africa Clean Energy Corridor took place on Monday afternoon. IRENA Deputy Director-General Frank Wouters introduced the initiative that seeks to link power systems from ‘Cairo to Cape Town.’



The side event on Financing the Africa Clean Energy Corridor was hosted by IRENA. The interactive panel discussion addressed the real and perceived risks for financing renewable energy in Africa.

Isaac Kiva, Ministry of Energy and Petroleum, Kenya, discussed experiences in Kenya. He listed risks, such as: integrity of measurement; commercial viability; and political stability, and shared the experience of setting up a risk mitigation facility to help private sector investment in drilling for geothermal potential.

Ingolf Dietrich, German Federal Ministry of Economic Cooperation and Development, expressed support for the Africa Clean Energy Corridor, highlighting the strong signal it sends on the importance of a regional approach. He discussed issues that complicate project viability and bankability, highlighting political stability and capacity.

Youssef Arfaoui, African Development Bank, shared experiences on concessional funding instruments such as the Clean Investments Fund and the Clean Technology Fund. He referenced projects in Kenya carried out in collaboration with the government that use Partial Risk Guarantees. He also discussed experiences in Djibouti where geothermal drilling was completed to confirm resources before the private sector joined, thus enabling the public sector.

Michael Eckhart, Citigroup, Inc., differentiated the Citigroup’s approach to finance, emphasizing that its clients are corporations, not governments, and encouraged parties interested in bringing Citigroup to Africa to do so by going through their clients. He highlighted the recent Green Bond Principles that provide voluntary guidelines for the development and issuance of Green Bonds, underscoring that if 10 to 20% of the US\$ 7 trillion a year bond market were to go green, there would be more funding for Africa to access.

Mokgadi Modise, Department of Energy, South Africa, shared the South African experience with public private partnerships used to protect customers from increased energy costs. Dietrich commented that the bidding system deployed in South Africa is an inspiration to addressing the challenges with the feed-in tariff system in Germany.

RISK COVERAGE FOR RENEWABLE ENERGY INVESTMENT

The side event on risk coverage for renewable energy investment took place on Monday afternoon, organized in two parts.

RISK MITIGATION INSTRUMENTS – STATE OF PLAY: Barbara Buchner, Climate Policy Initiative, identified risk as the most significant factor preventing investors from putting their money in renewable energy projects. She highlighted policy risk and financing risk as the key gaps in risk coverage. Emphasizing that development finance institutions and the public sector have significant opportunities to address these gaps, Buchner called for new and improved mechanisms to address risk.

IRENA Deputy Director-General Wouters underscored the importance of de-risking renewable energy investment. He explained that while developed and developing country markets have different risk profiles, many risks are common to all energy investments. He raised the question whether a focused approach, such as a facility concentrating on solar projects in Africa, or wind in West Africa, could be the way forward.

Jean-Marc Otero de Val, Total, France, discussed two successful solar energy projects in 2013 in South Africa and Chile. He highlighted, *inter alia*, that: Total mitigated technical

risks through full control of the quality of solar panels; and the best way to address risk is being competitive with alternatives. He argued that the secondary market is a good way to de-risk.

Sylvia Kreibiehl, Frankfurt School – UN Environment Programme (UNEP) Collaborating Centre for Climate & Sustainable Energy Finance, stated that the private sector is not risk averse but it does not like absorbing risks that it cannot manage. She reported on the GET Fit Uganda initiative that aims to help make renewable energy projects financially viable. She discussed, *inter alia*, the World Bank's Partial Risk Guarantee mechanism for private investors, saying it can significantly lower financing costs, but has not been possible to test in Uganda.

THE WAY FORWARD: IRENA Deputy Director-General Wouters focused the panel on the way forward with risk mitigation structures.

Moderator Eckhart pointed out that governments, development banks and the private sector argue that someone else should pick up more risk. He stated that developing new institutions is time-consuming and it therefore makes more sense to expand successful existing examples.

Scott Vaughan, International Institute for Sustainable Development, highlighted the Green Bond Principles as an important “game changer” and market signal to unlock significant amounts of money. He underscored the potential role of insurance in risk mitigation.

Dean Cooper, UNEP, discussed plans to develop a global risk insurance mechanism for mitigating policy risk. He outlined plans to provide a demonstration study, aimed to attract investors and building market confidence, inviting countries to participate in the UNEP initiative.

Moderator Eckhart underscored the potential of private funds, indicating that while the World Bank may invest USD\$ 30 billion a year, the debt capital market team in Citigroup “puts out the same amount in three days.”

Marcel Alers, UN Development Programme (UNDP), presented comparative studies that analyze risk differences between developed and developing countries. He showed the impact of integrated approaches for governments to reduce risk through stable policies and market-based instruments to provide incentives and transfer risk through policy risk insurance.

Participants and panelists discussed the value of three approaches to risk: loan guarantees, off-take guarantees and retroactive policy risks. Nicaragua called attention to its success in creating an investment environment that is favorable to foreign direct investment.

Deputy Director-General Wouters summarized discussions by highlighting, *inter alia*: opportunities in de-risking by allocating risk to parties best able to handle it; value of insurance products; and evidence of interest for UNEP projects.

RENEWABLE ENERGY MINISTERIAL ROUNDTABLE

On Monday evening, IRENA Director-General Amin moderated the high-level roundtable on renewable energy. Referring to the High-level Discussion on the IRENA preparations for the 3rd International Conference on small island developing States (SIDS), he asked delegates how IRENA can assist in the upscaling and implementation of renewable energy.

Prime Minister Henry Tuakeu Puna, Cook Islands, introduced the blue-green economy concept with several examples, including green tourism development, sanitation, fisheries and marine protected areas. Noting that SIDS are scattered throughout the world, he encouraged attending ministers and delegates to work together.

Rolph Payet, Minister of Environment and Energy, Seychelles, lauded IRENA for placing emphasis on renewable energy development in SIDS. He underscored that in small islands, energy provision is linked to other issues, such as tourism and waste management, suggesting waste-to-energy developments.

Thoriq Ibrahim, Minister of Environment and Energy, Maldives, asked how investments in renewable energy and waste management could be coupled.

Prime Minister Siale'ataongo Tu'ivakanō, Tonga, stressed affordability in the provision of clean energy, calling on IRENA as a transparent authority on the matter to build public support.

Josephine Stowers, Ministry of Natural Resources and Environment, Samoa, expressed gratitude for the financial assistance provided by the Abu Dhabi Fund for Development and IRENA, suggesting the launch of a Pacific Partnership on Renewables at the 3rd International Conference on SIDS in Samoa in September 2014.

Vete Sakaio, Deputy Prime Minister and Minister for Public Utilities, Tuvalu, underscored his country's commitment and political will on sustainable development, stating that Tuvalu aims to have 100% renewable energy by 2020.

Mike Burrell, Ministry of Foreign Affairs and Trade, New Zealand, commended IRENA's strong leadership to encourage the growth of renewable energy in New Zealand and with its SIDS partners.



The High-Level Discussion on preparations for the 3rd International Conference on SIDS in Apia, Samoa in September 2014



Roland Rösch, Senior Programme Officer, IRENA

Director-General Amin concluded with the suggestion that IRENA could support studies and capacity building focused on, *inter alia*: grid extension and grid stability; technology briefs on options to reduce inter-island diesel consumption and renewable alternatives for inter-island transportation; and desalination alternatives.

PROJECT NAVIGATOR

During the side event on Tuesday morning, Roland Rösch, IRENA, discussed the Project Navigator, a new tool developed by IRENA to assist renewable energy project developers in developing “top-notch” project proposals.

Rösch emphasized, *inter alia*, the intention to develop technical concepts for various renewable technologies, including special cases, such as ocean energy and solar energy in cities. Noting that project development can be a lucrative business, he explained that project development costs using the Project Navigator are very low.

Rösch outlined the Project Navigator guidance on project development in seven steps that cover project execution, operation and decommissioning. He identified the components of the Project Navigator, including interactive project development guidelines and the financial navigator. He explained that Project Navigator contains material on the socioeconomic, technical, economic, local and communal, organizational and political aspects of project development.

Rösch stressed the intention to do outreach and training, and implement pilot projects in IRENA member countries. He said the aim is to have Project Navigator online in April/May 2014.

TRANSITIONING TOWARDS GRID INTEGRATION AND ENERGY STORAGE

The side event on grid integration and energy storage took place on Tuesday afternoon, moderated by IRENA.

Paul Komor, University of Colorado, identified the challenge of maintaining electrical system reliability as renewable energy penetration increases. He drew attention to promising new options, including: storage; smart grids; and demand responses. He described that a range of storage technologies are commercially available, as well as emerging ones, saying each has its own strengths and challenges. While identifying the private sector as essential, he emphasized the importance of regulatory aspects.

Eicke Weber, Fraunhofer Institute for Solar Energy Systems, discussed modeling on a future German energy system showing that Germany can be transformed to use 70-80% of renewable energy with a total cost that is the same as in 2012 using fossil fuels. Weber stated that Germany may well exceed the target of doubling renewable energy by 2030, driven by cost advantages, especially for decentralized systems with increased electricity storage. He highlighted that the transition improves energy security and leads to increased stability.

Aki Okimoto, NGK Insulators Ltd., Japan, discussed a sodium-sulfur battery, emphasizing that it can transform intermittent power to stable energy, enabling the intelligent use of renewable energy. Okimoto outlined two existing examples in Japan: a 51 Megawatt (MW) wind application with 34 MW storage possibility; and a 5 MW solar application with a 1.5 MW storage system. He concluded that battery products have been proven through large-scale and long-term operation applications in the commercial field.

Morgan Bazilian, Joint Institute for Strategic Energy Analysis, US, discussed the Renewable Energy Futures with scenarios for 50-90% renewable energy integration in the US by 2050. He pointed out the key results, including that: 80% of US electricity generation in 2050 could be “comfortably” produced with renewable energy while balancing supply and demand at the hourly level; this can be achieved through



The side event on grid integration and energy storage identified challenges and current options, discussing upcoming alternatives for future expansion of grid-integrated renewables.



A view of the dais during the Renewable energy investment in the Gulf Cooperation Council event.

multiple technology pathways; technologies used in the study are already commercially available; and 50% of the 80% renewable power would be from variable sources.

Ernesto Macías Galán, Alliance for Rural Electrification, expressed satisfaction that the renewable energy revolution in developed countries has facilitated development in developing countries due to cost-reduction and new technologies. Highlighting, *inter alia*, mini grids and energy storage, he identified the need for support from public authorities, including regulators and power sector technical bodies.

Summarizing the discussions, Dolf Gielen, IRENA, highlighted that a high share of renewable energy power is feasible and even likely given the economics. He predicted that the nature of the electricity supply will change with an increase in decentralized solutions especially in developing countries. Highlighting that a range of new technologies are available to deal with variability, he highlighted, *inter alia*, big batteries with substantial capacity and the role of smart grids.

RENEWABLE ENERGY INVESTMENT IN GULF COOPERATION COUNCIL

The side event “Renewable energy investment in the Gulf Cooperation Council (GCC), moving beyond targets: opportunities and challenges” took place on Wednesday morning and afternoon in partnership with the UAE Ministry for Foreign Affairs, IRENA and the Renewable Energy Industry Advisory Board (RIAB) of the International Energy Agency (IEA).

WELCOMING REMARKS: Matar Al Neyadi, Undersecretary of Energy, UAE, welcomed participants to a special session of the RIAB of IEA and IRENA, reflecting the GCC’s regional priority on renewable energy deployment. He clarified that the discussion has evolved from a focus on the business case for renewable energy to how to meet ambitious targets and sustain economic growth to unlock the renewable energy potential in the region.

Roberto Vigotti, IEA, discussed RIAB’s work with selected volunteers to provide strategic advice and participate in outreach initiatives and highlighted upcoming events.

Hans Jorgen Koch, Chair of IEA Working Party on Renewable Energy Technologies, IEA, drew attention to challenges to a low-carbon economy posed by fossil fuel subsidies, calling for a delicate and balanced approach to resolution.

Maria van der Hoeven, IEA, spoke of global shifting trends in supply and demand for energy that has opened the market in the GCC, acknowledging drivers such as economic growth, availability of natural resources and ambition.

IRENA Director-General Amin noted the increasing clarity of opportunities in the region, stressing that the way forward is through transparent policy frameworks, value addition

and interconnected grids. On finance, he addressed the need to de-risk investments potentially through a multilateral framework.

Arthouros Zervos, Renewable Energy Policy Network for the 21st Century (REN21), noted growth that is shifting the role of the GCC region from a fossil fuel exporter to a leader in renewable energy.

CONTEXT OF RENEWABLE ENERGY

INVESTMENTS IN THE GCC REGION: Paolo Frankl, IEA, shared results from the “Medium-Term Renewable Energy Market Report 2013,” noting that significant growth is coming from emerging markets, specifically in concentrated solar power.

Rabia Ferroukhi, IRENA, briefed participants on opportunities to address challenges based on an economic rationale for diversification of energy. She highlighted the announcement of targets in many countries and landmark projects, calling for continued organization of policies and coordination to meet the domestic demand and support the capacity to become an exporter.

KEY OPPORTUNITIES AND CHALLENGES:

Moderator Gus Schellekens, PricewaterhouseCoopers (PwC), framed panel discussions with an approach to view capacity in: technology to deliver services that are superior to those in use; social and technical systems to accommodate the technologies; and political leadership.

Yousif Ahmed Al Ali, Masdar, spoke of the confusion caused by fossil fuel subsidies in economic analysis, sharing experiences from Shams Power Company.

Ibrahim Babelli, King Abdullah City for Atomic and Renewable Energy presented perspectives from Saudi Arabia, noting the importance of de-risking investments and citing the example of establishing leadership through funding prospecting of geothermal sources.

Adnam Shihab-Eldin, Kuwait Foundation for the Advancement of Sciences, highlighted the opportunity for rooftop solar installation that could benefit from government incentive programmes to homeowners.



View of the room during the event.

Christopher Burghardt, First Solar, demonstrated the role of early projects in creating a valuable knowledge base for both private and public sectors.

Michael Eckhart, Citigroup Inc., suggested future work for IRENA including: to study market development patterns to create timescales to attract commercial and international financing; to map market shares; and to generate risk analysis.

Stephen Knight, Allen & Overy LLP, reviewed challenges, pointing to the value of existing projects for better understanding risk allocation that supports financing.

Discussions addressed, *inter alia*: localizing the value chain of renewable energy, supporting education to insure that the knowledge exists in the region; and understanding the progress in the development of political frameworks.

IMPACTS AND SOLUTIONS: IRENA Deputy Director-General Frank Wouters moderated the session on impacts and solutions.

Gus Schellekens, PwC, presented results of an online survey identifying key aspects affecting investments, with questions addressing, *inter alia*: the business case; main barriers to investment; investment risks; policies that could make a major difference; and whether targets and roadmaps stimulate investment.

During panel discussion, Paddy Padmanathan, ACWA Power, agreed that there is a business case for renewable energy in the region. He identified an investment risk for early movers regarding future lowering of feed-in tariffs. He noted that the recognition of the true cost of fossil fuels would be a key policy incentive.

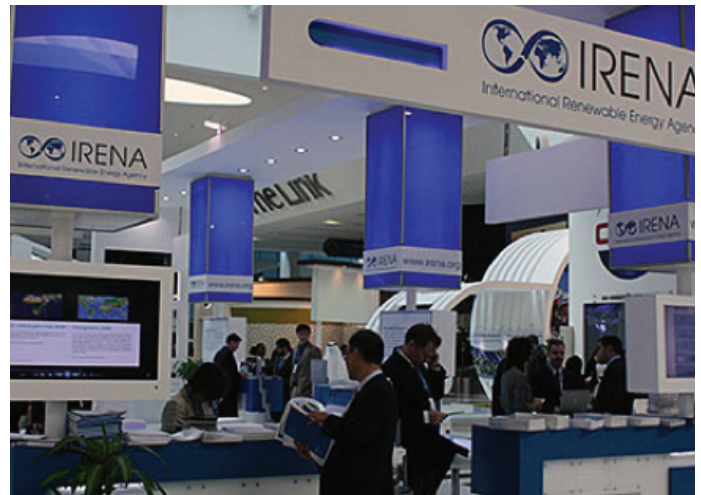
Saif Al Sayari, Abu Dhabi National Energy Company TAQA, emphasized the increasing awareness that long-term sustainability is an essential part of business, and the need to start diversifying the energy sector, including by looking into renewable energy.

Francesco Starace, Enel Green Power, noted that unlike most parts of the world, this region is not looking into renewable energy due to the urgency of addressing growing energy needs. He expressed hope that the region can advance “at the right time” and learn from mistakes made elsewhere. For his company’s investments, he identified the need for the country to have two to three natural resources for renewable energy, combined with demand growth and shortage of power, as well as legal and regulatory frameworks that can be trusted.

The panel exchanged views, *inter alia*, on: the most promising countries and technologies; and localization and local-content requirements.



View of the room during the event.



IRENA pavilion

BUSINESS MODELS FOR RENEWABLE ENERGY DEPLOYMENT IN CITIES

The side event on business models for renewable energy deployment in cities took place throughout the day on Wednesday.

WASTE TO ENERGY: The session was moderated by Mayor Lazaros Savvides, Strovolos, Cyprus.

Meghan Sapp, Planet Energy SL, presented on energy communities, saying these can be established, *inter alia*, in industrial parks, airports and cities of all sizes. She identified waste as the starting point and emphasized that energy communities can save important amounts of money.

Jyoti Mhapsekar, Stree Mukti Sanghatana, India, discussed the example of small, cost-effective biogas plants as a way to use municipal waste, noting a continuous generation of gas after an initial commissioning period of 21 days.

Asish Nawade, Innovative Environmental Technologies, India, reported on biogas produced from industrial waste, food waste and sewage treatment, highlighting social and economic benefits for communities, including organic fertilizer production, job creation improved health and environment conditions.

Discussing supportive conditions for biogas business development, Naser Odeh, Ricardo AEA, UK, highlighted the role of policy and legislation, as well as environmental and technical aspects which influence the waste management strategy selected.

Udi Gat, Eilat Eilat Region, Israel, underscored bottom-up initiatives and school programmes to encourage renewable energy development and presented the “Bedouin Drijat Village” as the first 100% solar energy village.

Karl Feilder, The Neutral Group, UAE, presented on small biorefineries producing biodiesel from restaurant vegetable cooking oil in Dubai, emphasizing the rationale of producing biodiesel in cities “because waste oil exists where people exist.”

Salvador Martos Barrionnevo, Abengoa Energy, presented on innovative approaches to treat municipal solid waste, referring to energy recovery opportunities by converting food waste to fuel.

Noting the Abu Dhabi Economic Vision 2030 to move towards zero carbon emissions, Nabil Al Yafeai, Abu Dhabi National Exhibition Center, discussed efforts to produce biodiesel from recycling cooking oil.

Abdul Vaheed, Lootah Biofuels, stressed the importance of engaging with communities and building partnerships, noting an example of blended biodiesel production from used cooking oil in Dubai for transportation, such as school bus fleets.

ROUNDTABLE DISCUSSION: Mayor Savvides moderated the roundtable.

Ola Oresanya, Lagos State Waste Management Authority, Nigeria, emphasized synergies between municipal waste collection and waste-to-energy conversion, based on a sound business model. Feilder discussed how to tackle the waste collection “overhead” for example, by segregating waste at the source or working with retailers to adopt a homogenous waste collection approach.

Eitan Parnass, Renewable Energy Association, Israel, called on municipal authorities to minimize the risks for small waste-to-energy and renewable energy companies by providing the right policy support. Mhapsekar, proposed training programmes for informal waste pickers to improve waste management. Al Yafeai, Abu Dhabi National Exhibitions Center, suggested working with youth to encourage waste segregation.

Thierno Bocar Tall, Renewable Energy Fund, and Nawade reflected on appropriate energy costing. Oresanya called on IRENA to encourage governments to support localized waste and energy management.

Al Yafeai explained the costing structure for biodiesel production facilities in Abu Dhabi. Vaheed noted that the cost of biodiesel depends in part on the cost of the raw material. Cautioning delegates to invest in the right biodiesel technologies, Feilder emphasized the importance of following safety procedures in the biodiesel production cycle.

Salvador Martos Barrionuevo, Abengoa Bioenergy, underscored “lining up objectives” and employing the right waste management strategy based on a particular municipality’s objectives.

Discussions addressed, *inter alia*: supportive policies and legal frameworks; education and communication about waste management and renewables; agriculture irrigated with treated wastewater; international cooperation and learning; the polluter pays principle; attitude shifts from “thinking about waste to thinking about recycling”; and challenges associated to pilot projects in integrated solid waste management and keeping local contexts in mind.

SOLAR WATER HEATERS: Lazare Kaptue, Mayor of Dendeng, Cameroon moderated the session.

Myriem Touhami, UNEP, demonstrated innovative financing mechanisms in the deployment of solar thermal, underscoring the importance of empowering local stakeholders and the value of market scale-up as a positive signal to the bank and support for policy change.

Imed Thabet, Agence Nationale pour la Maitrise de l’Energie Tunisian, presented on overcoming investment access barriers in Tunisia with: financial mechanisms, such as public investment and flat subsidies; quality control systems; shared institutional arrangements; program assessment; and risk identification.

Christian Holter, SOLID, outlined successful projects, highlighting innovative thinking such as crowd financing and overall importance of working with local actors.

AK Singhal, UNDP, India, reviewed the diverse range of concentrated solar technologies models deployed in India through the intervention of the UNDP-GEF Global Solar Water Heating project, creating awareness and confidence in the market by demonstrating viable technologies.

Participants posed questions to the panelists on: specific financial mechanisms, such as green mortgage options and payback programmes; and opportunities to collaborate on future UNEP projects.

RETROFITTING OUTDOOR/ROAD LIGHTING: Mohammad Yunos Nawandish, Mayor of Kabul, Afghanistan, moderated the session.

Noting that lighting accounts for circa 20% of global electricity, Martin Malmros, Aura Light, Sweden, stressed, *inter alia*: considering the total cost of lighting installations; sustainability over a product’s lifecycle; and minimizing up front investments via energy saving companies.

Referring to a smart city as an energy efficient city, Jürgen Stürm, Global Lighting Association, underscored lighting as critical part of a city’s urban infrastructure network, especially for safety and security. He encouraged engaging stakeholders early in the process, including in the vision, zoning and planning process.

Susanna Godehart, City of Durban, South Africa, underlined energy efficiency considerations for municipal lighting investments, *inter alia*: electricity consumption of available technology; potential electricity savings; cost; payback periods; and light distribution. She indicated that in Durban LED alternatives are preferred, although maintenance requirements remain unclear and financial viability depends on application and electricity tariffs.

Discussions addressed: use of mobile and digital technologies for motion sensors; collaboration between IRENA and the lighting industry, municipalities and international organizations; funding alternatives; capacity building and knowledge sharing; product lifetimes and warranties; standardization in lighting alternatives, such as LEDs; niche segments focused on least cost and least risk; and lighting for city beautification and atmosphere.

GLOSSARY

ECOWAS	Economic Community of West African States
GCC	Gulf Cooperation Council
IEA	International Energy Agency
IRENA	International Renewable Energy Agency
MW	Megawatt
NREL	National Renewable Energy Lab
REN21	Renewable Energy Policy Network for the 21st Century
RIAB	Renewable Energy Industry Advisory Board of the International Energy Agency
PwC	PricewaterhouseCoopers
SIDS	small island developing States
UAE	United Arab Emirates
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
WFES	World Future Energy Summit



Around the World Future Energy Summit