



### RENEWABLES – COMPETITIVENESS AND INNOVATION: WORKSHOP ON THE OCCASION OF THE OFFICIAL IITC INAUGURATION: 6 OCTOBER 2011

The International Renewable Energy Agency (IRENA) held a workshop on Renewables – Competitiveness and Innovation on 6 October 2011, the first of two events marking the occasion of the inauguration of its IRENA Innovation and Technology Centre (IITC) in Bonn, Germany. The IITC is to compliment the work of IRENA’s headquarters in Abu Dhabi, United Arab Emirates, by working towards a framework for renewable energy technology support as well as on cost reduction potentials and policies to support innovation and increased use of standards. The workshop had sessions on: the economics of renewables, focusing on competitiveness, costs and benefits; costs of systems integration and benefits of renewables; innovation for accelerated development; upcoming developments in renewables; and the IITC roadmap.

#### WELCOME AND INTRODUCTORY REMARKS:

Adnan Amin, Director-General, International Renewable Energy Agency (IRENA), welcomed participants, thanking the German government for its support and commitment to renewable energy. He said IRENA aims to become a nexus for international cooperation and offer a framework for practical discussions on providing the best possible information for decision-makers. Amin expressed hope that the workshop’s findings will assist in the finalization of IRENA’s upcoming work program.

Karsten Sach, Deputy Director-General, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany, spoke on renewable energy and climate change, citing costs and innovation needs as factors limiting renewables deployment. He described the German government’s strategy on phasing out nuclear energy, cutting GHG emissions, and making the transition to renewable energy, which will make the country’s economy one of the most energy efficient in the world. Sach highlighted IRENA’s role as a platform for providing policy advice to governments, while taking into account different country conditions.

Manfred Konukiewitz, Deputy Director-General, Federal Ministry for Economic Cooperation and Development, Germany, recalled divisive views on renewable energy during the Johannesburg 2002 Summit, and the change in government attitudes in many countries that has occurred since then, particularly due to recent increases in oil prices. He stressed the need to better understand intervening variables for costing renewables, and conduct cross-cutting expert analyses.

#### Session I: The Economics of Renewables –

**Competitiveness:** This session was Chaired by Gauri Singh, Knowledge Management Innovation and Technology Cooperation, IRENA, Abu Dhabi.

Dolf Gielen, Director, IRENA Innovation and Technology Centre (IITC), presented a preview of a draft IRENA study on the competitiveness of renewable energy technologies. He emphasized its aim of assisting governments in decision-making. He explained the report’s methodology and difficulties IRENA researchers have had in getting fact-based figures and objective cost data. He touched upon cost indicators and categorization of technologies, such as photovoltaics, concentrated solar power and wind turbines. He pointed out that the study is the start of a dialogue, and called for comments from participants.

Christine Lins, Executive Secretary, Renewable Energy Policy Network for the 21st Century (REN21), lamented the myth that renewable energy is expensive. She welcomed collaboration with IRENA, complimented its focus on indicators and mentioned the need for better cost estimates.

Eicke Weber, Director, Fraunhofer Institute for Solar Energy Systems (ISE), commented on scientific progress to lower costs. He emphasized that transforming the global energy picture is the responsibility of our generation. He said cost calculations should be regularly updated, and learning curves for different technologies should be carefully analyzed.

William Young, Bloomberg New Energy Finance, spoke on risk assessments from a financial market perspective. He mentioned the effect of fluctuating markets and such factors as credit ratings, risks, including political, and the need for constant updating of statistics and arriving at correct forecasts.

In the ensuing discussion, one participant said reduction of renewable energy costs does not work as effectively in small economies as in large ones. Other participants observed that changes in cost sometimes are due to currency fluctuations and inflation, and disparities in electricity costs reflect different financial conditions in different countries.

Chair Gauri concluded by highlighting the need for a bottom-up approach in setting renewable energy goals, proceeding from national to global. She admitted the complexity of modeling renewable energy scenarios, the need for objective data and constant updating to determine trends.

#### Session II: The Economics of Renewables – Costs and

**Benefits, Part I:** Hugo Lucas, IRENA, introduced the panel and said it would focus on the macroeconomics of renewables.

Nicolai Zarganis, Danish Energy Agency, highlighted that the new Danish government recently announced strong renewable energy and climate policies, including increasing wind energy as a percentage of total electricity production from the current 22% to 50% by 2020 and 100% renewable energy by 2050. He said this will cost Denmark 0.6% of GDP, but that this must be considered against the savings that will materialize in an era of increasingly expensive fossil fuels.

Urike Lehr, Institute of Economic Structures Research (GWS), discussed employment effects of renewable energy in Germany and Tunisia. She noted that in Germany, 160,000 renewable energy jobs existed in 2004, and in 2010 this number had jumped to 370,000. She discussed a study which found that domestic investment, domestic production, and exports drive employment in renewable energy. On Tunisia, she described the UNEP supported PROSOL solar water heating program.

Joo Sueb Lee, Global Green Growth Institute (3GI), said a paradigm shift in growth ideology is needed in developing countries. He introduced 3GI as a new institute with the vision of spreading good green growth policies and practices around the developing world. He said 3GI is working with Cambodia to develop a national Green Growth Master Plan and the establishment of National Committee on Green Growth within the Ministry of Environment. He said that the appropriateness of technologies and using step by step approaches to policymaking are key.

Lucas then summarized results of the panel, stressing the importance that renewables development remain policy driven in the near term, but changes are needed to create more holistic approaches to take into account changes in technology, maximize social benefits and include the private sector.

#### Session II: The Economics of Renewables – Costs and

**Benefits, Part II:** A second panel after lunch continued the discussion started in the morning, with Lucas chairing once more.

Andrea Ricci, Institute of Studies for the Integration of Systems (ISIS), described results of the EU research project New Energy Externalities Development for Sustainability (NEEDS). He found that by far, wind energy produces the lowest externalities of all conventional and renewable technologies. He said that in 2050, nuclear, photovoltaic, and wind become nearly equal in their low externalities. He contrasted this with biomass, gas with carbon capture and storage, and coal which had the highest external costs in all scenarios.

Paolo Frankl, International Energy Agency, talked about the cost of system integration of variable renewables, discussing results of the IEA study "Harnessing Variable Renewables," which found that load balancing depends on traits of variability, being: demand fluctuation, variable renewable power plants, and unexpected outages; and on traits of flexibility, being: dispatchable power plants, demand side issues, storage, and interconnection.

Richard Taylor, International Hydropower Association, discussed costs of traditional hydropower as well as matching demand. Taylor explained that hydropower used in tandem with wind can overcome variability issues. He closed by saying renewables costs should be discussed in terms of ranges, not fixed numbers, especially if one considers externalities.

Brigitte Knopf, Potsdam Institute for Climate Impact Research, compared costs of GHG reductions via renewables with other options. Knopf said low bioenergy scenarios increase mitigation costs of bioenergy significantly, and that mitigation with nuclear is not especially cost effective. She said that although renewables costs remain high in many cases, some are already cost competitive, and current learning rates indicate that costs will continue to decrease.

In the ensuing discussion, one participant said that to adequately compare the differences, it is important to convey costs of integration, externalities, and other costs of conventional electricity production in addition to that of renewables.

**Session III: Innovation for Accelerated Deployment:** This session focused on best practices and lessons learned on the framework conditions for renewable energy technological innovation, and was chaired by Mohamed El-Ashry, Chair, Steering Committee, REN21.

Bob van der Zwaan, Energy Research Centre of the Netherlands, emphasized the high cost of new technologies, referring to the rapid increase of the price of commodities used in renewables construction, such as copper and steel.

Mario Ragwitz, Fraunhofer ISI, highlighted conditions for innovation: long-term targets, stable demand, education, information provision, existence of a global market, and continuous cost reduction.

Ron Benioff, National Renewable Energy Laboratory (NREL), United States, contemplated the US experience with efficiency and effectiveness of renewable energy innovation. He advised a mixture of: government price support; market instruments; loan programs; dedicated research, development and demonstration; cooperation with industry; tax policies to promote investments; and educational programs and training.

Steve Sawyer, Global Wind Energy Council, described innovation drivers in wind technology. He expressed the view that future technical progress will be incremental. He gave the example of offshore wind turbine foundations as a challenge to reducing cost, and mentioned floating anchored turbines as a viable option.

Fumiaki Ishida, New Energy and Industrial Technology Development Organization, Japan, recounted the history of Japanese innovation policy, and lessons derived from Fukushima, which was followed by a policy of rapidly accelerating development and deployment of renewable energy.

**Session IV: Innovation for Accelerated Deployment: The Next Big Developments in Renewables:** Mohamed El-Ashry, REN21, chaired this session.

Reiner Buck, Institute of Solar Research (DLR), talked about the next generations of concentrated solar power, highlighting the new 19 megawatt GEMASOLAR plant in Spain as the state of the art due to its 15 hours energy storage capacity, meaning it can provide power 24 hours per day at an efficiency level of 44%. He said the major challenge remains high costs, which can be reduced by increasing production, lowering risks and improving technologies.

Øyvind Leistad, Enova SF, discussed innovations in wind power and argued that increased public funding of technology development, such as Enova SF, is needed. He said that there are proven linkages between increased wind market share and lowering costs. Leistad explained that there is on average 90% higher wind potential over the sea compared to on land, and introduced a revolutionary floating turbine tower construction concept called the Sway Turbine, with a 10 megawatt potential.

Günther Ebert, Fraunhofer Institute for Solar Energy Systems (ISE), talked about smart grids and electric vehicles as an energy storage option. He said in the first half of 2011, 20.8% of German energy was renewable, and estimated by 2050 it would be 80-100%, with wind and solar dominating the mix. Ebert then explained elements needed for a successful smart grid, highlighting demand side management as particularly important, along with finding the optimal energy and storage mixes.

In the ensuing discussion, a participant inquired what role IRENA should play in the development of these technologies, with Leistad answering that assistance to better understand costs would be helpful, as would outreach assistance.

To close the session, Dolf Gielen, IITC, offered a summary and outlook of IITC's activities in the field of innovation. He said five projects are ongoing: scenarios and strategies, especially for Africa and moving to the Pacific; roadmaps for renewables, currently in manufacturing, and next year for cities; work with the World Intellectual Property Organization on making the 200,000 existing renewable energy patents available online; collaboration with the IEA Energy Technology Systems Analysis Program (ETSAP) on renewables fact sheets; with NREL on translating general innovation policy frameworks to developing countries; and finally on technology transfer and cooperation and the question of whether IRENA needs Technology Centers. He said in coming years, systems integration, especially smart grids will take precedence, along with work on equipment standards and testing procedures.

**Session V: IITC Roadmap – Initial Steps:** Thomas Johansson, Lund University, chaired the panel and introduced it, asking what challenges loom ahead for renewables.

Louis Seck, Minister of Renewable Energy, Senegal, and President Designate of IRENA's Second Assembly, highlighted the problems of access to modern energy services as well as a lack of renewable energy policies in Africa. He said the largest hurdles to renewables deployment in Africa are access to technology and lack of human capacity. He called for technical, educational, and financial assistance in realizing the vast renewables potential of Africa.

Martin Schöpe, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany, noted several issues that could be addressed by IRENA, in particular: scenarios, cost analyses for modeling, synergies for energy efficiency, and policy analysis. He said aggregating goals should start at the local level, and take into account sectoral areas and factors.

Ron Benioff, NREL, United States, said IRENA occupies a unique niche for learning, creating collaborations across sectors, providing an objective analysis on new technology, and leadership for transformative solutions for the next generation. He expressed his preference that IRENA build a network of existing centers of excellence, rather than creating new ones.

Eicke Weber, Director, Fraunhofer ISE, said IRENA could help introduce renewable energy goals for 2020 and 2050, and proposed technology centers where there are none, international laboratories and a virtual renewable technology transfer center.

In the ensuing discussion, one participant said that more thinking outside the energy box is needed to make real progress in Africa, and recommended broader thinking in scenario and target work. He then cautioned against offering conflicting guidance, or repeating work done elsewhere.

Offering concluding statements, Weber suggested IRENA could be the leading global think tank on renewables and also on energy efficiency. Benioff said it is critical that IRENA serve as a neutral and objective source of information, as a global forum for work on innovative policy, frameworks and innovative technologies, and as a partner in work with individual countries. Schöpe said the current discussion must be incorporated into next year's work program in cooperation with Member States. Seck stressed the importance of encouraging renewables for the energy poor.

Dolf Gielen, IITC, noted that all presentations will be made available on IRENA's website and closed the workshop at 6:49pm.