

id	session code	title	Presenter name	Affiliation
Invited-10	E-2-1	Current situation and prospects of renewable energy sources in Cuba focusing on wind energy	Prof. Dr. Conrado Moreno	Center for Study of Renewable Energy Technologies (CETER), Cuban Society for Renewable Energy Promotion and Environmental Respect (CUBASOLAR)
187	E-2-2	Example Dardesheim/Germany – Communities realizing 100 % renewable energy solutions	Mr. Heinrich Bartelt	GeneralWind GmbH
4	E-2-3	Paving the way to large-scale wind power developments: Morocco's pre-COP22 policies	Mr. Khalid Benhamou	Sahara Wind
Invited-11	E-2-4	Wind Hydraulic Pumps Desalination Systems Off Grid to Produce Energy, Water Food and Minerals in Arid Zone	Prof. Dr. Galal Osman	Cairo University, Egypt

[Invited Speaker]

CURRENT SITUATION AND PROSPECTS OF RENEWABLE ENERGY SOURCES IN CUBA FOCUSING ON WIND ENERGY

Conrado Moreno Figueredo and Jose Augusto Medrano

Center for Study of Renewable Energy Technologies (CETER)

Abstract:

Over the latest years, Cuba's electricity industry has undertaken relevant reforms. By 2005 the Government of Cuba designed an energy development strategy known as Energy Revolution in Cuba. Distributed generation, electric grid rehabilitation, energy saving, energy education and the growing use of renewable energy sources become the spinal column of this strategy. The Cuban strategy of developing the National Electric System establishes the tendency to decrease the share of thermal power plants burning oil. Such as other regions of the area, the country not yet possesses the necessary sources of fossil fuels for its subsistence but if it is rich in renewable energy resources. In Cuba, it constitutes a necessity to increase the use of all the types of renewable sources of energy and at the same time to elevate the energy efficiency of the facilities. The reasons are of different nature: to reduce the dependence of the country of the import fossil fuels what is very related with the energy sovereignty, to diminish the costs of the energy production due to effect of the high prices of the fossil fuels, the high costs of the energy that it is distributed the users to achieve a more efficient national economy and to diminish the negative effects on the environment caused by the use of the fossil fuels among other causes. The renewable energy sources which appear in the Cuban archipelago and have an application currently are: the wind energy, the thermal and photovoltaic solar energy, the small wind turbines and the biomass as energy source fundamentally the sugar cane wastes. Among the renewable energy (RE) sources in the country, wind energy is considered as the most dynamic source in the first years of this new strategic design. In the last years, wind energy has been the RE source with major growth, from 2,1 MW in 2007 to 11,7 MW in 2010. Currently a wind park of 50 MW is in stage of implementation. The program by 2030 is focused to have 700 MW installed. Other renewable energies possess ambitious plans for the near future such as photovoltaic connected to the grid, the sugar cane biomass and the small hydro. The purpose of this work is to give a panoramic of the current situation of these renewable energy technologies in exploitation and the perspective of each one of them, the laws that govern in the country supporting the use of the renewable energy in these moments and the productive chain of the Cuban industry.

Example Dardesheim/Germany **- Communities realizing 100 % renewable energy solutions**

Heinrich Bartelt

GeneralWind GmbH

Abstract:

The German municipality of Dardesheim is well known as “town of renewable energy”. Dardesheim is a small nice town having just 1.000 inhabitants. It is located in the eastern German bundesland of Sachsen-Anhalt. Renewable energies are by far the most important industry of Dardesheim. On the roofs of the private buildings there are a lot of photovoltaic systems. The local wind energy farm consists of 35 Enercon 2 MW-turbines and 1 Enercon-machine of 6 MW, in total an installed capacity of 76 MW, producing forty times more than the total electrical demand of the municipality. The photovoltaic installations are producing actually about 100 % of the private households` electrical demand. Several inhabitants are financial shareholders of the combined renewable energy farm. Nearly everybody is profiting from the results, privately or in his role as member of different social groups of the town. The outcome of the energy farm leads to an increasing local purchasing power.

The organisers are advertising for increasing financial participation in the wind farm by the citizens: During the first eight years since erection the annual interest rate for them was between 8 – 10 % depending of the results. The wind farm is sponsoring local cultural and social groups, for instance sports groups, young and senior peoples activities or for instance the local brass orchestra which by now five times won the Germans brass orchestras championships. Sponsoring is also granted to an annual rock music festival organised by a group of young musicians. And they advertise for wind energy on their event posters. Each second month the energy farm publishes a newspaper for the people of Dardesheim and the villages around free of charge. These newspapers are also published on the website of the energy farm: www.generalwind.com, which attracts increasing numbers of visitors by now in 13 different languages.

A new idea is the combination of the wind farm with a neighboured 80 MW hydro storage station, so that not only Dardesheim, but also about 10.000 people around can be supplied by 100 % renewable energy even if actually wind is not or not sufficiently blowing. During high wind speeds the water is pumped up to a higher level – at low winds water runs down and reproduces electricity via two 40 MW hydro turbines. A model of the control panel of that renewable virtual power plant can be seen in the town hall of Dardesheim. There interested people can see and understand: The conventional energy prices are increasing and the costs of renewable energy are decreasing and will be in future more and more the cheaper alternative. Renewable energies are supporting the regional economy. In Dardesheim the people are feeling: “This fits very well to our landscape and to our future political expectations.

Paving the way to large-scale wind power developments: **Morocco’s pre-COP22 policies**

Khalid Benhamou

Sahara Wind

Abstract:

With only 850 MW of capacity auctioned in 2016, the Moroccan Wind Energy Initiative of ONEE provided the world’s lowest wind energy costs. At 3.0 ¢cent/kWh without support mechanisms and close to 70% of the total investment in local contents, the industry is on track to reach even lower wind energy prices in the future. Attributed to a consortium linking Nareva -a local developer and equity investor- with Enel Green Power (EGP) and Siemens, the deal pitching four other competing international consortiums was judged on price and plans for local manufacture. As a result, and in order to serve regional export markets as well, Siemens unveiled a rotor blade factory near Tangier Morocco, which is to start operating in 2017. Considering the rather limited size of the wind power auction, Morocco leveraged its wind development experience backed by future wind potentials quite well. From an operational wind power capacity of 795 MW -whose largest share is installed on the Saharan trade windblown coastline- ONEE’s integrated wind energy initiative consecrated years of experimentations with various wind development frameworks. These were aimed at maximizing wind project outcomes while minimizing costs as well as financial exposures. A thorough review of the country’s renewable energy policies pertaining to wind energy developments ahead of its chairmanship of the COP22 conference which will take place from 7-18 November 2016 in Marrakech will demonstrate the learning curve which has been acquired. A mix between concessionary public and full private wind energy developments based on Morocco’s Renewable energy law 13-09 took advantage of industrial offset policies that provide state of the art facilities to manufacturers. It is only through the establishment of a sustainable wind industry of which the Siemens blade factory in Tangier is the first step that a well-interconnected grid to neighboring markets backed by an efficient generation mix will enable the country to tap into its significant wind energy potential. For this to happen, a High Voltage Direct Current (HVDC) transmission line will provide a much needed effect of scale. The Sahara Wind project’s 5 GW-HVDC efficient long transfer line will also open the access of the Sahara trade winds to a regional wind power dispatch. Sound, inclusive renewable energy policies are therefore of utmost importance in this process.

[Invited Speaker]

WIND HYDRAULIC PUMPS DESALINATION SYSTEMS OFF GRID TO PRODUCE ENERGY, WATER, FOOD AND MINERALS IN ARID ZONES.

GALAL OSMAN

Founder and Vice President of WWEA, President of Egypt Wind Energy Association, Director of Renewable Energy Research Center Egypt Ministry Of Higher Education & Scientific Research Mansoura University.

Abstract:

Wind Desalination-wind hydraulic pumps-Off Grid-Agricultural- RO desalination- Minerals

The idea of climate drought along with constant increase in demand of natural resources is opening the horizon for a new global market to be served. That includes but not limited to fresh water and minerals for the agriculture and chemical industries.

Challenges of the so called Water-Food-Energy Nexus provide commercial opportunities for the development of innovative solutions. These solutions combine existing commercially proven technologies to reduce financial and technology risk. We live in a world today where more than one billion people live in areas without water or where water resources are scarce .Experts expect competition between cities, even between industry and agriculture sectors over the availability of water resources, which can lead to international tension and conflicts over current diminishing resources. Climate mapping shows current and predicted drought trends, as expected, recent drought conditions are set to continue.

New concepts are based on combining mature and innovative technologies. Pressurized hydraulic flow created in wind farms with wind driven pumps (wind pumps) used for rated electric power production by means of hydraulic motors or turbines of constant speed and variable torque which actuates alternately/or simultaneously rated electric generators as function of wind power availability.

Use of positive displacement pumps driven by rotors of fixed pitch blades for maximum capture of wind power enables the attainment of tip speed ratio in range of high power coefficient by means of the pressurized hydraulic flow of wind farms..

Another application of wind farms with wind driven pumps is for creation of variable hydraulic flow of fixed pressure as function of wind power availability which may be used for water elevation as well as for the desalination of salt water solutions by reverse osmosis.