G8 – UNESCO
The World Forum

Trieste – Italy 10-12 May 2007

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The form was organised by ICTP and its Director Professor Srinivasan with several organisations, WREN among them. The forum was open by the Prime Minister of Italy, Dr Romano Prodi and the Director General of UNESCO, Dr Koichiro Matsuura.

More than 100 countries participated and there were 40 ministers of education or energy present at the Forum. Many issues were discussed - the need for electricity/energy, and science research and higher education in Asia and Africa; the shortage of electricity and lack of potable water in most parts of the world and poverty and aid programmes for developing countries.

Professor Sayigh was responsible in organizing the session on SUSTAINABLE DEVELOPMENT AND ENERGY. He was the Rapporteur while Dr David Lindley chaired the session. The panalists were: Prof Evgeny P. Velikhov from Russia, Dr Larry Kasmerski from USA and Mr Isao Yukawa from Japan. All three speakers highlighted the importance of the use of renewable energy as a main source of electricity. The summary of the programme and session is below.

The Prime Minister of Italy Dr Romano Prodi with the Director General of UNESCO at the opening ceremony.

Some of the participants at the Forum.

Extracts from the G8-UNESCO Forum Programme on Friday 11 May 2007

14:30-15:50 Sustainable Development and Energy

How to develop an integrated approach involving education, research and innovation to solve the energy challenges of the 21st century? Identify critical areas of research, e.g. bio-nanotechnology, bio-molecular medicine, genetic engi-

neering, telemedicine and new cancer therapies.

Coordinator:

Dr. David LINDLEY

Director, Ocean Power Delivery Ltd., UK

14:30-14:45 Opening

Mr. Giandomenico MAGLIANO

Directorate General for Multilateral Economic and Financial Cooperation, ITALY

Keynote speakers

Dr. Lawrence L. KAZMERSKI

Director, National Centre for Photovoltaics, USA

Dr. Isao YUKAWA

President, Kyocera Solar Corporation, JAPAN

Dr. Evgeny P. VELIKHOV

President of Russian Research Centre, RUSSIA

15:50-16:30 Discussion and the Report of the Rapporteur

Rapporteur

Professor Ali SAYIGH

Chairman of WREC, Director General of WREN, Editor-in-chief of Renewable Energy Journal, Brighton, UK

SUSTAINABLE DEVELOPMENT AND ENERGY SESSION

The following issues and facts were reported:

• World Population is doubling itself every 40-50 years.

• Demand for energy is doubling every 30 years.

• Demand for electricity is doubling every 10 years

• Each year developing countries use more energy compared with the previous year in order to improve their lifestyle and standard of living. For example: in 1965 the ratio of energy consumption between developed and developing countries was 18. This ratio in 2006 was reduced to 4. By 2030 this ratio will be equal and energy demand will have trebled its present levels.

• Excessive use of fossil fuels will continue for the next 10 years while renewable energy will be adopted globally to replace present energy supplies.

• The level of CO_2 emissions in 1960 was 315 ppm, while in 2006 it had reached 384 ppm, an increase of 22%. In 2007 so far it has reached 480 ppm.

Prof Sayigh and Dr Yukawa with The Congolese Minister of Energy

One of the major contributors to this high level of emissions is that of the motor car. For example in the USA there are 173 m cars on the road while in Germany 60 m cars, UK 33 m and so on. Similarly the emissions caused by air travel is 10 times worse than that of motor car travel. Again citing an example: in 2006, JF Kennedy airport saw 100 m passengers passing through while Heathrow airport saw 62 m.

RENEWABLE ENERGY WILL MEET THE CHALLENGE

In 2100 it is expected that 90% of our energy need will be met from renewable energy resources, and furthermore the prediction 70% will come from photovoltaic technology.

Moreover most developing countries not only have long hours of sunshine but also higher solar intensity as well. Therefore IT MAKES SENSE TO INVEST in renewable energy.

In 1973, the first large scale renewable energy conference was held at UNESCO in Paris "The Sun in the Service of Mankind", Prof Sayigh was one of the participants. His advice to developing countries then was to use the SUN to meet your energy needs, and the frequent response was " if it is so good why the people of the west not using it?

Now the west is using it extensively and the gap between developed and developing countries has widened, and the west is using billions of dollars to develop and use renewable energy while most of the developing countries are watching only!

WHERE ARE WE NOW?

• Hydroelectricity

Installed capacity: 700,000 MW
Under construction: 150,000 MW
Potential can be developed: 1,500,000 MW

Marine Turbine Technology, Wave and Tide Energy will be a main energy source in 10-years from now. So far the largest project is in Portugal with 2 MW capacity.

• Hydrogen and Fuel Cells

Research and development in hydrogen technology, fuel cells, biofuel and biodiesel has resulted in many large scale demonstration projects to generate electricity and for transportation. Again millions of dollars are being spent by the governments of developed countries as well as in private enterprise aiming to achieve a cleaner environment and a low cost source of energy by 2030.

• Geothermal Energy

In heating and thermal applications, more than 20,000 MWt is achieved, while more than 10,000 MWe of electricity is being generated from geothermal sources.

• Solar Thermal

Solar water heaters are used almost everywhere in the world. As far back as 1962 Israel saved 2% of its electricity by using water heaters. In the old 15 EU countries, solar water heaters save 60 Mtoe per year. Several solar thermal plants exist globally, 342 MW in USA, 11 MW in Spain, several 5MW in Europe, while another 200 MW is being built in Spain and 200MW is being built in Australia by using the solar chimney concept. China has more than 60 companies producing evacuated tubes for hot water heaters. In 2005, the sale of theses tubes earned China more the 50 Million US $.

• Biomass & Biogas

These sources supply 15% of all the world's energy at present and are mostly suited for rural areas.
THE TWO AREAS where most advances have been made are wind energy and photovoltaic applications.

• Wind Energy

Europe is leading the way with more than 45,000 MW installed, while globally there are more than 80, 000 MW of installed capacity. Wind farms
vary in size, from a few MW to 576 MW in Spain. Machines are commercially available 1-3 MW rating and their cost is competitive with both gas and electricity.

• Photovoltaic Technology

An example of the growing photovoltaic industry mentioned was that of Kyocera, started in 1959 with 28 persons and a capital of 30,000 US $, which in 1998 employed 12,457 persons and generated 1,000,000,000 US $. In 2006, the company sales reached 11,814,000,000 US $ and employed 61,468 persons.

In 2006 shipments of PV reached 2600 MW, and installations were in excess of 4000 MW. The efficiency of crystalline silicon reached 22% and the costs are about 3 US$/W. The largest system planned in Portugal is 62 MW, 8 MW in USA, 11 MW in Spain. The growth of the PV industry has surpassed all expectations, some of the largest companies can produce up to 500 MW per year. PV can be used everywhere and there are literally hundreds of possible applications from telecommunications to home electricity, traffic parking meters to space satellites, from medical refrigeration to street lighting.

In China now there are 200 companies producing solar cells.

Prof Srinivasan standing between Dr Larry Kazmerski and H E Ugandan Minister of of State for industry and technology, Prof Ephraim Kamuntu (MP)

A group picture during one of the dinner party.

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