

**Plenary Session I:  
Opening Session  
Tuesday, 1 June, 9.00 – 10.00 h  
Venue: Plenary Hall IKBB**

Internationale Konferenz  
für Erneuerbare Energien, Bonn  
International Conference  
for Renewable Energies, Bonn



## **KEYNOTE ADDRESS**

### **“Renewable Energy: Seeking a Global Commitment”**

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The timing of this important Conference could not have been more appropriate. It is almost two years since the World Summit on Sustainable Development in which the Johannesburg Plan of Implementation clearly identified that we “take joint actions & improve efforts to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievements of the millennium development goals, including the goal of halving the proportion of people in poverty by 2015.” It further elaborates action to include access to environmentally sound energy services and resources, improving access to modern biomass technologies, supporting the transition to cleaner use of liquid and gaseous fuels and the development of national energy policies and regulatory frameworks that would help to attain some of these goals. This Conference, therefore, marks a watershed in defining global strategies and programmes of cooperation whereby the goals set in Johannesburg can be realized within the time frame that was highlighted at that Summit. In this address, I would like to highlight some important considerations that create the imperatives for concerted actions and a major global commitment towards the large-scale development and use of renewable forms of energy. These considerations are embedded in the fact that:

1. Renewable energy technology is no longer a fringe question. Technology development in this field has brought renewable energy options within the range of mainstream energy solutions under an expanding set of facilitating conditions.

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2. The challenge of achieving energy security at the global level rests squarely in a forward-looking and vigorous plan of action for harnessing renewable forms of energy.
3. Of the almost two billion people in the world who lack access to modern forms of energy, only a small fraction can be served in the foreseeable future through the use of fossil fuels on an economically viable basis. The most viable large-scale option for this segment of the global population lies in the use of renewable energy technologies.
4. The threat of climate change and the urgent need for mitigation of emissions of greenhouse gas requires urgent progress towards a low carbon energy future in the world, of which renewables would be a major part.

On the first of these considerations, the evidence today is overwhelming. Wind energy technology was expensive and wind power machines extremely cumbersome and lacking in versatility a quarter century ago. Today, wind power competes effectively with fossil fuel based conventional power options and the rate of growth of this technology has been phenomenal, particularly in western Europe. Pointed evidence of the growth of renewable energy is provided by a recent estimate which indicates that annual investment in renewable energy was to the tune of \$17 billion worldwide in 2002. This was a major increase from the \$6 billion invested in 1995. The cumulative investment in renewable energy during 1995-2002 was estimated to be at least \$80 billion. As against the annual investment in conventional power, which is to the order of \$100-150 billion, this \$17 billion is not a very large figure, particularly since renewable energy capacity is still barely 3% of the global installed power generation capacity. But, the total renewable energy capacity installed worldwide at 100 gigawatts (GW) represents the achievement of an important milestone. Of this 100 GW, wind power alone accounted for 31 GW in 2002, with a remarkable rate of growth, which could make this source provide at least 3-4% of the global installed capacity of power by 2010. The International Energy Agency (IEA) has come up with projections of reductions in capital costs of renewable energy technologies between the period 2000-2030. Of these, the reduction in solar photovoltaic costs is estimated at around 15%, off-shore wind

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around 10%, solar thermal around 10%, and modern biomass technologies by around 11%. These cost reductions, which are based on very conservative assumptions, would make several of these technologies economically viable for large-scale uses by 2030. Fuel cells will be used for distributed power generation on a large scale when capital costs fall below \$1000/kW, which would be a quarter of the current costs. It is also expected that the efficiency of fuel cells will approach 60% compared to 40% now. The future of fuel cell usage as a source of decentralized power, particularly in developing countries, is full of promise and potential benefits.

Based on these conservative estimates, there is a strong case for large-scale funding of R&D for renewable energy technologies, and setting in place regulatory structures that would ensure rational prices, including internalization of environmental externalities, so that renewable energy technologies can be developed and deployed on a level playing field. The rationale for a forward-looking approach, where Government needs to play a proactive role, also arises from considerations of energy security. It is expected that the demand for oil globally by the year 2030 would reach a level of 120 million barrels/day (mbd), which represents a substantial increase from the level in 2000 of 75 mbd. Corresponding to this demand, the production of oil in OPEC would increase from 28.7 mbd in 2002 to 64.9 mbd in 2030. Of this quantity, the members of OPEC in the middle-east would increase production from 21 mbd in 2000 to 51.4 mbd in 2030. This scenario requires attention for two reasons. Firstly, global dependence on a small geographical area in the world makes oil supply subject to the uncertainties of local politics and changing global geopolitics. The current situation in Venezuela and Iraq are pertinent in this context. The second reason arises out of the need for large investments in exploration and the creation of production facilities in the oil exporting countries. These would materialize only if large increases in the price of oil were to take place for providing revenues on a suitable scale for investments that would be required. An associated reason for concern would be the possibility of shortfalls in production, which would translate into substantial increase in prices of oil. A world consuming 120 mbd would be far more vulnerable to sudden price increases in 2030 than a world that consumed 75 mbd in the year 2000.

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The objectives of energy security and the use of technological development on an optimal scale would be met effectively by ensuring access to those currently deprived of modern forms of energy through provision of energy from renewable sources. But this is an area where business as usual will not yield results. Firstly, regulatory bodies will need to be educated on the full economics of renewable vs. conventional forms of energy. The term full economics would include the environmental benefits of renewable energy use both at the global and the local levels. It would also include the inclusion of a security premium, which shall provide renewable energy with a cost advantage against imported oil. But a far more critical element in the expansion of renewable energy supply and expanded access to those who are deprived today, particularly in the rural areas of the developing world, would include:

1. The strengthening or creation of institutions at the local level which can take decisions and action for harnessing decentralized and distributed forms of energy generation using renewable resources, as against decision-making by utilities that provide power and energy through centralized and extended distribution systems. Fortunately, there are, in India for instance, a large number of cases of how the use of local institutions provide strong and sustainable infrastructure for spreading the use of renewable energy. Several rural projects implemented by my own Institute, TERI, stand out as examples of this grassroots based local institution oriented approach, which is lasting, economically viable and technologically effective.
2. The availability of micro-finance at the rural level is critical as an input for decentralized decision making. Experience has shown that recovery of investments made in properly formulated, distributed and decentralized energy projects has been remarkably good and far better than even bank loans for the organized sectors of the economy
3. Renewable energy technology for use, particularly in rural areas, needs to be customized for the end uses pertinent to a particular community. TERI's activities in rural areas have emphasized this critical element of customization, resulting in large-scale market demand for suitably engineered products such as solar lanterns, for instance. These sell at around Rs.500/unit (around US \$11 at current rates). Solar

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lanterns and other customized devices are sold through the harnessing of local entrepreneurs who also provide after sales service against payment. No government subsidies enter into this creation of renewable energy markets for the projects that have been implemented through this approach and philosophy. They are eminently successful because they embody faithfully the preferences of the customer.

4. Energy projects in rural areas cannot succeed in isolation and require integration of energy solutions with a broader development approach based on technical innovation. With this objective, TERI has evolved an approach called INSTEP (Integrating New and Sustainable Technologies for Elimination of Poverty). This approach involves energy innovations combined with innovations in areas such as agriculture, management of natural resources, such as water, connectivity through mobile telephones and the spread of modern information technology. It has been found that integrated innovation in all these areas yields combined benefits that are much larger than the sum of the parts from individual interventions in all these areas. Incomes of the communities involved grow substantially and on a lasting basis. The challenge, therefore, is to mobilize civil society and local government across the board in all these sectors, which then makes energy an important part of a combination of innovations along with all the others.

This Conference needs to come up with some clear messages in all these specific directions which would shape energy policies round the world in a direction that has substantial global benefits apart from the local benefits described earlier. In my capacity as Chairman of the IPCC, let me highlight two important conclusions of the Third Assessment Report (TAR). These are:

- There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities; and
- Emissions of CO<sub>2</sub> due to fossil fuel burning are virtually certain to be the dominant influence on the trends in the atmospheric CO<sub>2</sub> concentration during the 21<sup>st</sup> century.

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Renewable energy technology provides the most effective and globally responsible approach for tackling the challenge of mitigation of emissions of greenhouse gases. It is for this reason that in the Fourth Assessment Report of the IPCC, technology is being included as a cross cutting theme. I hope that the valuable material to be presented on this Conference and hopefully to be published in suitable form would provide a valuable input for the Fourth Assessment Report, work on which is now fully in hand.

There is an urgent need for a global commitment to assess the future role of renewable energy and programmes of action to harness the options available for local as well as global benefits.