



DECENTRALISED ENERGY SOLUTIONS

**MESSAGE: DR JACO CILLIERS, COUNTRY DIRECTOR
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The RE-INVEST conference is a welcome initiative of the MNRE in wake of the Prime Minister's 'Make in India' call. UNDP appreciates the Government's supportive policies on renewable energy and we feel this will be very beneficial to the country in the long run.

India's energy consumption has more than doubled since 1990. In spite of this, about 300 million Indians remain without access to electricity and 800 million still depend on traditional biomass burnt in inefficient cook-stoves for serving their cooking energy requirements. This is not speaking of the fact that even for most of those who do have access to energy the amount of energy available falls woefully short of meeting their complete requirements. The reasons for this could be either inadequate energy supply or unaffordability or both. The energy access situation in the country, therefore, poses a complex challenge with multiple dimensions such as resource availability, affordability, etc.

In order to put some spotlight on the energy issues confronting remote and backward areas, the UNDP considered sponsoring a session on this topic. We are happy to bring out this booklet, which documents important issues on decentralized energy and talks of eminent speakers who graced this session. I hope participants will find this booklet useful.

*Dr Jaco Cilliers, Country Director
United Nations Development Programme, India*

Dear Mr Kansal, distinguished speakers on dais, and participants,

It gives me great pleasure to welcome the speakers, investors, eminent experts, development practitioners, Government officials and international delegates to this extremely important session.

India has now entered into a phase of positive development orientation wherein emphasis is being put on a close and continuous dialogue with the nation's citizens and addressing their priorities. The new Government has come out with its expansive economic vision outlining how it plans to usher in reforms that lead to inclusive development. Needless to say, since energy happens to be an important pre-requisite for development, strengthening and augmentation of energy infrastructure in the country constitutes a major thrust area of the new Government. It is also heartening to note that renewable energy features very prominently in Government's plans of boosting, strengthening and revamping the energy infrastructure in the country. This will also bode well for the entire world by way of fostering long term sustainability.

This vision of the Government of India very much compliments the 'Sustainable Energy for All' or SEFA initiative of the United Nations Secretary General, which is aimed at facilitating access to energy for the entire world and also double the use of renewable energy by 2030.

Promoting low carbon, climate resilient and inclusive development has always been UNDP's commitment. Within the UNDP, there is a dedicated unit focusing on Energy and Environment. We continue to support the Government of India in meeting their national development objectives and its commitments under important multilateral environment agreements.

Which brings us to the theme, constituting the main focus of this session? Although India has made considerable progress in energy access, it is estimated that nearly:

- 300 million people do not have access to electricity. This is one-third the global population without access to electricity.
- 800 million people depend primarily on biomass as a source of energy for cooking, which of course, is done in a rather inefficient manner.

A large segment of the available potential for undertaking farming and other economic activities in rural areas remains untapped due to lack of energy access. For instance, there exists over 9 million diesel pump-sets in the country, many of them grossly inefficient and polluting, simply because of unavailability of electricity or unreliability of power supply services in certain areas. Similarly, as many as 800,000 telecom towers in India make use of diesel-based electricity, again due to unavailability or unreliability of power supply services.

When we look at urban and semi-urban areas, it is amply clear that fossil-based energy sources such as LPG, petroleum fractions, coal, etc., continue to be the predominant fuel options for domestic chores such as cooking, water heating and industrial applications.

This session envisions pooling of experiences from around the world and bringing them together to evolve sustainable solutions involving use of renewable energy.

Renewable energy has travelled a long way from the times when the costs were very high and only a very high level of subsidy could accord some dimension of affordability. Over the past decades, considerable degree of technological and

economic feasibility has been achieved by improving on aspects like energy conversion efficiency, optimization of materials, scales of economy, etc.

UNDP has supported several pilot initiatives in this area showcasing sustainable and economical solutions in last two decades with the Government of India, specifically, the Ministry of New and Renewable Energy. I would like to cite a few examples:

Demonstration installations that serve to establish practical utility of micro-hydro power plants for electrification of remote rural areas, were undertaken, followed up by development of a master plan for decentralised electrification of remote areas of Himalayan states. A micro-hydro simulator has been installed at IIT Roorkee, which is serving as a training platform for different categories of personnel. Trainings are being conducted by the Institute on self-sustaining basis and experts are providing policy inputs on micro-hydro even after project closure.

Practicability of bio-methanation technology for power generation based on different substrates was demonstrated; capacities of the demos varied from ½ to 2 MW. On a parallel note, assessment of waste generation in about 80 cities was carried out.

The market demand for solar water heaters for domestic and industrial uses has tripled due to a UNDP supported demonstration project.

An ongoing project on use of solar concentrators for direct heat applications is generating very interesting results – it has already increased the market for solar concentrators by about three times in comparison with that in the baseline year 2011. India has largest population of solar concentrators for heat applications both in terms of number of installations and collector area. The project has established two state-of-the-art test centers for solar concentrators at the National Institute of Solar Energy, Gurgaon and University of Pune. These are perhaps only of its kind in Asia, the handful of others being located in the United States, such as NREL.

Pilot efforts of market development for renewable energy products such as solar PV products have helped household business, provided employment and five banks have started providing loans for RE products in Rajnandgaon.

Building on these experiences, UNDP in collaboration with MNRE with funding support from GEF has launched a project to develop market for renewable energy-based rural enterprises. The new project aims to set up 30,000 enterprises in 15 districts in the states of Assam, Madhya Pradesh and Odisha. Khadi and Village Industries Commission, National Thermal Power Corporation, Climate Group, Local State Nodal Agencies, NGOs, and service providers are expected to support us in implementing the project.

To address the various dimensions of decentralised energy requirements, this technical session aims to cover three key aspects, which are:

First: Decentralised thermal energy solutions through heat derived from the sun. India has enormous potential for solar energy with more than 300 clear sunny days. There is significant energy demand for meeting cooking, hot water and process steam requirements in urban as well as rural areas. For a city like Bengaluru, almost 15% of its domestic hot water requirement is met by solar water heaters. Many cities in India and perhaps in other countries can replicate this and increase the penetration of solar energy further. One estimate indicates that the market potential for solar water heaters stands at about 350 m². India has over 5 million small enterprises which require process heat, presently met by burning fossil fuels. Solar concentrators can be valuable clean energy solution.

Second: Decentralised thermal energy solution through biomass based technologies. Over 80% of Indian household's burn biomass in very inefficient cookstoves leading to inordinate deforestation as well as causing dangerous levels of indoor air pollution. Efficient cookstoves, biogas, biomass gasifier based devices; alternative fuels can address these issues. In addition, there is considerable need for heat in industrial applications for which coal, kerosene oil / diesel, woody biomass, crop residue and even electricity are used as fuel. Biomass gasifiers can be a viable alternative that reduce the biomass consumption by half or replace the use of fossil fuels.

Third: There is enormous potential to make use of renewable energy to meet decentralised electricity requirement. Depending on the resources available, micro-hydro, solar, biogas, biomass and even small wind generators can be viable options. According to an estimate of the International Energy Agency (IEA), by the year 2050 the potential for decentralised energy systems in India is in between 92 and 115 GW. The Government of India aims to connect all villages with 24 x 7 electricity supply and also achieve a target of 100,000 MW of solar electricity by 2022. In order to achieve this ambitious target, decentralised renewable energy solutions can play a significant role.

To increase the energy access and fully realize the potential of renewable energy, it is essential to catalyze the experiences so that one can choose most robust options and also require huge investments. The speakers will provide us with their expertise on delivery mechanisms both financial and technology. They will also deliberate on the need for policy environment, investments required and experiences of how it can be mobilised. I am sure addressing these aspects will also strengthen India's response to global commitments when the countries meet in Paris at the end of this year.

I am sure today we will be able to benefit substantially from the vast experience of our distinguished speakers and make use of the discussion generated herein for making pertinent plans for promoting decentralised energy solutions in India and other countries. Again, while welcoming all distinguished participants, I eagerly look forward to looking at the outputs of this session and subsequent new and innovative ideas that emerge subsequently.