

PAPER II.1

INDIA - EU COOPERATION IN RENEWABLE ENERGY SPECIAL FOCUS ON SOLAR ENERGY

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India has made considerable progress in harnessing new and renewable sources of energy such as solar, wind, biomass and small hydro. A renewable power capacity of over 13,500 MW has been installed, which is about 8% of the total installed capacity in the country and contributes about 3% to the electricity mix. Major contribution of 9500 MW has come from wind power. Renewable energy is also being deployed for a variety of decentralized applications. Over 1.5 million solar lighting systems have been deployed, mostly in the rural areasⁱ.

Recent developments in India have brought renewable energy in sharp focus in the energy security and climate change space. Keeping in view the vast potential of solar energy, with about 300 sunny days over a large part of the country, high priority has been accorded to accelerate solar power generation through both the technology routes of solar photovoltaics and solar thermal power or Concentrated Solar Power (CSP). In the National Action Plan on Climate Change, a National Solar Mission has been announced among eight National Missionsⁱⁱ. A goal of 20,000 MW of solar power by 2020 is envisaged. The Solar Mission will aim to “leapfrog” and thus place India in a leadership position in development, manufacturing and deployment of solar energy technologies.

1. EU – India Summit

At the recent EU – India Summit held at Marseille in September, 2008, joint commitment was reiterated to urgently address climate change and deepen co-operation in energy, clean development and climate change. It was agreed to evolve a long-term co-operative work programme by end-2009 to promote and implement joint activities, research and policy development. It was also decided to explore the upscaling of financing for climate change activities, potential for research and technology co-operation and options for technology transfer. Towards promoting sustainable development under India – EU Joint Action Plan, a new activity on fostering co-operation on solar energy was identified with a view to jointly developing a flagship programme in solar energyⁱⁱⁱ.

2. Joint solar initiative

Significant progress has been achieved by various countries of the European Union in recent years in development and deployment of renewable energy technologies, particularly in the area of solar energy. Targets have been set for reducing emissions by 20% and for renewable energy to meet 20% of the electricity needs by 2020. There is thus a strong case to foster and re-inforce India – EU Cooperation in view of common interests in clean energy and sustainable development^{iv}.

It is proposed that a Joint Solar Initiative be developed to facilitate and expedite the implementation of a broad agenda and framework for EU–India co–operation in renewable energy, with special focus on solar energy, to begin with. The scope of cooperation should include research and technology development, demonstration & deployment covering concentrated solar power and providing access to energy, apart from facilitating technology transfer and financing and catalyzing investments.

3. Research and technology development

Cooperation in research and technology development should focus on solar photovoltaics with the objective of achieving higher efficiencies, reducing costs and improving reliability and long term performance stability. This can be achieved through development of innovative, new concepts and novel materials, devices and processing routes. Such cooperation should facilitate networking of R&D institutions on both sides. Good quality proposals need to be developed in limited and well-targeted research areas and topics, for example, in the areas of thin film solar cells and concentrator photovoltaics^v.

The Solar Energy Centre of the Ministry of New and Renewable Energy near New Delhi is engaged in research, technology development/evaluation and human resource development in the areas of solar thermal and photovoltaic technologies. Several laboratories and test centres in Europe have established facilities and have undertaken work in development of standards, test and evaluation methods and protocols, best practices etc. Co-operation should be established to upgrade the expertise and facilities at the Solar Energy Centre. There is potential for linkage to be established with the EC Joint Research Centre in Ispra, Italy and other leading research institutions in Europe.

4. Solar power projects

Demonstration projects should be taken up as they are very effective in giving high visibility to new developments, in involving and developing stakeholder confidence, and leading to wider implementation and replicability. In the area of solar thermal power, apart from established technologies, several new technology configurations are being investigated in Europe. Concentrated Solar Power (CSP) should be taken up as another priority area for co-operation. The Rajasthan Integrated Solar Combined Cycle (ISCC) project could be revisited and redesigned keeping in view the current technology status. The earlier configuration for the 140 MW project had envisaged a 35 MW solar component based on parabolic trough collectors and a conventional power block based on gas turbines^{vi}.

In order to take advantage of economies of scale, a 50 MW demonstration solar power project is proposed, to be based on the parabolic trough design including its Linear Fresnel Reflector (LFR) variant, or the central receiver design. With a view to increasing the capacity factor, the configuration could be based on a hybrid/integrated design, with a conventional power block, or include thermal storage, depending upon the base load and peaking requirements. Thermal storage might be the preferred option as the entire output would then come from solar, as against use of a fossil fuel leading to emissions in the hybrid/integrated configuration.

The demonstration project should be implemented as a joint India-EU initiative at a suitable site in Rajasthan. The most appropriate technology configuration based on long term Indian requirements and local conditions will need to be selected and a detailed project report prepared for inviting bids for the project to be executed through a Public Private Partnership (PPP) process by European and Indian industry, developers and investors with participation by the local power

utility. Alongside, a Technical Assistance programme would need to be developed to strengthen local capacities and capabilities in resource assessments, sites selection, feasibility and design studies, grid interface issues for promoting commercial CSP power plants in India in the near and medium term. Taking advantage of local factors of production such as labour, raw materials and industrial infrastructure, solar thermal power equipment could be produced in India for future commercial CSP projects. In order to catalyse commercial solar power development, information could be exchanged and experiences shared on policy and regulatory frameworks and models for large-scale solar power projects.

5. Access to energy

Government plans to provide 'energy to all' by 2012. Rural electrification under the Rajiv Gandhi Gramin Vidyutikaran Yojana (RGGVY Programme) aims to electrify all remaining villages by 2009 and all households by 2012. Those villages and hamlets that are not likely to be connected by the grid are being provided clean energy through decentralized renewable energy systems including solar photovoltaic systems under the Remote Village Electrification (RVE) Programme. Such systems can also be deployed where grid connectivity exists provided there is unmet demand and they are found to be cost-effective. Providing access to the vast rural population, however, remains a key challenge.

Co-operation needs to be advanced through joint activities and partnerships aimed at increasing large-scale deployment of renewables to achieve in a time-bound manner safe, secure, affordable and sustainable energy supplies in the context of local energy needs and overall socio-economic development goals. An India-EU cooperation programme could be developed to provide efficient, cost-effective and reliable systems such as solar domestic lights, solar lanterns, street lights etc. in the rural areas. This would not only offset the huge subsidy/ under-recovery on sale of kerosene but also help in reducing emissions. Villages/ habitations could be identified in clusters based on an area-based approach in selected States. Sustainable implementation models would need to be developed that have the maximum potential for creating impact and leading to replicability. Such a joint pilot programme could aim at providing access to 100,000 rural households.

6. EC instruments and budget

The existing EC instruments have not attracted adequate interest and participation of developing countries in good measure. This needs to be reviewed and new simple, country-specific instruments devised that have short gestation and address the concerns, priorities and needs of those countries. EC's budget should be suitably enhanced to leverage public funding and private investments in support of the Joint Agenda of Action for co-operation with India in the area of new and renewable energy with special focus on solar energy.

7. Financing, technology transfer and investment

Various domestic, bi-lateral and multi-lateral financing opportunities, including carbon financing, will need to be tapped to meet the financing requirements of the joint activities. The European Investment Bank should provide funding on attractive terms and facilitate technology transfer for renewable energy investment projects that contribute to climate change mitigation and adaptation.

Considerable progress has been made in India, but the domestic efforts could get significantly enhanced through greater flow of technology and resources from the European Union. In order to stimulate investment, along with conducive policies and a regulatory regime to promote

investments, efforts would need to be made to get around barriers such as intellectual property rights so that they do not become impediments to technology transfer and joint ventures in areas that may be of mutual benefit to partners on the two sides. This will not only bring about transformational change in the energy sector and spur growth in India, but will also help to alleviate poverty and realize the development goals, while addressing environmental concerns in a sustainable manner.

Based on a common vision and shared partnership and co-investment of resources, India – EU cooperation has the potential to contribute to the emergence of solar energy in the medium term as a commercially attractive, socially and economically viable, environment friendly and sustainable clean energy option for India.

8. Recommendations

- a) Cooperation in renewable energy to be viewed and promoted in the context of India-EU joint efforts to deepen cooperation in energy, clean development and climate change
- b) Develop a broad-based EU-India Joint Solar Initiative as a first step towards implementing a broader EU-India Cooperation in renewable energy. Such an initiative could cover:
 - i. Joint research and technology development with focus on solar photovoltaics
 - ii. Establishment of linkages of the Indian Solar Energy Centre with leading research institutions in Europe with a view to upgrade its expertise and facilities
 - iii. Joint development of a 50 MW CSP demonstration project in Rajasthan based on current technology, to be executed through a PPP process by European and Indian partners. A Technical Assistance programme to also be developed to strengthen local capacities and capabilities for promoting commercial CSP power plants in India
 - iv. Development and implementation of a pilot programme aimed at providing access to 100,000 rural households in India through sustainable and replicable models based on installation of solar photovoltaic devices and systems
- c) Scale-up funding for joint programmes and investments in renewable energy through enhancement of EC's budget and financing from European Investment Bank, apart from other financing mechanisms, including carbon funds
- d) Make efforts to promote technology transfer by getting around any barriers such as intellectual property rights

ⁱ Ministry of New and Renewable Energy – Internal communication, November 2008

ⁱⁱ Government of India, Prime Minister's Council on Climate Change, National Action Plan on Climate Change, June 2008

ⁱⁱⁱ EU-India Summit Documents, Marseille, September 2008

a) EU-India Joint Press communiqué

b) Global partners for global challenges; The EU-India Joint Action Plan (JAP)

c) Joint Work Programme – EU-India Cooperation on Energy, Clean Development and Climate Change

^{iv} Action for a Global Climate Community, Proceedings of the High-Level India-Europe Conference, Potsdam, May 2008

^v Ministry of New and Renewable Energy, Proceedings of the EU-India Workshop on Renewable Energy Research & Technology Development, New Delhi, March 2008

^{vi} Rajasthan Energy Development Agency/ Fischer/ Engineers India Ltd., Detailed Project Report, Solar Thermal Power Project, Mathania, Rajasthan, 1998