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INDIA

*AN OVERVIEW OF
INDIAN
RENEWABLE ENERGY SECTOR*

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The views expressed in this paper are those of the author,
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Sector**

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TATA BP SOLAR INDIA LIMITED

Contents

Introduction

Renewable energy sector-Export potential

- **Global perspective**
- **SAARC region and Africa**

Main issues of concern

Recommendation

ANNEXURES

1. Potential and achievements in respect of various renewable sources
2. A sector-wise use of PV Modules in the financial year 2002-2003

INTRODUCTION

Earth's climate has changed over the millennium but the main concern is the projected rapid rate of change due to increased human activities resulting in enhanced energy consumption using fossil fuels, industrial processes, land use, etc. Paragraph 6 of the Doha Ministerial Declaration reiterates "the aims of upholding and safeguarding an open and non-discriminatory multilateral trading system and acting for the protection of the **environment** and the promotion of **sustainable development** can and must be mutually supportive." And paragraph 31 states "With a view to enhancing the mutual supportiveness of trade and environment, we agree to negotiations, without prejudging their outcome, on : (iii) the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services." Therefore, it is amply clear that it has been recognized that initiatives in liberalization of trade has to be in tune with the global concern on climate change and consensus being strived for sustainable development.

Sustainable development is defined as a development process that meets the needs of the present without compromising the ability of future generation to meet their own needs. Energy is one of the very important inputs for development and improved quality of life. It has been more or less established that a strong co-relation exist between Projected growth rate of demand for power to that of Gross Domestic Product (GDP). Countries over the globe have been relying on excessive consumption of conventional fossil fuels to meet the increased demand of energy and thereby development. It is reported that the world community today uses up in one minute what it took the earth a millennium to create. In the projected demand for final consumption of commercial energy, the growth of electricity envisaged is the highest. In generation of electricity it is expected that the share of thermal generation will go up and in that share of hydro - carbon based generation as compared to coal may be greater especially in India.

There are certain *disastrous consequences* for this trend.

The sudden spurt in the petroleum prices effected by the oil producing countries in mid-2000 threw out of gear the economic activities in countries across the world which were dependant heavily on imported petroleum and petroleum products. Further, there was threat from global warming, rising sea levels and climate change due to increasing atmospheric pollution caused by the Green House Gases Emission from economic activities based on fossil fuels. It is also known that at the present rate of consumption the world will run out of conventional fuels before long, if it were to sustain the projections made. There is thus an increasing realization that the switch over to non-conventional and renewable sources to meet the growing energy needs cannot be delayed any further. Clean and Green power for sustainable development has become the motto. It is imperative therefore that renewable energy has to be an essential part of any attempts for global consensus on trading addressing the issues of environment and sustainable development.

Our country is endowed with abundant sunlight for most part of the year and as such tapping the solar energy for power generation assumes importance in any effort to promote renewable energy. It is worth mentioning here that due to the long term vision of our decision makers in the past, a solid foundation has been created in India for the growth of *solar energy*. India is perhaps the only country in the world to have an exclusive Ministry for Non-Conventional Energy Sources (MNES). The National Programs in different areas of renewable energy

sector have resulted not only in generation of a strong manufacturing base but also in developing expertise on distributed energy services. It also has helped in a visible increase in the deployment of renewable energy systems and devices for varied applications. As per MNES, the contribution of renewables has reached 3000 MW as on December 31st, 2000 representing 3 percent of total grid capacity. Government of India has set a target of 10% from the renewables by year 2012 of the estimated addition of 100,000 MW. The potential and achievements in respect of various renewable sources is given in **Annexure 1**.

This paper particularly focuses on the solar energy segment of renewables in the country. Solar energy segment consists of Solar Thermal Energy and Solar Photovoltaic Electricity. Use of solar energy for thermal applications include water heating, cooking, drying, space heating, distillation and power generation. Amongst this Solar thermal energy for water heating is well developed and the rest of the applications could be considered to be emerging. It could be observed from Annexure 1 that the achievement in Solar Water Heating is only about 6.8 lakh sq. m. in comparison to a potential of about 1400 lakh sq. m. of collector area. However, the industry is well developed in terms of manufacturing expertise and engineering. Solar Photovoltaic Technology (SPV) enables direct conversion of sunlight into electricity without any moving parts and without causing any pollution. Referring back to Annexure 1, it could be observed that against a potential of 20 MW/sq. km. the achievement so far has been only 107 MWp. Most common systems being deployed are portable solar lanterns, fixed type solar home lighting systems, street lighting systems, water pumping systems and village level power plants. A sector-wise use of PV Modules as on March 2003 is given in **Annexure 2**. The SPV industry consists of manufacture of silicon, silicon ingots, silicon wafers, solar cells, solar modules and solar photovoltaic systems. It is learnt that we have a manufacturing capacity per annum of about 5 million wafers, 32 MW of solar cells and 70 MW of solar PV modules. The SPV systems generally consist of solar modules, battery and balance of systems (BOS) which may include charge controllers, invertors, hybrid controllers etc. Thanks to the implementation of a variety of stand alone and hybrid (with grid mains, diesel or wind) power plants through the programs of MNES (Financed directly and through IREDA, Indian Renewable Energy Development Agency) there has also been considerable expertise developed in the country for design, engineering, installation and commissioning of SPV power plants and energy services including different models of financing mechanisms. In addition, the thrust given by the Government of India for electrification of about 18,000 odd rural remote villages by year 2012 through renewables (mainly biomass, micro-hydel and solar PV) is also likely to enhance the expertise in distributed generation and innovative modes of financing.

It could thus be observed that renewables, particularly solar energy products, systems and services (design of systems, operation and maintenance and unique financing models applicable) cannot be wished away from any negotiation on liberalization of trade in environmental goods due to the very nature of the utility of these for environment friendly sustainable development and India has a full fledged infrastructure in all fields of its deployment. The deployment of modules in India through these systems is estimated to be about 23 MW during year 2002-2003.

RENEWABLE ENERGY SECTOR-EXPORT POTENTIAL

Global perspective

According to certain estimates the global market was about 418 MW in year 2002 and the growth was about 20 % from year 2001. A careful scrutiny of the distribution amidst various countries reveal the following;

- Japan is leading the pack in terms of market size and growth (almost 35%)
- Rest of the World (ROW) including India registered a growth of 16% at 100 MW

Some studies also forecast that the Global shipments might cross the 3000 MW mark by year 2010 and a substantial chunk here is expected to be on the Grid Connect and remote habitation market.

This only shows the tremendous potential for export of goods and services of solar energy sector in India in years to come.

SAARC region and Africa

Although this region offer great potential for the deployment of solar energy products and systems especially in the fields India has derived immense strength like solar water heating systems, solar photovoltaic stand alone home lighting systems, solar PV water pumping systems, solar lanterns, distributed power generation for remote habitation etc. the lack of funds with the respective countries is an important deterrent.

It may be mentioned here that firms in India have reached an export level of about 15 MW (Approximately Rs.220 crores) of Solar photovoltaic cells, modules, products and systems in the financial year 2002-2003 thanks to the stringent quality management measures introduced by MNES, the testing, qualification and guiding facilities provided by the Solar Energy Center of MNES and the quality consciousness of Indian firms aware of the stringent global competition. Many firms have their solar modules certified by international qualifying agencies like ISPRA etc. Having assured of the quality Indian solar energy products and systems are competitive in the global market place due to the price as well. While most of the U.S and European manufacturers have high level of automation to support their manufacturing facility Indian firms have an edge over them in terms of optimum deployment of labor which makes products and systems with low wattage modules like solar lanterns, home lighting systems etc and devices like solar cells and solar modules extremely competitive. Another favorable factor for Indian solar energy industry is the rich experience it has derived in the field of distributed generation in terms of hardware and services (design, engineering, operation and maintenance and innovative financing mechanisms thanks to the many programs sponsored by MNES. This strength offers tremendous export potential not only in developing countries but also to a certain extent in the developed countries.

MAIN ISSUES OF CONCERN

In the context of Trade liberalization in environmental goods and services one of the issues generally debated is *whether renewable energy goods as a category should be included in environmental goods or not? Is there a potential export interest for India?*

It is very obvious from the facts stated above that in the light of the **vital role played by renewable energy goods for mitigation of climate change and sustainable development for improvement of quality of life of people especially in the remote rural area it should be included as a category in environmental goods.** It is also clear from the above that India has great strength for export of renewable energy products and systems especially in the field of solar energy.

Another issue raised in the context is about the renewable energy products of particular export interest to developing countries?

Referring to the solar energy field one can very confidently list out raw materials and intermediaries like silicon nuggets, ingots, wafers; devices like solar cells and modules; products like solar lanterns, solar home lighting systems, solar water pumping systems and large power plants. In addition as mentioned above expertise in terms of knowledge ware for system engineering, design, operation and maintenance services also will be of great interest. Last but not the least is the expertise being developed in the country by the various NGO-Industry consortia in deployment of appropriate renewable energy applications for integrated community development of remote rural population addressing improvement in quality of life and enhancement in income generation.

A third and major issue under consideration is whether tariffs or non-tariff barrier the main obstacles to export of these products? What other problems do Indian exporters in this sector face in markets in other countries?

While a very detailed investigation is required to calibrate the right response to these questions the following points are worth mentioning:

- In general there are not any major tariff barriers in Europe, U.S and other countries. However, it is learnt that Japan has higher level of import duties, which act as a barrier.
- Although demand exists in African and other underdeveloped countries especially for the Indian solar energy products because of its easy adaptability on account of geographical and demographical considerations, as mentioned earlier the lack of funds inhibit the same. Many financial grants and aids that flow in to these region from developed countries are generally tied with supply of goods from the donor countries and this in fact can be construed as a major non-tariff barrier.
- Looking internally, although Government of India has brought import duties of materials and devices to almost international level and coupled with export incentives solar energy products and systems are globally competitive the duty incidence on many essential Capital Goods required for manufacture and testing is still at a very high level of 40 to 50%. This needs to be looked into.

RECOMMENDATION

- **Solar energy goods should be included in the category because of its importance for environment, sustainable development and export potential**
- **Tariff barriers in Japan needs detailed investigation as the export potential is high**
- **Grants tied with supply of goods from donor countries to SAARC and African region can be construed as a non-tariff barrier and need to be looked in to.**
- **Duty levels in India of certain Capital Goods required in manufacturing need to be brought down**
- **Services (system design, operation and maintenance and integrated community development expertise) to be included in any negotiation**
- **APEC LIST – 854140 need to be enlarged from Indian perspective from devices to include materials, systems and services**

*ANNEXURE 1***Potential and achievements in respect of various renewable sources**

	POTENTIAL	ACHIEVEMENT AS ON 31.12.2002
Biogas Plants	120 lakh	33.70 lakh
Improved Chulhas	1,200 lakh	339 lakh
Wind	45,000 MW	1,702 MW
Small Hydro	15,000 MW	1,463 MW
Biomass Power/Cogeneration	19,500 MW	468 MW
Biomass Gasifiers		53 MW
Solar PV (export)	20 MW/sq. km.	107 MWp. (46 MW)
Waste –to-energy	2,500 MW	25 MW
Solar Water Heating	1,400 lakh sq. m.	6.8 lakh sq. m.
	Collector area	Collector area

Source: Annual Report 2002-2003, MNES

*ANNEXURE 2***A sector-wise aggregate use of PV Modules as on March 2003**

Street Lights	3.5 MWp.
Power Plant	3.8 MWp.
Lantern	4.9 MWp.
Pump	6.6 MWp.
Home Light	9.1 MWp.
Telecom	16.3 MWp.
Others	16.8 MWp.
<i>EXPORTS</i>	<i>46 MWp.</i>
TOTAL	107 MWp.

Source: Annual Report 2002-2003, MNES