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RENEWABLE ENERGY TO THE INDIAN ENVIRONMENT

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Abstract

Fossil fuel reserves are diminishing rapidly across the world. Greenhouse gas emissions, climatic changes and global warming have a direct impact on the environment. A secure and accessible supply of energy is very crucial for the sustainability of modern societies. There is an urgent need for a quicker switch over of energy systems from conventional to renewable that are sustainable and can meet the present and projected world energy demand. Renewable energy has a large potential to become the fuel of the future. The present study is aimed to explore such potential and achievements in India. India is expected to have high growth rate in energy demand over the coming years due to its huge population and rapid economic development. The renewable energy prospects/spectrums of India have been highlighted in table 1, table 2, and table 3.

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1. Introduction

For mankind whose survival is totally dependent on nature's bountiful resources, the incessant demands of development are sharply eroding the fragile ecological balance on the earth.

Energy is an essential element in human life. A secure, sufficient and accessible supply of energy is very crucial for the sustainability of modern societies. The demand of energy is increasing worldwide and will continue to rise as developing nations reach a developed status and developed nations maintain their modernization trends.

Energy systems, presently in use across the world, can be classified into fossil fuels, nuclear power and renewable. Renewable energy resources are easily accessible to mankind around the world. They are not only available in a wide range, i.e. solar, wind, biomass and hydro but they are also abundant in nature. India has a population of 1,041,144,000 (year 2002 figures) with an annual growth rate of 1.8% [1]. Huge population and development activities are assumed to increase India's energy demand tremendously over the coming years.

Table1.

Status of energy sources and impacts

Energy Sources	Major Concerns
Fossil Fuel	Environmental Impacts, Global Warming, Human Health and Ecology
Nuclear Power	Radioactive emissions, High Investment Cost, Stringent Safety Requirement
Renewable Energy Sources	Abundant In Nature, Clean, Environment Friendly, Vast Potential

Ministry of non-conventional energy sources (MNES), Government of the Indian is fully committed to harness, development of renewable energy technologies in India. MNES has a monitoring programme to ensure the completion of the projects and co-ordination with state agency organizations.

The overall impact of renewable energy projects is positive on the environment. It reduces pollution and creates a hygienic environmental atmosphere. Developing countries need to work on sustainable ways to harness renewable energy resources. All renewable energy sources are clean in nature. Renewable energy is a clean, green source of energy that is lighting up the path of progress in harmony with nature. India, as a developing country has an immense potential.

India's expanding economy, and the strong growth expected in the next few decades, will require a substantial addition to energy generating capacity. Just as the last two centuries were driven by coal and oil, it is assumed that the next century will belong to renewable. The challenges of the present scene offer a window of opportunity in the form of renewable energy sources to reduce the dependence on fossil fuels by expanding and diversifying energy supply mix and shifting the development path towards greater sustainability as well as environmental and social responsibility. In addition, renewable can also provide a degree of national energy

2. Achievement

India is today at the forefront in harnessing renewable energy sources and has a broad based programme in this field. It has been recognized and thrusts to achieve objectives in global environmental prospective for ensuring green house gas abatement. In this context, the Government of India established an independent specialized public sector company Indian Renewable Energy Development Agency (IREDA) Limited undertaking under the Ministry of Non-conventional Energy Sources to translate the renewable energy policies into realities. IREDA is engaged for promoting, developing and financing renewable energy projects and helping, in large scale, utilization of renewable energy sources.

Table2. * Achievements in renewable energy during the last four years

S.No.	Programmes	As on 12-10-1999	As on 12-10-2003	Growth (%) last four years
A.	Grid connected systems (installed capacity in MW)			
1.	Wind power	1022	2002	96
2.	Small hydro power	1218	1530	26
3.	Biomass power	171	571	234
4.	Industrial waste power	2	26	1200
5.	Solar photovoltaic	1	3	200
	Total	2414	4132	71
B.	Decentralized systems			
6.	Biogas plants (Nos. in lakh)	28.8	35.5	24
7.	Community biogas plants (Nos.)	2673	3902	46
8.	Improved chulha {Nos. in lakh}	250	350	46
9.	Solar home lighting systems (Nos.)	64000	260000	300
10.	Solar street lighting systems (Nos.)	32920	43470	32
11.	Solar lanterns (Nos.)	222000	442000	99
12.	SPV pumps (Nos.)	2160	6400	196
13.	Solar water heating systems (lakh sq. meter area)	5.7	7	22

*Data Source, ministry of non-conventional energy sources (Govt. of India)

3. IREDA'S Financing

The government of India and a number of State Government and Union Territories have extended fiscal and financial concessions to the industry as well as the users of renewable energy systems and devices to keep the growth and momentum in this sector. IREDA has the biggest financing programme for following the renewable energy sector and is also involved in providing finance for the manufacturing of equipments.

- Hydro Energy
- Wind Energy
- Biomass Co-Generation and Power Generation
- Energy recovery from waste
- Energy Conservation and Efficiency

The main challenge to policy makers in the 21st century is to ensure adequate, affordable and reliable energy sources in a sustainable manner. It is well recognized that energy is a critical input of social and economic development. It can be seen that the adoption of renewable and other clean energy technologies reduces the adverse environmental impact.

4. Energy Crisis

Renewable energy is becoming more and more popular abroad while in India it is not getting much progress due to the lack interest by state governments. As per the study report by the Ministry of non- conventional energy sources there is a capacity to achieve 80,000 megawatt electricity from renewable energy sources in India, but only 4800 megawatt is produced at present.

Table.3 Produced Energy

Energy sources	capacity	Produced
Wind energy	45,000 mw	2483mw
Bio mass	20,000 mw	672mw
Small hydro power	15,000mw	1601mw
Solar energy	...	3mw
Garbage	...	41 mw
Total	48, 000 mw	4800mw

5. 10th Five Year Plan

In the 10th five year plan a target of 3075mw has been fixed to produce electricity from renewable energy sources and Rupees 895 crores have been allotted to achieve this target [2].

Proposal of the systems to be set up

Bio gas plant	10 lakhs
Spv light	8.5 lakhs
Spv pump	8,000 No.
Wind pump	800 No.
Solar water heating systems	5 lakhs million sq meter area

6. Research and Development Strategy

The Ministry of Non-Conventional Energy Sources has been supporting research and development for technology development and manpower in renewable energy. The present emphasis is on the reduction of cost and increase of efficiency. For sustained development in this sector, efforts are being made so that renewable energy is driven to a large extent by the market and the consumer. The ministry has evolved a policy of supporting research and development with the close involvement of the industrial sector as well as research and training institutions of the country along with requisite entrepreneurship and the market-orientation approach [3].

- R&D for technology development in industry
- Involvement of industry and scientific establishment
- Access technological development elsewhere avoiding 'Reinventing the wheel'
- Indigenous R&D for new and emerging technologies and improvement of available technologies
- Time bound specific tasks for identified R&D activities to be assigned to recognized institutions with clear understanding on the achievement

7. Renewable Energy Policy

The Prime Minister of India has announced a goal of 10% share for renewable energy or 10,000 MW power generation capacities to be added during the period up to 2012. The broad objectives in the policy are:

- Meeting the minimum energy needs through renewable energy
- Providing decentralized energy supply in agriculture, industry, commercial and household sectors in rural and urban areas

(a) Foreign Investment Policy

Foreign investors can enter into a joint venture with an Indian partner for financial and/or technical collaboration and for setting up renewable energy based power generation projects

- Proposal for up to 100 percent foreign equity participation in a joint venture for automatic approval
- Hundred percent foreign investment as equity is permissible with the approval of the Foreign Investment Promotion Board (FIPB).

- Foreign investors can also set up a liaison office in India

(b) Industrial Policy

- Ministry of Non-Conventional Energy Sources (Government of India) is promoting medium, small, mini and micro enterprises for manufacturing
- and servicing of various types of renewable energy systems and devices Industrial clearance is not required for setting-up a renewable energy industry
- No clearance is required from Central Electricity Authority (CEA) for power projects up to Rs. 1,000 million
- A five year tax holiday is allowed for renewable energy power generation projects
- Soft loans are available through IREDA for renewable energy equipment manufacturing
- Facilities for promotion of Export Oriented Units are available for the industry
- Financial support is available to renewable energy industries for R&D in association with technical institutions
- Import of power projects are allowed
- Private sector companies can set up enterprises to operate as licensee
- Customs duty concession is available for renewable energy spares and equipment, including machinery required for renovation and modernization of power plants. Excise duty on a number of capital goods and instruments in the renewable sector has been exempted

(c) Policies for Small-Scale Industries

- An industrial undertaking is defined as a small-scale unit if the investment in assets in plant and machinery does not exceed Rs. 10 million
- Small scale industries (SSIs) are not permitted more than 24% equity paid up capital from industrial undertaking, foreign or domestic
- SSIs can get registered with the Directorate of Industries or District Industries in the state government concerned
- SSIs are free to manufacture any item including those notified as exclusively for the state government concerned
- SSIs are free from location restrictions, which are mandatory for large industry

(d) Incentives for Investing in Renewable Energy Technology

- MNES provides financial incentives, such as interest and capital subsidy
- IREDA provides soft loans to a wide range of applications of renewable energy technology
- Direct taxes-100% depreciation in the first year of installation of project
- Exemption/reduction in excise duty
- Exemption from central sales tax and customs duty concessions of import of material, components and equipment used in renewable energy projects

(e) The national Small Industries Corporation

The national Small Industries Corporation (NSIC), under the Ministry of Industry and Commerce, also provides assistance through a number of schemes, which includes marketing services, technical services and training, and export facilitation.

- Helps procure and deliver machinery and equipment, including imported equipment at the doorsteps of entrepreneurs on hire purchase and lease terms
- Provides working capital, finance and term-loans schemes
- Helps to create confidence in purchasing agencies about the Small scale industries
- Facilitates exports for and on behalf of export-oriented entrepreneurs and infrastructure
- Facilitates sourcing of critical raw materials and components required during production
- Facilitates enterprise-to-enterprise cooperation through its international programme

8. Renewable Energy Technology and Abatement of Greenhouse Gas Emissions

The energy sector in India is the largest emitter of greenhouse gas emissions. Coal is the country's largest source of commercial energy. Thermal power plants, steel and railways are the major industrial consumers of coal. ON the overall CO₂ emission fossil fuels, emissions from coal consumption account for almost 65%.

With increased international concerns to reduce greenhouse gas emission, developed countries seek to meet their commitments under the Kyoto Protocol by switching to renewable energy. In the context of environmental sustainability, renewable energy technology is considered a highly attractive option since it is clean and renewable.

9. Conclusions:

India is also looking forward to becoming a global leader in new and renewable energy technologies. Its efforts in promoting renewable energy are in harmony with nature. A modest manufacturing capacity has been set up in the country. Several renewable energy technologies such as wind, solar thermal, solar photovoltaic and small hydro are promoted on a commercial scale.

Today, India has the largest decentralized solar energy programme, the second largest biogas and improved stove programmes, and the fifth largest wind power programme in the world. There is a need to make linkages among strategic planning, management, raising share of renewable energy, energy efficiency policies, mobilization of public and private finance along with international cooperation.

Environment friendly renewable energy is free, fresh, forever, for all.

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