

IMPERATIVE FOR RENEWABLE ENERGY SOURCES –AN INSIGHT INTO THE REGULATORY AND POLICY FRAMEWORK

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ABSTRACT. Renewable energy technologies can help solve energy issues related to electricity generation, like environmental concerns, energy security, rural electrification and applications in niche markets where conventional electricity supply is not feasible. The use of these sources has enhanced relevance in India as the emphasis is on electricity shortage. The different renewable energy sources include, solar energy, wind energy, bio-fuels from various sources ranging from unicellular blue-green algae to the angiosperms and animal fat. The positive attributes of generating electricity from renewable energy sources are widely accepted, although some of these technologies may not be currently competitive commercially with conventional fuels.

The analytical descriptive approach to the paper aims to enumerate on the sources and analyse the existent policies of regulation and further suggest new policies of implementation. The choice of renewable energy sources can be validated as they supplement the present power generation and simultaneously address the environmental and energy security issues with a good potential in India. The scope of the paper is limited and extends to the kinds of renewable and non-conventional energy sources and the policy framework in India suggesting the role of the government & ministries in promoting the use of enhanced renewable energy.

1. INTRODUCTION

Renewable resources of energy in India are natural resources that can be refilled by natural processes at a rate analogous or faster than its speed of consumption by humans. Solar radiation, tides, winds and hydroelectricity are permanent resources and are considered as renewable resources of energy as they do not have the hazard of non availability. Renewable resources may also mean commodities such as wood, paper, and leather, if harvesting is performed in a sustainable manner. Some natural renewable resources of energy in India include geothermal power, fresh water, timber, and biomass.

A life cycle evaluation provides a systematic means of estimating renewed ability of these resources. The term “renewable resources” has an implication of sustainability of the natural environment. Gasoline, coal, oil and natural gas, diesel, and other commodities derived from fossil fuels are non-renewable resources of energy which like a renewable resource cannot have a sustainable-yield.

India is blessed with abundance of water, sunlight, and biomass. Dynamic efforts during the past two decades are now bearing fruit as people in all walks of life have become more aware of the benefits of renewable energy. India has the world’s largest programme for renewable energy, the Government having created the Department of Non-conventional Energy Sources (DNES) in 1982. A complete Ministry of Non-conventional Energy Sources was established in 1992 and the Prime Minister controls the activities of this ministry.

The activities of this department promote renewable energy technologies, an environment conducive to promote renewable energy technologies and renewable energy resource assessment. Creating an environment conducive for their commercialisation, research, development, and production of biogas units, solar thermal devices, solar photo-voltaics, cook stoves, wind energy and small hydropower units are also some more

responsibilities of the ministry. Non-conventional sources of energy in India comprise those energy sources that are natural, in-exhaustible as well as renewable like solar energy, tidal energy and wind energy. Interestingly, wind and running water were in use as sources of energy long before the conventional sources of energy like coal, mineral oil and natural gas came to be used widely for grinding grains, pumping water and navigation. In present times, some of the major and extensively used non-conventional sources of energy include wind, tides, solar geo-thermal heat, biomass including farm and animal waste as well as human excreta.

2. RENEWABLE ENERGY TECHNOLOGIES

Almost all the states in India are facing energy shortages in the range of 3% to 21% with national average energy shortage of about 10%. Renewable energy sources can supplement the present power generation and at the same time address the environmental and energy security issues. Renewable energy technologies have a good potential in India and considerable progress has been achieved. Creating an environment conducive to promote renewable energy technologies is the need of the hour. India has a wealthy resource of renewable energy including Wind Energy, Solar Energy, Biomass, Geothermal Energy, Ocean Energy and the Energy from Wastes that constitute the major alternative to the conventional sources. Though the Renewable Energy Scenario in India looks encouraging, we need to look into a long term strategy to manage the future energy needs.

Research shows that an energy mix, with wind energy providing 30%, solar energy 20% and gas turbines (biogas and natural gas) a further 20%, is technically and economically viable. Wind power is mainly an energy resource that replaces fossil power generation. In areas where wind power production is high during peak demand, wind power can be used to replace the fall in capacity by up to 40% of the installed wind power plant capacity. In India, Solar Power systems are primarily used to cut down on energy costs that most households consume it being a concept that excites researchers because of its ability to tap an obvious resource, however limited by technology promoting R &D to enhance the technical potential of Solar Energy Generation. Besides, turning Garbage and bio-gas from it into energy is slowly being adopted in India to generate electricity for homes and offices.

India reached a stage where it is generally accepted that renewable energy is the most substantial and sustainable solution to its future need and perfect balancing of mankind's need for energy with the environmental cost to our planet is a major challenge.

3. RENEWABLE ENERGY POLICY FRAMEWORK IN INDIA

Renewable Energy Act: To meet India's future needs India with 17 per cent of the world population and just 0.8 per cent of known oil and natural gas resources is going to face serious energy challenges in the coming decades. The draft law prepared by WISE charts a road map for energy independence. In India, MNES, in 1993 prepared policy guidelines for promotion of power generation from renewable energy sources which included provisions such as accelerated depreciation, concessions regarding the banking, wheeling and third party sale.

Further, the Electricity Act 2003 (EA 03) that was notified by the Ministry of Power in June 2003 along with the National Electricity Policy recognized the role of renewable energy technologies and stand-alone systems. The EA 03 has accorded significant responsibilities to the State Electricity Regulatory Commissions (SERCs) that are now key players in setting tariffs for renewable energy based electricity generation and have also been mandated to set quotas for renewable energy as a percentage of total consumption of electricity in the area of distribution licensee. The National Tariff Policy that was notified by the Ministry of Power in January 2006, in continuation with the EA 03 and the National Electricity Policy also emphasizes the importance of setting renewable energy quotas and preferential tariffs for renewable energy procurement by the respective SERCs.

Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India at the National level for all matters relating to new and renewable energy. The Ministry has been facilitating the implementation of broad spectrum programmes including harnessing renewable power, renewable energy to

rural areas for lighting, cooking and motive power, use of renewable energy in urban, industrial and commercial applications and development of alternate fuels and applications. In addition, it supports research, design and development of new and renewable energy technologies, products and services. In India, the importance of the role of renewable energy in the transition to a sustainable energy base was recognized as early as the 1970s. At the Government level, political commitment to renewable energy manifested itself in the establishment of the Department of Non-Conventional Energy Sources in 1982, which was subsequently upgraded in 1992 to a full-fledged Ministry of Non-Conventional Energy Sources, now re-christened as Ministry of New and Renewable Energy, since October 2006.

The Electricity Act already provides a role for renewable sources but given the magnitude and importance of the activities under the Mission, it would be necessary to make specific amendments. The National Tariff Policy 2006 mandates the State Electricity Regulatory Commissions (SERC) to fix a minimum percentage of energy purchase from renewable sources of energy taking into account availability of such resources in the region and its impact on retail tariff. National Tariff Policy, 2006 would be modified to mandate that the State electricity regulators fix a percentage for purchase of solar power. The solar power purchase obligation for States may start with 0.25% in the phase I and to go up to 3% by 2022. This could be complemented with a solar specific Renewable Energy Certificate (REC) mechanism to allow utilities and solar power generation companies to buy and sell certificates to meet their solar power purchase obligations. The Central Electricity Regulatory Commission has recently issued guidelines for fixing feed-in-tariff for purchase of Solar power taking into account current cost and technology trends. These will be revised on an annual basis. The CERC has also stipulated that Power Purchase Agreement that utilities will conclude with Solar power promoters, should be for a period of 25 years.

In order to enable the early launch of “Solar India” and encourage rapid scale up, a scheme is being introduced in cooperation with the Ministry of Power, the NTPC and the Central Electricity Authority, which would simplify the off-take of solar power and minimize the financial burden on Government. Under the Solar Mission, a normative Generation Based Incentive will be payable to the utility and would be derived as the difference between the solar tariff determined by the Central Electricity Regulatory Commission for the concerned solar generation technology less an assumed base price of Rs. 5.50/kWh with 3% annual escalation. Funds will be disbursed through Indian Renewable Energy Development Agency (IREDA), a PSU under MNRE. The distribution utilities will be entitled to account such electricity generated and consumed within their license areas for fulfilment of RPOs. The metering and billing arrangements between the utility and the rooftop PV operator will be as per guidelines/regulations of the appropriate commission. State Governments would also be encouraged to promote and establish solar generation Parks with dedicated infrastructure for setting up utility scale plants to ensure ease of capacity creation.

Ministry of Power Initiatives

With an objective of enhancing the operations of the power sector entities in the country as well as creating conducive environment for investments, Ministry of Power, has taken a number of initiatives in the past. These initiatives have been characterized on the basis of major legislative changes, policy measures and administrative actions.

Major Legislative Initiatives

Prior to the EA 03, the power sector in India was governed by three important legislations viz.

- The Indian Electricity Act, 1910;
- The Electricity (Supply) Act, 1948 and
- The Electricity Regulatory Commission (ERC) Act, 1998

Prior to the enactment of the ERC Act, 1998, the regulatory function at the central level was performed by the Central Electricity Authority (CEA) / GoI and at the state level was performed by the SEBs / state government. The authority of the CEA was exercised through the process of grant of techno-economic clearance and the stipulation of various norms. GoI was responsible for the tariff setting of central generating stations. At the state level, the state governments and the SEBs were responsible for the regulatory function of the sector.

The key features of the ERC Act, which is relevant in the context of pricing of renewable energy based power generation, are as follows:

- The ERC Act, 1998;
- Provision for setting up of Central Electricity Regulatory Commission (CERC) / State Electricity Regulatory Commission (SERC) with powers to determine tariffs;
- Constitution of SERC optional for states;
- Distancing of government from tariff setting process;
- Rationale for change in legislative framework;

The key reasons for devising a new legislation governing power sector were:

- Requirement for harmonizing and rationalizing provisions in the existing laws to create a competitive environment which would result in enhancing quality and reliability of supply to consumers
- Distance regulatory responsibilities of the government
- Obviate the need for individual states to enact their own reform laws
- Introduce newer concepts like power trading, open access, Appellate Tribunal
- Providing special provisions for rural areas

Electricity Act 2003

In order to formulate a comprehensive legislation imparting renewed thrust to coordinated development of the power sector in the country, the Electricity Act, 2003 (EA 03) has been enacted. The EA 03 provides a comprehensive yet flexible legislative framework for power development and envisions a sector characterized by a competitive market in power where the regulators and the power utilities play increasingly significant roles.

The important objectives of the EA 03 are as follows:

- To consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of the entire electricity industry;
- Promoting competition in the industry;
- Protecting the interest of consumers and supply of electricity to all areas;
- Rationalization of electricity tariff;
- Ensuring transparent policies regarding subsidies;
- Promotion of efficient and environmentally benign policies;
- Constitution of CEA, Regulatory Commissions and establishment of an Appellate Tribunal; and
- For other related matters

The EA 03 also had its impact on the renewable power sector and recognized the role of renewable energy technologies in the National Electricity Policy and in stand-alone systems. Some of the important provisions in the Act with regard to the promotion of renewable energy are:

Section 3 (1): *“The Central Government shall from time to time, prepare the National Electricity Policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy.”*

Section 4: *The Central Government shall, after consultation with State Governments, prepare and notify a national policy, permitting stand alone systems (including those based on renewable sources of energy and other non-conventional sources of energy) for rural areas.”*

The state electricity regulatory commissions (SERCs) are now crucial players in the context of state level policies for renewable.

Section 61 (h): *“The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the promotion of co-generation and generation of electricity from renewable sources of energy.”*

Section 86 (1) (e): *“to promote co-generation and generation of electricity through renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any persons, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee.”*

Policy measures and initiatives

National Electricity Policy

In pursuance of the provisions of the Act, the Government of India has notified the National Electricity Policy vide MOP notification No. 23/40/2004-R&R (Vol-II) dated 12.2.2005.

National Electricity Policy also stresses the need for the promotion of Non-Conventional Energy Sources.

“5.12 Cogeneration and Non-Conventional Energy Sources

5.12.1 Non-conventional sources of energy being the most environment friendly there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on nonconventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources.

5.12.2 The Electricity Act 2003 provides that co-generation and generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from nonconventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions.

Such purchase by distribution companies shall be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies.

5.12.3 Industries in which both process heat and electricity are needed are well suited for cogeneration of electricity. A significant potential for cogeneration exists in the country, particularly in the sugar industry. SERCs may promote arrangements between the co-generator and the concerned distribution licensee for purchase of surplus power from such plants. Cogeneration system also needs to be encouraged in the overall interest of energy efficiency and also grid stability.”

National Tariff Policy

In compliance with Section 3 of the EA 03, the Central Government notified the Tariff Policy vide MOP notification No.23/2/2005-R&R (Vol. III) dated January 6, 2006 in continuation with the National Electricity Policy. Some of the important provisions with regard to nonconventional energy generation are highlighted below –

Section 6.4

(1) Pursuant to provisions of section 86(1)(e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from non-conventional sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006. It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission.

(2) Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.

(3) The Central Commission should lay down guidelines within three months for pricing non-firm power, especially from non-conventional sources, to be followed in cases where such procurement is not through competitive bidding.

Implementation of Section 86 (1) (e) of the EA 03 and Section 6.4 (1) of the National Tariff Policy are underway and different SERCs are in the process of issuing tariff orders for renewable energy based electricity generation and specifying quota/share for power from renewable energy.

Integrated Energy Policy

The Prime Minister and the Deputy Chairman, Planning Commission, Government of India, took the decision for an effective and comprehensive energy policy as an urgent imperative in the year 2004. An expert committee was constituted under the leadership of Dr. Kirit Parekh, to prepare an integrated energy policy linked with sustainable development that covers all sources of energy and addresses all aspects including energy security, access and availability, affordability and pricing, efficiency and environment.

The committee was constituted on 12th August 2004. The draft integrated energy policy was circulated in December 2005 and the final policy was notified in August 2006. The broad vision behind the energy policy is to reliably meet the demand for energy services of all sectors including the lifeline energy needs of vulnerable households, in all parts of the country, with safe and convenient energy at the least cost in a technically efficient, economically viable and environmentally sustainable manner.

The integrated energy policy has outlined some ambitious tenets. These are summarized below.

- Renewable energy may need special policies to encourage them. This should be done for a well-defined period or up to a well-defined limit and should be done in a way that encourages outcomes and not just outlays.
- Phase out capital subsidies, which only encourage investment without ensuing outcome, by the end of the 10th Plan linked to creation of renewable grid power capacity
- Power regulators must seek alternative incentive structures that encourage utilities to integrate wind, small hydro, cogeneration, etc., into their systems. All incentives must be linked to energy generated as opposed to capacity created.
- Respective power regulators should mandate feed-in laws for renewable energy, where appropriate, as provided under the Electricity Act and as are mandated in many countries.

4. CONCLUSION

The renewable energy technologies are being promoted through various policies and programmes of the Ministry of Non Conventional Energy Sources (MNES). However, it has been observed that in the overall power generation scenario, the utilization of renewable energy for electricity generation has remained marginal. The present installed capacity of renewable energy based electricity systems is about 8100 MW whereas the total installed capacity in India is about 1,26,000MW.

Some of the other limitations and barriers that have been faced for promoting renewable energy based electricity generation are (a) pricing of power generated from the renewable energy sources, (b) intermittent nature of electricity from wind and small hydropower, (c) barriers such as restrictions on siting, access to grid and (d) market barriers such as the lack of access to credit. Out of these issues the pricing of power generated from renewable energy sources remains the most critical issue and various policies have been implemented to overcome this issue in India. These policies are generally related to the stage of development of the technology e.g. capital subsidies in the early stages of development.