

Energy Security: Renewable Energy Challenges in India

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Abstract: The paper on Energy security and renewable energy challenges in India aims to present the renewable energy status in India and challenges in implementing the decentralized power systems and other social and political issues and its relation to power accessibility in selected areas. Original study of the area, survey, data collection and development reports of government are put together for the study. This helped in analysing the current status of renewable energy availability and possibility of further development of selected area and studying the current status and potential of renewable energy in India. The area selected for the study was district Lakhimpur (Kheri), Uttar Pradesh, India a semi-urban district with 5000 villages and towns with 37 lakh inhabitants. Main profession of population is agriculture, few are in service and others in small and mid scale business. Many villages do not have access to electricity though it is available as per government orders. In agriculture, all the jobs are performed manually. Area was having very few average level educated people in town areas whereas in village the education level is very low.

After the launch of solar mission in year 2008 the reach of decentralized solar power systems is far from villagers. Underlying corruption, unorganized political policies and lack of awareness and absence of post project monitoring are the main reasons of under-development of the area. Awareness on decentralized energy systems and subsidies / other government schemes for implementing the small energy systems on every home is required for the area's development.

Keywords: Renewable energy, India, Lifestyle, Decentralized power systems

Objective: Presenting the status of renewable energy (solar, wind, biomass, wave, geothermal and tidal power) in India, policies in practice and related social and monetary issues/ challenges in India. Social and political issues and its relation to power accessibility in selected areas, are studied, aiming to find if decentralized power systems can be the basis of development. Study area was selected with aim of working on pilot basis. This paper also suggests the measures for overcoming the challenges of development in rural and semi-urban areas.

Introduction: Implementation of solar power system was a scheme started by Government of India in 1980's. Aim was the development of rural areas. Various loans and subsidies were also

provided but due to lack of awareness in common public, this scheme was used only by educated and well aware population that is only 10% of total population. In year June 2008, Government of India implemented the National policy for Sustainable development and low carbon growth of the country named it as National Action Plan on Climate Change (NAPCC). NAPCC is comprised of 8 National Missions namely National Solar Mission (NSM), National Mission on Energy Efficiency (NMEE), National Mission on Sustainable Development (NMSD), National Water Mission (NWM), National Mission on Sustaining the Himalayan Ecosystem (NMSHE), National Mission for Green India (NMGI), National Mission for Sustainable Agriculture (NMSA), National Mission on Strategic Knowledge for Climate Change (NMSKCC).

This paper focus on National Solar Mission which aims at implementation of 10,000 MW by year 2010 and 20,000MW solar power by year 2020 and mission is governed by Ministry of New & Renewable Energy (MNRE), Central Government, India. Sustainable energy is the provision of energy such that it meets the needs of the present without compromising the ability of future generations to meet their needs. Sustainable energy sources to generate the power are solar, wind, wave, geothermal and tidal power. India's population is 1.2 billion at present. As of 31st August 2010, there are 89,808 villages or 15.1 % of the total which were still un-electrified. Approx. 25% of the population currently does not have energy access. The daily average solar energy incident over India varies from 4 to 7 kWh/m² with about 1500–2000 sunshine hours per year, depending upon location. With about 300 clear sunny days in a year, India's solar power reception, on its land area is approx. 5000 trillion kWh/year. NAPCC, GoI suggests, approx. 15% of India's energy could come from renewable sources by 2020.

The Ministry of New and Renewable Energy (MNRE), Government of India reports that, as of June 2010, India has over 17.5 GW installed renewable energy capacity, which is approximately 10% of India's total installed capacity. Wind represents 11.8 GW, small hydro 2.8 GW, and the majority of the remainder is from biomass installations. PV installations have reached 15 MW of cumulative capacity installation for both on- and off-grid applications. In the current, Eleventh Five-Year Plan (Eleventh Plan; 2007-2012), the Government of India targets capacity additions of 15 GW of renewable energy, which, if achieved, would bring the cumulative installed capacity to over 25 GW in 2012. As on September 2010 the status of Decentralized Energy Systems was Family Type Biogas Plants 4.27 million; SPV Home Lighting System 6,19,428; Solar Lantern 8,13,380; SPV Street Lighting System 1,21,227; SPV Pumps 7,495, Solar Water Heating Collector Area 3.77 mill. sq. m. India do not have wave, geothermal or tidal power generation to be counted.

Though GoI data shows the country's interest in increasing the use of renewable energy but solar power systems are costly and efficiency is very low. 1KWp solar power system cost approx Rs. 2,50,000/-. It is not affordable by general public / villagers. MNRE have scheme of providing the solar systems at 30% subsidized cost but affordability of 70% of the cost is also beyond the reach of average salaried person. Though 50% of the cost can be met thru bank loans but this way of purchasing energy is complicated in comparison to conventional power. To study other reasons of non-implementation of ambitious solar mission a real time study was done.

Study Site and Methodology: This is real time case study of a selected site i.e. district Lakhimpur (Kheri), Uttar Pradesh in northern part of India. Methodology adopted to make this study was interviews, tour / audit of the study area for assessing real time situation and learning from experience of inhabitants of the area and interviewing the population facing the challenges due to under development of area, even after more than 64 years of Independence of the country. Status of the selected site and growth plan of country is presented for providing insight into the efforts of Indian Government and the reality of implementation of policies / target of the mission.

Status of Study Site: The lifestyle of the population in areas not having access to electricity was analysed. It was observed that the area was very under-developed and villagers are only depending on agriculture. In agriculture, the jobs are performed manually. Area was having very few educated people. Awareness on decentralized energy systems and finances /subsidies / other government schemes for implementing the small energy systems was equivalent to nil and was desperately required for the area. Hardly 20% of the population was aware of the solar mission and scheme of subsidized solar power systems. Approx. 3% of the population utilized the scheme and used the solar power systems at their homes. Wind and hydro power generation is nil in the area.

Insights of Current Renewable Energy Policies and Political Status of State of Selected Study Site: India is huge country with 28 States and 7 Union Territories and every state is having its own Government, having different policies and rule of different political parties thus different type of leaders. Progressive and proactive political leaders taking initiatives for the development of state, may use the progressive policies from Central Government. Other states who are not progressive due to corruption or passive leadership/ indulgence of political leaders in own aims of not moving along with Central Government, do not try to leverage the progressive schemes also. Result is the under developed villages and population remain under developed for years.

Underlying corruption all over is another major reason of non-implementation of the policies laid down. On many occasions it was observed that political parties / authorities, who are assigned the job of implementation of scheme, do get involved in personal monetary gains and as result the amount allocated for development do not reach for the purpose it is allocated. The same was observed for solar mission also. State Government is passive towards the public development and majority of officials to support the government, could not take any action for making public aware of solar mission or for taking action any action for rural electrification.

Policy for GHG Emission Reduction and Role of General Public: Government policies framed under the Electricity Act, 2003, and also the National Action Plan on Climate Change provided a road map for increasing the share of RE in total generation capacity in the country. Due to uneven spread of RE resources across the country, states have not been able to mandate a fixed renewable energy purchase obligation (RPO) for all states.

The National Action Plan of Climate Change (NAPCC) envisages five per cent of total energy production every year from all states will be from renewable sources. But in the financial year ending March 2010, the achievement was of 3.9%, majority of which came from Tamil Nadu and Karnataka the southern part of India. The gap is likely to increase as NAPCC's target will rise by one percent annually to touch 15 percent by 2020. An adviser (renewable) with the Central Electricity Regulatory Commission (CERC), India informed that "electricity is a concurrent subject where states retain the authority to frame policies on renewable energy" and this is also a reason of not meeting the mission target.

For effective implementation of solar mission, a new policy for carbon trading within country is developed i.e. Renewable Energy Certificates (REC). REC is a tradable receipt, representing a value of one megawatt hour (MWH) of power injected into the grid through renewable resources. REC would be issued to a generator of RE upon complying with conditions. To remove roadblocks in flow of renewable energy from surplus states to the deficit ones, the forum of electricity regulators suggested use of renewable energy certificates (REC). These certificates allow entities to buy renewable energy from generators. One certificate is equivalent to one MW per hour of renewable energy. Solar, wind or biomass energy generators can register for REC trading. The trading is important, since all states have to buy a certain proportion of their total power purchase from renewable resources. This purchase of RE power can only be done through power exchanges. Approx. 125 RECs, from 18 registered RE generators, would be traded at power exchanges from 30 March

2011. Anyhow this policy is only for RE generators (business community) and Government officials and average population and less educated villagers that composed of more than 50% of population of India has nothing to do with these schemes. For average villagers, decentralized power system / rural electrification by lightening every home can only fulfil the requirement of aesthetics and development.

In India, Solar energy generation is 10 times costlier than the conventional coal-based power generation. According to the Central Electricity Regulation Commission (CERS), the cost of setting up each megawatt of solar plant is Rs 17 crore, i.e. nearly thrice that of a coal-based plant. Revenue generation is just one fifth. A 5-MW coal-based plant, may sell about 80,000 units of power in a day. But a 5-MW solar plant will produce only about 15,000 units per day. The per-unit cost of solar energy generation, thus, works out to be Rs 17.91.

Reason of High Cost and Measures Required for Overcoming the Challenges: Lack of experienced Solar cell manufacturing, solar power generators, lack of trained manpower and availability of other solar equipment manufacturers is another reason of high cost of solar power. Cell manufacturing units within country is the urgent requirement for decreasing the cost of solar power.

Lack of infrastructure for providing electricity to all villages is a major roadblock in on-grid / grid interactive solar power generation. Huge solar power plants may decrease the cost of power generation but due to lack of basic infrastructure the same cannot be provided to villages for their development. Therefore decentralized power plants for rural electrification and electrifying each home in villages is the only solution. But this need public awareness about the Government scheme or corruption free implementers of Government scheme and at present this is lacking in the study site as well as in many areas across the country.

State Governments have right to decide the implementation / non-implementation of national policies and this is recognized as major hurdle in implementing the national policies seamlessly. Once the national policy, related to the development of common population and policy related targets decided by the Central Government then all states of the country should be given the targets to implement it. This will lead to overall development of the country and will not leave loopholes, which at present are seen in policies / leadership of state government.

Mass awareness about the development policies should be made and the information about policies and way to achieve it should reach ground level population.

Middle level bodies employed for implementation should be reduced to one i.e. all policies should be implemented only thru one channel between Government and common people. This one body should be responsible for receiving money from Government and implementing the policy decisions. This will help in reducing the corruption and policy benefits will meet the aim directly.

Conclusions: India though said as fast developing country, the fact is that the population under poverty level is approx. 29%. Government, though float many development schemes but that do not reach to the target population. Mostly the middle level corruption, political conditions of the area and lack of monitoring of implementation plan and post-project monitoring are the reasons of failure of Government schemes.

A technological breakthrough is required because as per the NAPCC, the solar mission must bring the cost of solar power at par with cheap coal by 2015. Also it aims at 15 per cent of the energy produced in India by 2020 must constitute renewable energy and is a mandatory requirement for development of country. This is the only way for sustainable development and should be achieved to keep India at the track of fast developing country and maintaining the current GDP.

Huge possibility of implementation of onshore wind power plant exists in India. India's mainland coastline of 6100km is enough to meet the challenge of energy crises and moving towards energy security. For this purpose Technology transfer of successful model implemented by Denmark / Spain (Scandinavian) countries is required for India.

References

- [1] *Indian Renewable Energy Status Report, October 2010, India*
- [2] *National Action Plan for Climate Change, Jawahar Lal Nehru National Solar Mission, Government of India*
- [3] *Eleventh Five Year Plan, Government of India*
- [4] *Bidding exposes solar tariff game, Down To Earth, 16 to 31 December, 2010*

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