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RE-Energizing Maharashtra: An Assessment of Renewable Energy Policies, Challenges and Opportunities



Policy Brief Prepared By
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1. Context

Maharashtra is one of the leading industrialized states in the country. Maharashtra's economy is growing at a faster pace and so its energy needs are continuously increasing. In the past few years, the state has been facing a grim power demand-supply scenario. The Government is in process of adding thermal capacity in the state to address that issue. There is a tremendous opportunity to improve the overall power scenario in the state through accelerating the implementation of renewable energy projects.

At present the state has about 6145 MW¹ of installed Renewable Electricity (RE) capacity making it one of the top states in India in terms of the installed RE capacity. The total electricity mix along with the share of RE (~17%) in the state is shown in Figure 1.

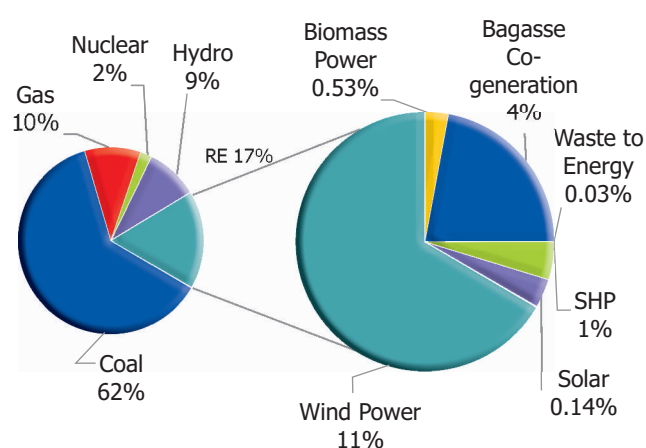


Figure 1: Resource wise installed capacity in Maharashtra

The Government of Maharashtra announced its first policy to promote renewable energy in 1996 which did not elicit much interest from the industry. It revised the policy in 1998 but again could not stir up the private sector for investment. By the year 2001, the total wind capacity added in state was 79MW whereas in comparison Tamil Nadu had added 771MW by then. So the Government finally came out with a policy in 2003 which really kick-started the sector and since then we have witnessed a steady capacity

addition in the state. Later in 2008, the Government revised the policy (New Policy for Power Generation from Non-Conventional sources of Energy, 2008) and clearly stated a fixed target for different RE technologies, after the achievement of which a new policy was to be launched. Since then there have been no revisions in the policy apart from updating the procurement price via various tariff orders. The target set by the policy for different renewable electricity options in the state is illustrated in Table 1.

Table 1: Renewable Energy Capacity Targets & Potential

Renewable source	Capacity Target (MW)	Potential ² (MW)
Wind	2000	5439 ³
Bagasse (Cogeneration/other)	1000	1250
Biomass	400	1887
Small Hydro	100	733

The state renewable policy however does not have any provisions for development of critical renewable energy resources such as solar energy and waste to energy. Also the policy is restricted to development of power generation and not energy portfolio as a whole e.g. thermal energy requirement in industries and for cooking energy at household level. Under the Rajiv Gandhi Gramin Vidyutikaran Yojana (RGGVY), a central government sponsored scheme to electrify villages across the country, whole of Maharashtra has achieved complete electrification at village level over the last decade. However, as per the latest NSSO census statistics, over 2.08 million households are still using kerosene for lighting purposes, out of which 92% are in rural areas. Also the status of cooking energy sources is bleak in most of the districts except the industrialized ones i.e. Mumbai, Pune, Thane, Raigad and Nagpur; as more than 50% of households are still dependent on firewood and chips for cooking.

¹ Data collected from MERC

² RE Resource Potential is cited from MEDA

³ Potential is estimated with an assumption of 80m Height for Hub of Wind Turbine.

The district wise status of LPG penetration particularly in rural areas is poor and majority of the population in these areas lack access to modern sources of energy for cooking and therefore rely on traditional and non-clean biomass based fuels. In this context, renewable energy options, specifically the ones yielding heat energy as output e.g. biogas, solar thermal, improved cookstoves etc. need to be prioritized while promoting renewable energy in the state. To summarize, Maharashtra has a huge opportunity to meet its growing energy needs through accelerating the deployment of renewable energy. Apart from providing electricity, it must be noted that decentralized renewable energy technologies can be up-scaled to meet a range of thermal and mechanical energy gaps in the state.

2. Purpose and Scope of Study

The purpose of the study is to present a detailed overview of the status of renewable energy in Maharashtra and to identify the key barriers and challenges to the growth of RE in the state. The study has been carried through analysis of secondary sources of information and engagement with key experts and stakeholders representing industry, Government, research and policy think tank set to get their views and recommendations.

3. RE Landscape in Maharashtra

Maharashtra is second in total installed capacity of the renewable based power across all states in the country. The combined renewable power generation capacity in the leading four states including Tamil Nadu, Gujarat and Karnataka is almost 75% of the country's total renewable power capacity. Each of these states has relied on specific renewable resource which is abundantly available there. For e.g. over the last few years, Gujarat developed its solar power whereas Tamil Nadu has extensively developed its wind energy capacity. Maharashtra has large potential for wind, biomass and solar resources. The state has till now developed mainly two resources: wind and bagasse based cogeneration.

Grid connected RE power development as illustrated in Figure 2 has been driven by both national as well as state policies. The role of Maharashtra Electricity Regulatory Commission (MERC) in setting tariffs for feeding generated renewable power to the grid has been also quite important. One of the major hurdles faced by most of the grid connected renewable energy technologies have been relatively higher tariff impact it can have on the consumer. At present the renewable energy tariffs allowed by the MERC, are much higher compared to tariffs charged to the domestic consumers. However, the tariff for

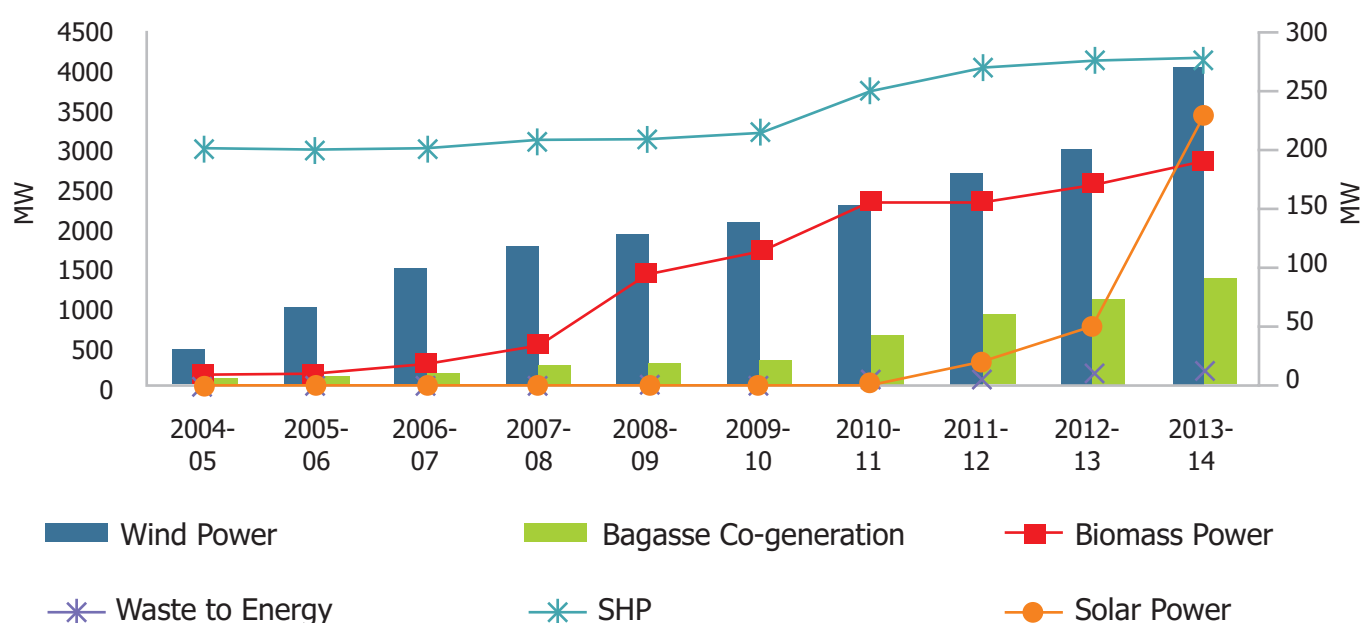


Figure 2: Grid connected RE capacity in Maharashtra

commercial category consumer in the state is at parity with most of the renewable energy based options. Thus, it would be more appropriate to promote technologies in the consumer sectors such as in commercial establishment followed with industrial sector and finally for mass domestic consumers.

The Renewable Purchase Obligation (RPO) targets as specified by the MERC for the state is shown in Table 2. At present, Maharashtra has differentiated RPOs for solar and non-solar RE power generation.

Table 2: RPO Targets for Maharashtra

Year	Minimum Quantum of purchase (%)		
	Solar	Non-Solar	Total
2010-11	0.25%	5.75%	6.00%
2011-12	0.25%	6.75%	7.00%
2012-13	0.25%	7.75%	8.00%
2013-14	0.50%	8.50%	9.00%
2014-15	0.50%	8.50%	9.00%
2015-16	0.50%	8.50%	9.00%

This essentially puts more focus on development of demand for these two renewable resources. However, in absence of dedicated policy for solar or provisions in the state renewable policy, supply side development remains a weak link in solar power development.

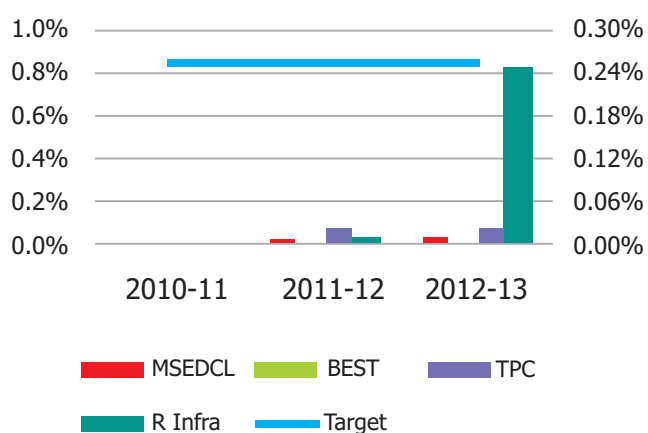


Figure 3: Solar RPO target and compliance by various utilities in Maharashtra

Since solar PV technology is yet to mature, it needs policy support for initial years. This could be one of the reasons behind most of the utilities achieving non-solar RPO targets whereas solar RPO targets are hardly met.

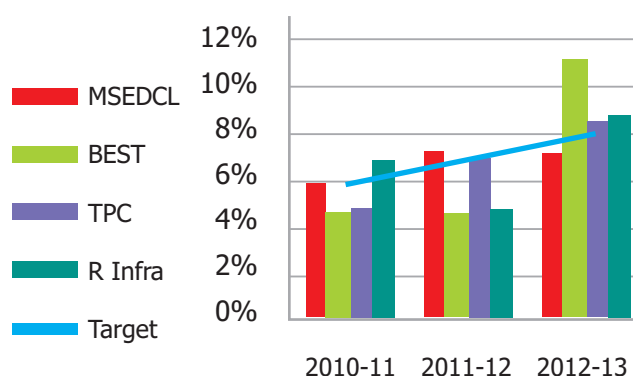


Figure 4: Non-solar RPO target and compliance by various utilities in Maharashtra

RPO compliance and enforcement: Figures 3 and 4 illustrate solar and non-solar compliance by various utilities in the state. REC and RPO mechanism is crucial to ensure uptake of renewable power by distribution utilities throughout the country. Yet out of all the states, only Maharashtra and Rajasthan enforced penal provision of Section 142 of the Electricity Act, 2003 on their electricity utilities for shortfall of RPO target. MERC directed all obligated entities to fulfil their targets for both solar and non-solar for the years 2010 to 2014. This has been a strongest-ever decision taken on RPO by any state or central authority since the launch of the RPO programme. MERC in the past has also directed Maharashtra Energy Development Agency (MEDA), the state nodal agency for RE to formulate a committee to investigate and take a review of existing formats for data collection for RPO compliance of obligated entities. Majority of these findings are on streamlining the governance processes for open access and captive uses of renewable energy in the state. With open access there is a freedom with the consumer to choose electricity supplier/distributor; this pushes the distribution utilities to provide better service quality. The findings of the committee are summarized in the Table 3.

Table 3: Findings of MEDA Committee

Sr. No.	Issue
1	Identification of obligated entities and listing: The list of obligated captive users and open access consumers in the State with MEDA is not exhaustive. Further, there exist no streamlined process for identification and registration of such Obligated Entities
2	Verification of Data submission by captive users: Energy generation data submitted by captive users is self-certified and may not be authentic for the purpose of RPO compliance
3	Verification of Data submission by Open access consumers: Data submission by open access consumers for RPO compliance is currently not verified.
4	Practical difficulties in monthly data submission: MERC RPO Regulations (11.1) specifies obligated consumers to submit data MEDA on a monthly basis, which is found to be practically difficult from data submission and collection point of view.
5	Lack of standard data Formats: There should also be standard formats for data submission by DISCOMs/Electrical Inspector's Office (PWD) to MEDA and MEDA to MERC for RPO compliance data submission.
6	Standard methodology for energy accounting for computing RPO compliance of Obligated Entities: For captive users and open access consumers other than those having in-situ captive power plants, the base energy to be considered for RPO compliance could be computed either based on the net energy or based on the gross energy at the generation point after accounting for the wheeling /transmission losses incurred during the wheeling of power from the source of generation.
7	Lack of check on Double accounting of RPO compliance: No check exist to verify that RPO compliance by captive users and open access consumers is not counted towards RPO compliance of the host distribution licensee.

4. Policy and Institutional Structure

Maharashtra was one of the first states to make some policy developments in the renewable energy sector. Still, its existing policy (New Policy for Power Generation from Non-Conventional sources of Energy, 2008) does not have any provisions for development of critical renewable energy resources such as solar energy and waste to energy. Besides, the policy is restricted to development of power generation and not energy as a whole.

The Rural Village Electrification (RVE) Policy in the state plans to provide solar home lighting systems and solar street lights for tribal and remote villages of the state till 2016-2018. Small Hydro Power (SHP) development in the state is governed by the SHP policy by the Water Resource Department (WRD). Under this policy, potential SHP sites are identified by WRD for development through either IPP or CPP route. The SHP sites allotted under this policy shall be developed on Build, Operate & Transfer Basis (BOT) for a period of 30 years.

5. Issues and Barriers

Table 4 summarizes key issues and barriers for various RE technologies.

Table 4 Technology wise Issues and Barriers

Technologies	Issues
Wind Energy	<p>Technical: Un-availability of high resolution wind potential maps at kW scale as well as at above 80m height for MW scale plants is a major issue. Grid evacuation arrangement is also not conducive for adding more capacity. Integration of the energy generated depends upon the forecasting mechanisms by the wind developers, in absence of which load dispatch center faces major hurdles in maintaining grid stability.</p> <p>Financial: Promotion of generation based incentives coupled with competitive bidding can minimize the tariff impact on the consumers and attract more investment which in turn will spur further growth of sector.</p> <p>Regulatory/Administrative: Delays in clearances such as land clearances become major hurdles in planned project timelines.</p>
Solar PV	<p>Maharashtra receives good solar radiation however; the growth of the sector has been sluggish compared to other states like Gujarat and Rajasthan.</p> <p>Technical: Lack of high resolution solar resource maps availability is a challenge for developers and investors in planning targeted development of sector. There are no clear guidelines on standardization & quality control of solar PV panels system.</p> <p>Policy/Regulatory: Almost all of the states with good solar radiation availability have a dedicated Solar Policy which clearly mentions targets and roadmaps for sectoral development along with incentives and administrative facilitation by the state. In absence of such a policy, the solar sector in Maharashtra could not get the clear state support. Dedicated Independent Power Producers also suffer from unavailability of grid evacuation mechanisms along with rooftop producers who face hurdles in the absence of a clear net-metering policy. Developers also face bad governance practices in availing subsidies and required clearances.</p>
Solar Thermal	<p>Solar thermal technologies have advantage of shifting the electricity and energy load demand pattern if substituted for thermal applications such as industrial heat and domestic heating applications. However, in absence of complete substitution of conventional fuels, the technology has to compete with the conventional subsidized fuels. As a result, from industrial (end user) point of view, the payback period for solar thermal solutions seems to be significantly higher. Further, in the absence of recognized standards, quality control and technology awareness, it becomes difficult for the sector to grow.</p>

Waste to Energy Technologies

These technologies have the additional advantage of waste disposal still it is one of the most underdeveloped energy options in the state. There is a clear absence of successful case studies, both at state and national level. Unorganized nature of fuel supply chain along with variation in the quality and quantity of waste and lack of financing poses a serious challenge for development of the technology.

Biomass and Cogeneration Technologies

The current installed power generation capacity in the state, except for cogeneration projects where supply chain linkage is organized, is suffering heavily from the fuel supply chain instability (with quantity & quality of fuel and biomass prices). Achieving continuous fuel supply of desired quantity at desired prices depends upon the social engineering efforts taken by the developer/investor, in absence of which, low plant load factor hampers the financial viability of power plants

6. Recommendations

The study shows that there is a huge scope to upscale renewable energy for meeting both electricity and thermal energy requirements in the state. In this context, the following recommendations are made.



Comprehensive State RE Policy

The existing state renewable energy policy largely focuses on the power generation through a few RE technologies. Besides, it has become slightly outdated now as many developments have happened in the renewable power sector in recent times. Therefore a comprehensive renewable energy policy which can promote integrated development of all feasible resources in the state for both electric and non-electric applications is urgently required.

The following points should be taken in consideration while formulation of the new comprehensive RE policy:

- There should be clear roadmap and targets for development of RE technologies based on overall resource potential.
- Prioritization of RE technologies should be based on various aspects such as maturity of technology, manufacturing potential and tariff impacts on the consumer.

- The policy must focus on bottleneck areas like net metering for solar rooftop, grid evacuation, ensuring RPO compliance, developing a solution for better forecasting of renewable energy generation such as wind.
- The policy should also address the issue of land acquisition and availing multiple clearances.



State Cooking Energy Mission

Despite being an industrialized state, over 78% of rural households in Maharashtra use firewood as principle cooking fuel. The challenge of lack of access to modern fuels for cooking can be addressed through implementing a dedicated Cooking Energy Mission.

The following measures should be taken while strategizing the mission:

- Focus should be given on accelerating the use of modern sources of energy including sustainable and clean cooking system backed by fuel supply chain.
- The mission should clearly strategize the innovative business model/plan, financial mechanism and standardization of technologies to promote adoption and investment.



Rural Electricity Service through RE micro-grids

Although the state has achieved a complete electrification status as per the RGGVY scheme definition, the service quality of electricity (in terms of hours of supply, time of supply, voltage and current fluctuations etc.) is very poor. The poor quality of power supply essentially hampers the core purpose of providing electricity to the village level. Hence, establishing a network of RE based micro-grid can bring effectiveness in electricity service provision as well as provide entrepreneurship opportunities and socio-economic development at local level. In this regard, a clear strategy on micro-grid development in the state needs to be formulated.



State level Action Plan

At the moment, no state-level plan currently exists to promote RE deployment for rural electrification.

In order to deploy more RE in rural areas, the state Government must implement a state-level action plan which has a target-driven approach for un-electrified rural households which are not covered under the central scheme of RGGVY.



Improved Financial Support

At present lack of supportive low-cost finance is a major barrier for off-grid rural RE projects. The State Government should offer more financial support for rural electrification projects which may also be channelized through rural regional/cooperative banks in the form of low interest loans.



Grid Infrastructure & RE integration

Adequate network augmentation is required in absence of which future RE capacity addition in the state could lead to local-grid saturation in RE rich areas and to grid congestion between power generation and load centers. Developing a solution for better forecasting of renewable systems, such as wind, is

critical from load management and needs urgent attention. In this context, the following measures should be adopted:

- State Transmission Unit should prepare a long-term transmission plan with a focus on RE-rich districts
- State grid infrastructure should be strengthened between RE rich areas / Generation sites and urban load centres
- All solar and wind power plants should be mandated to install advanced data monitoring technologies which provide real-time RE data to load dispatch centres so as to enable better grid integration
- Solar parks, land banks etc with required grid evacuation infrastructure should be established.



Capacity Building and O & M Network:

Developers are facing the problem of lack of skilled human resource for implementation of RE projects as well as for O&M.

The following measures should be adopted to improve the capacity building and O&M network:

- Industrial Training Institutes in the state must RE related courses and training programs in curriculum.
- These training courses can be linked to employment in industries.
- Current network of AkshayUrja shops can further be strengthened to improve O&M.



Standardization and Quality Control

One of the major challenges for developers and manufacturers of RE technologies is lack of quality control protocols and product standardization. To address this, appropriate technical standards can be decided by MEDA in collaboration with BIS to improve the quality across all RE related systems and components.



Single Window Clearance Mechanism

It is very difficult for large scale project developers to get the required permits and clearances in a time bound manner. No investor grievance redressal mechanism exists for stalled clearances either which leads to delay in project implementation. The following measures should be adopted to avoid such delays:

- A single window clearance mechanism as well as subsidy availing facility for all of the renewable energy options must be established. MEDA has a critical role to play in the facilitations of different clearances required for such projects.
- Establish an appropriate mechanism for investor grievance redressal.
- The clearance process should have time bound deadlines.
- Land acquisition process should be streamlined for speeding up utility scale RE projects.



Cross Cutting Issues

Informal discussions with RE sector professionals highlighted the following cross cutting issues and recommendations that need to be

adequately addressed so as to attract investments and overall development of the sector:

- Strengthen MEDA by building its resource capacity to execute all type of RE projects in the state. Building their capacity would improve the overall ease of project execution and subsidy related activities across different technologies segments. This is quite important as MEDA being the nodal agency is responsible for the development of the renewable energy utilization in the state.
- Create incentives and measures that establish a strong renewable energy manufacturing base and supply chain in the state.
- Create adequate demand for renewable energy implementation within large state programmes and schemes in critical areas like health, education, water, sanitation, agriculture, livelihoods etc.
- Maharashtra MPs and MLAs can also implement various small scale RE projects in their constituencies (both urban and rural areas) through utilization of MP and MLA LAD funds. Besides they can also demonstrate suitable examples in provision of lighting, cooking, water and other services through renewable energy in line with the recent initiatives like the Sansad Adarsh Gram Yojana (SAGY) and other national and state level schemes.





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