

Summer Internship Report

On

**STUDY OF POLICY INSTRUMENTS TO PROMOTE
RENEWABLE ENERGY IN MAHARASHTRA
AND
THE IMPACT OF RPO ON POWER PURCHASE COST**

(A Case Study)

UNDER THE GUIDANCE OF

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DECLARATION

I, Kuldeep, Roll no. 40 / Semester 3rd / Class of 2012-14 of the **MBA (Power Management)** of the **National Power Training Institute, Faridabad** hereby declare that the Summer Training Report entitled:

**STUDY OF POLICY INSTRUMENTS TO PROMOTE
RENEWABLE ENERGY IN MAHARASHTRA
AND
THE IMPACT OF RPO ON POWER PURCHASE COST**

is an original work and the same has not been submitted to any other Institute for the award of any other degree.

A Seminar presentation of the Training Report was made on and the suggestions as approved by the faculty were duly incorporated.

Presentation In charge
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Director/Principal of the Institute

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EXECUTIVE SUMMARY

India has 150 GW of known renewable energy potential, of which only about 18% has been developed. Renewable energy is considered to be an important part of the solution to India's energy shortage. The country's renewable energy potential is likely to be even greater than 150 GW, as sources with significant generation capacity have not yet been mapped. Developing renewable energy can help India increase its energy security, reduce the adverse impacts on the local environment, lower its carbon intensity, contribute to a more balanced regional development, and realize its aspirations for leadership in high-technology industries.

Further, the National Action Plan on Climate Change (NAPCC) has recommended increasing the share of renewable energy to 10% by 2015 and 15% by 2020. However, Clause 6.4 (2) of the National Tariff Policy also mandates that such procurement by distribution licensees for future requirement, as far as possible should be done through competitive bidding under Section 63 of EA2003 within suppliers of energy offering same type of renewable energy sources. In the long term, these technologies would need to compete with other sources in full costs. The competitive procurement of renewable energy sources could be based on several parameters such as -tariff, capital costs, performance parameters such as Capacity Utilization Factor (CUF), Plant load Factor (PLF) etc, or any combination of these factors. Further, In Maharashtra such procurement has to be undertaken within the framework of Renewable Purchase Obligation (RPO) regulations for all RE resource together.

This report presents various scenarios for the RPO trajectory based on the resource-wise supply of renewable energy sources, target suggested by NAPCC and the impact of increasing the renewable purchase obligation (RPO) on retail tariffs. It also highlights the key challenges and bottlenecks along with the enablers for the development renewable energy in India. The data used for the analysis is based on information corroborated from the Ministry of New and Renewable Energy (MNRE), SERCs, state

nodal agencies, the Central Electricity Regulatory Commission (CERC), and developers on various wind, solar, biomass, and small hydro projects in potential major states as well as the information.

However, this study report is focused only on the renewable sources which are mentioned in the policies and regulations. Thus, this report does not include the renewable sources like tidal, geothermal and OTEC etc.

LIST OF ABBREVIATIONS

BEST	Brihanmumbai Electric Supply and Transport Undertaking
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CERC	Central Electricity Regulatory Commission
EA 03	Electricity Act, 2003
ERC Act, 1998	Electricity Regulatory Commissions (ERC) Act, 1998
FOR	Forum of Regulators
FY	Financial Year
GBI	Generation Based Incentive
GOM	Government of Maharashtra
kWh	Kilo Watt Hour
MEDA	Maharashtra Energy Development Agency
MERC	Maharashtra Electricity Regulatory Commission
MNRE	Ministry of New and Renewable Energy
MSEDCL	Maharashtra State Electricity Distribution Company Limited
MSETCL	Maharashtra State Electricity Transmission Company Limited
MSW	Municipal Solid Waste

MU	Million Units
MW	Megawatt
MYT	Multi Year Tariff
NAPCC	National Action Plan for Climate Change
OTEC	Ocean Thermal Energy Conversion
NEP	National Electricity Policy
PPA	Power Purchase Agreement
PPC	Power Purchase Cost
RE	Renewable Energy
REC	Renewable Energy Certificate
RInfra-D	Reliance Infrastructure Ltd - Distribution
RPO	Renewable Purchase Obligation
RPS	Renewable Purchase Specification
TP	Tariff Policy
TPC	The Tata Power Company Limited
SERC	State Electricity Regulatory Commission
SHP	Small Hydro Projects
SLDC	State Load Dispatch Centre
STU	State Transmission Utility

WEIGHTS AND MEASURES

BU	Unit of energy, equal to 1×10^9
kWh	Unit of energy, equal to 1 unit
MW	Unit of power, equal to 1×10^6
GW	Unit of power, equal to 1 billion (10^9) watts
MT	Unit of weight, equal to 1,000 kg

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Chapter 1: Introduction

The Maharashtra Electricity Regulatory Commission (MERC or Commission) has been very proactive in promoting energy generation from renewable energy sources. MERC has been in the forefront of determining preferential tariffs for renewable energy technologies, with its first tariff Order for non-fossil fuel based co-generation projects issued even before the enactment of Electricity Act, 2003 (EA 2003).

The enactment of EA 2003 in June 2003 has radically changed the legal and regulatory framework applicable to the renewable energy sector in India as it has specific provisions for promotion of renewable energy technologies. The EA 2003 provides for policy formulation by the Government of India and mandates Electricity Regulatory Commissions (ERCs) to take steps to promote renewable sources of energy within their area of jurisdiction.

As per the provisions of EA 2003 and Tariff Policy, MERC has taken proactive measures for promoting renewable energy based generation within the State, such as determination of preferential tariff, Renewable Purchase Specification framework, grid connectivity framework, etc. The Commission has issued Tariff Orders for various types of renewable energy technology such as wind energy, non-fossil fuel based cogeneration, small hydel power, biomass power, etc.

MERC introduced the “Renewable Purchase Obligation” (RPO) in the year 2004, to address the immediate requirement of equitable sharing of renewable energy purchase obligation amongst all distribution licensees in the State, before devising a long-term regulatory policy for harnessing of renewable energy resources within the State as mandated by the Electricity Act, 2003. Under RPO framework, feed-in tariff was to be offered to renewable energy generators, and the entire renewable energy generation

within the State was required to be shared amongst the distribution licensees in proportion to their consumption. The procurement cost of renewable electricity was to be shared by all distribution licensees under the RPO pool operation through financial settlement mechanism.

However, this RPO pool mechanism was limited to only distribution licensees, whereas, the Tariff Policy notified by the Government of India requires promoting sale of renewable energy to any person including captive and open access consumers as well. Besides, RPO framework was post-facto settlement based on actual renewable energy generation whereas the EA 2003 and Tariff Policy envisaged more proactive approach for promotion of renewable energy by way of upfront percentage specification for RE procurement.

In order to overcome the shortcomings of RPO framework, the Commission developed a Renewable Purchase Specification (RPS) framework under which, mandatory RPS was made applicable not only to the distribution licensees but also to the captive and open access consumers. Further, the percentage targets for RE procurement were specified upfront for all eligible persons, providing the incremental trajectory of minimum renewable purchase specification till FY 2009-10. Subsequently, such framework was modified in view of several petitions and shortfall in availability of renewable energy generation as compared to levels projected at the time of RPS Order.

The Tariff Orders for different renewable energy technologies and the RPS Order are valid till March 31, 2010. Therefore, as a part of regulatory process before specifying the new framework, the Commission has engaged the services of ABPS Infrastructure Advisory Private Ltd. (ABPS Infra) for undertaking a comprehensive review of the existing renewable energy framework, and suggesting the appropriate approaches on various aspects of renewable energy framework after duly considering the legal and policy framework, and recent developments at national and international level.

1.1 Legal and Policy Framework for Renewable Energy

1.1.1 Electricity Act, 2003

The EA 2003 has several enabling provisions to accelerate the development of renewable energy based generation, such as –

- (a) Section 3: National Electricity Policy and Plan for development of power system based on optimal utilization of resources including renewable sources of energy,
- (b) Section 61(h): Tariff Regulations by Regulatory Commissions to be guided by promotion of generation of electricity from renewable energy sources in their area of jurisdiction.
- (c) Section 86(1)(e): Regulatory Commissions to specify percentage of renewable energy to be procured as renewable purchase obligation for licensees and other persons.

Tariff determination for Renewable Energy sources: As per Section 61 of EA 2003, while formulating the Tariff Regulations, the Appropriate Commission is required to specify the terms and conditions for the determination of Tariff, in accordance with the provisions of the EA 2003 Further, as per Section 61 (h) of EA 2003, while specifying the terms and conditions for tariff, the Commission shall be guided by promotional aspect as regards renewable energy sources. The relevant extract of provision of EA 2003 is as under:

Section 61 (h):

“61. 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 following, namely:-

...

(h) The promotion of co-generation and generation of electricity from renewable sources of energy; ...”

The Commission has already notified the MERC (Terms and Conditions of Tariff) Regulations, 2005 on August 26, 2005 as per provisions of Section 181 of EA 2003. As per proviso to Regulation 26.1 of the said Tariff Regulations, the determination of tariff in respect of supply of power from non-conventional sources of energy to distribution licensees shall be in accordance with the relevant terms and conditions as stipulated under relevant Orders for such source.

Promotion of renewable energy sources: Under Section 86 of EA 2003, the Regulatory Commissions are required to specify obligations of various entities to procure specific percentage of renewable energy out of total consumption of electricity in the area of distribution licensee. The relevant extract of EA 2003 is as under:

“86. The State Commission shall discharge following functions, namely –

(1)...

(e) Promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of total consumption of electricity in the area of distribution licensee”.

1.1.2 National Electricity Policy

Clause 5.12 of the National Electricity Policy stipulates several conditions in respect of promotion and harnessing of renewable energy sources. The salient features of the said provisions of NEP are as under:

“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 non-conventional 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 non-conventional 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.”(Emphasis added)

1.1.3 Tariff Policy

The Tariff Policy (TP) notified on January 6, 2006 has further elaborated on the role of Regulatory Commissions, and the mechanism for promoting harnessing of renewable energy and timeframe for implementation, etc. Clause 6.4 of the Tariff Policy addresses various aspects associated with promotion and harnessing of renewable energy sources. The salient features of the said provisions of TP are as under:

“(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 such 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.”(emphasis added)

From the above, it is clear that promotional aspect for renewable is not only limited to ‘tariff’ related matters but also need to address various associated issues that influences growth /harnessing of renewable energy such as:

- (a) Connectivity with grid for power evacuation
- (b) Sale to any person, and
- (c) Purchase obligation as percentage of consumption by all.

Chapter 2: Regulatory Framework

Ever since its inception, MERC has been very pro-active in promoting the renewable energy based generation within the State and has issued various Tariff Orders for each type of renewable energy source after following due regulatory process and taking into consideration the views and inputs of various stake-holders such as distribution licensees, consumer representatives, generating companies, developers, investors, experts, etc. from time to time.

In accordance with its statutory obligations, earlier under erstwhile Electricity Regulatory Commissions (ERC) Act, 1998 and later as per EA 2003, MERC has also provided its advice to the Government of Maharashtra (GOM) on several policy matters pertaining to renewable energy after conducting detailed deliberations and taking into consideration inputs from various stakeholders from time to time.

The Commission has issued Tariff Orders in respect of various renewable energy technologies. The Commission has also specified the capacity to be added for each technology, except for Municipal Solid Waste (MSW). Further, the Commission has determined tariffs for capacity to be commissioned under these Orders. Renewable Energy purchase by distribution licensees within the State is being done in accordance with tariffs and other terms and conditions stipulated under these Orders.

Tariff Orders have been issued by the Commission for the following technologies:

- a) Non-fossil fuel based cogeneration projects
 - Order dated August 16, 2002 in Case No. 8/9/10/15/17/18/19/20/21 of 2001 for purchase of power from bagasse based co-generation projects and in the matter of aiding the State Government in formulation of the Policy.

- The Tariff Rate and tariff structure, as approved, was valid till March 31, 2007 or 300 MW of capacity addition whichever is earlier. Subsequently, through RPS Order (Case 6 of 2006), the Commission extended the validity of the Tariff Rate, tariff structure and other conditions of said Order for co-generation projects to be commissioned upto March 31, 2010.
- The Commission further issued a Clarificatory Order dated November 21, 2003 specifying the qualification criteria for co-generation projects and outlining the measurement and verification protocol for compliance monitoring.
- Subsequently, the Commission has issued an Interim Order for review of tariff rate and tariff structure for Bagasse based grid connected Cogeneration projects on January 11, 2010 (Case No. 123 of 2008) upon scrutiny of submissions made by Cogeneration Association of India.

b) Non-fossil fuel based Non-Qualifying Cogeneration projects

- Order dated May 25, 2005 in Case No. 26 of 2004 on Rate and other dispensation for purchase of power from bagasse and other non-fossil fuel based Non-Qualifying Co-generation projects.
- The Order covers those co-generation projects that do not qualify under 'efficiency criteria' specified under the Order dated August 16, 2002, but meets other qualifying requirements as regards various criteria comprising of
(a) mode of operation (b) fuel for non-qualifying co-generation projects (c) Efficiency for non-qualifying co-generation project (d) Minimum purchase criteria.
- Further, non-qualifying co-generation projects are included in the dispensation

for obligatory purchase of power in terms of Commission's Order dated September 3, 2004 for determination of renewable purchase obligations (RPO) of distribution licensees within Maharashtra.

- The tariff rate and tariff structure, as approved, is valid for Non-Qualifying co-generation projects to be commissioned up to March 31, 2010. The same shall be reviewed as and when review of Tariff for Qualifying Co-generation projects is initiated so as to enable integrated assessment and possible view to be taken.

c) Wind Power

- Order dated November 24, 2003 in Case No. 17(3), 3, 4 & 5 of 2002 for procurement of wind energy and wheeling for third party sale and/or self use.
- The tariff rate has been determined for various categories of wind energy projects classified as Group-I, Group-II and Group-III.
- The Commission shall review the tariff rate and the tariff structure for wind power projects after March 31, 2007 or on addition of 750 MW of additional wind capacity after 1st April, 2003, whichever is earlier. Subsequently, through RPS Order (Case 6 of 2006), the Commission extended the validity of the Tariff Rate, tariff structure and other conditions for wind energy projects to be commissioned upto March 31, 2010.

d) Biomass based power generation projects

- Order dated August 8, 2005 in Case No. 37 of 2003 for determination of tariff and dispensation of related issues in respect of procurement of power from biomass based power projects.

- The Order is applicable to all biomass based power generation projects in Maharashtra using the Rankine cycle based technology applications and commissioned by March 31, 2010, or until installed plant capacity based on biomass reaches 250 MW, whichever is earlier.
- This Order is applicable only to those Projects harnessing biomass potential in Maharashtra and commissioned in the State, and intended for sale of electricity to Licensees within Maharashtra.
- Further, the Tariff Rate and Structure is applicable only to Projects employing Rankine cycle technology applications. The dispensation for Projects employing any technology other than Rankine cycle would be dealt with separately if and when the need arises.
- Subsequently, the Commission has issued Orders for revision of Variable Charge component of Tariff on March 25, 2009 and thereafter on December 14, 2009 (Case No. 83 of 2008) upon scrutiny of submissions of few operational biomass power projects.

e) Small hydro projects

- Order dated November 9, 2005 in Case No. 25 of 2004 for determination of tariff for Small Hydel Power (SHP) projects within Maharashtra.
- The Order shall be applicable for supply of electricity from all small hydro projects (upto 25MW) to the Distribution Licensees in the State of Maharashtra.
- The Order is applicable for addition of SHP projects upto 200 MW.

- The Commission shall review the tariff rate and structure after five years from the date of approval of the order or on commissioning of 200 MW of SHPs, whichever is earlier.

f) Municipal Solid Waste

- Order dated April 6, 2004 in Case No. 15 of 2002 in the matter of procurement of power from municipal solid waste based projects.
- Under the above Order, the Commission had encouraged the concept of procurement of power by Municipal Corporations and Local Authorities based on municipal solid waste on the tariff/terms to be mutually decided amongst the private developers and local authorities subject to ceiling tariff as stipulated by MNRE guidelines.
- Further, licensees were directed to facilitate such transactions and provide open access to their distribution systems to enable local authorities to procure power from MSW based projects.
- Subsequently, through RPS Order (Case No. 6 of 2006), the Commission enabled sale and purchase of power from MSW projects to distribution licensees as well. However, rate for such procurement was to be determined based on petition, if any, filed before Commission. No petition for tariff determination for MSW based power project has been filed till date.

g) Solar Power Projects

- Suo-Motu Tariff Order for Solar power projects was issued on March 8, 2009 (Case No. 100 of 2008) upon detailed regulatory and consultation process.

- The Tariff Order has been issued pursuant to announcement of Generation Based Incentive (GBI) mechanism by Ministry of New and Renewable Energy (MNRE) for Grid connected Solar Power projects.
- The Tariff Order seeks to treat GBI projects and Non-GBI projects separately for the purpose of tariff. For GBI projects, the tariff and other conditions have been specified whereas for Non-GBI projects, the Commission has directed licensees to adopt competitive procurement route and directed them to file relevant Bidding Documents for initiation of further regulatory process in the matter.

h) Renewable Purchase Obligation (RPO) Order

- Order dated September 3, 2004 in Case No. 1 of 2004 for determination Renewable Purchase Obligations (RPO) for Utilities within Maharashtra.
- The RPO mechanism, as specified under this Order, was made applicable to all existing and future electricity distribution Licensees in Maharashtra, including successor entity(ies) of MSEB as and when they are constituted.
- The RPO mechanism was made applicable from FY 2004-05 till it is revised or revoked. Further, the Commission directed the Licensees to work together for detailed modalities, including accounting of energy, and formulate a mechanism for operationalising RPO, by consensus.
- MEDA, being the State Nodal Agency for renewable energy sources, was directed to provide requisite information, extend support, coordinate with the Licensees and facilitate early finalization of a suitable mechanism to enable operationalisation of RPO.

- Further, taking note of the need expressed by Prayas at the first hearing, MEDA was directed to prepare an Approach Paper on the long-term development of renewable sources and associated enabling regulatory framework for Maharashtra, and submit it to the Commission upon eliciting public comments and debate.

i) Renewable Purchase Specification (RPS) Order

- Order dated August 16, 2006 in Case No. 6 of 2006 for Long-term Development of Renewable Energy Sources and associated Regulatory (RPS) Framework.
- RPS targets have been made applicable not only to the distribution licensees but also to the captive users and open access consumers, as envisaged under Electricity Act, 2003.
- Incremental trajectory for renewable purchase targets has been specified as 3% for FY 2006-07, 4% for FY 2007-08, 5% for FY 2008-09, and 6% for FY 2009-10.
- Shortfall in RE procurement by Eligible Persons to be treated as non-compliance with the Commission's directives, and attract action as per appropriate provisions of EA 2003. Eligible Persons are liable to pay an enforcement charge at the rate of Rs 5.00 per unit of shortfall in FY 2007-08, Rs 6.00 per unit of shortfall in FY 2008-09, and Rs 7.00 per unit of shortfall in FY 2009-10. Further, such enforcement charges would not be 'pass through' expenses under the Aggregate Revenue Requirement of Utilities.

- MEDA has been made responsible for administering this RPS framework in the State. The Commission also directed MEDA to put in place the ‘RPS Operating Framework’ within the stipulated timeframe.
- Subsequently, such framework was modified in view of several Petitions and shortfall in availability of renewable energy generation as compared to that projected at the time of RPS Order (Ref. Case 104, 122 & 125 of 2008).

2.1 Recent Regulatory and Policy Developments

2.1.2 National Action Plan for Climate Change (NAPCC)

The National Action Plan for Climate Change (NAPCC), announced by the Hon. Prime Minister of India on June 30, 2008, envisages several measures to address global warming. One of the important measures identified involves increasing the share of renewable energy in total electricity consumption in the country. NAPCC has set the target of 5% renewable energy purchase for FY 2009-10, with the target increasing by 1% for next 10 years. The relevant text of Para 4.2.2 of NAPCC is reproduced below:

“The Electricity Act 2003 and the National Tariff Policy, 2006 provide for both the Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commission (SERC) to prescribe a certain percentage of total power purchase by the grid from renewable based sources. It also prescribes that a preferential tariff may be followed for renewables based power.

The Following enhancements in the regulatory/tariffs regime may be considered to help mainstream renewables based sources in the national power system:

- (i) A dynamic minimum renewable purchase standard (DMRPS) may be set, with escalation each year till a pre-defined level is reached, at which time the

requirements may be revisited. It is suggested that starting 2009-10, the national renewables standard (excluding hydropower with storage capacity in excess of daily peaking capacity, or based on agriculture based renewables sources that are used for human food) may be set at 5% of total grids purchase, to increase by 1% each year for 10 years. SERCs may set at higher percentages than this minimum at each point in time.

...”

Further, in order to ensure compliance with the DMRPS target, NAPCC envisages transaction of renewable energy from surplus regions to deficit regions through some policy instruments. One such policy instrument prescribed in NAPCC is Renewable Energy Certificate (REC) Mechanism, which would enable large number of stakeholders to purchase renewable energy in a cost effective manner. The relevant text of Para 4.2.2 of NAPCC is reproduced below:

“ ...

(ii) Central and State governments may set up a verification mechanism to ensure that the renewables based power is actually procured as per the applicable standard (SERC specified). Appropriate authorities may also issue certificates that procure renewables based power in excess of the national standard, Such certificates may be tradable, total utilities falling short to meet their renewables standard obligations. In the event of some utilities still falling short, penalties may as may be allowed under the Electricity Act 2003 and rules thereunder may be considered.” (Emphasis added)

2.1.3 FOR Report on ‘Policies on Renewables

The Forum of Regulators (FOR) constituted under Section 166 of Electricity Act, 2003,

for harmonising the policies across the Regulatory Commissions, has published a Report.

‘Policies on Renewables’ with the objective of evolving a common approach to the promotion of renewable sources of energy in the country as a whole. The key recommendations of the FOR report are as follows:

- Each State Commission may specify a minimum RPO of 5% in line with the NAPCC. RPO should be calibrated with regard to the energy input in the system, after adjustment of losses and not on energy billed.
- Need for a facilitative framework for grid connectivity and inter-State exchange of power generated from renewable energy sources.
- Need to develop Renewable Energy Certificate (REC) mechanism for achieving the RPO targets.
- Preferential tariff for renewable sources should be specified at least during their loan tenure, subsequent to which, they should be encouraged to compete amongst themselves.
- Generation Based Incentive (GBI) should be declared upfront to enable the Regulatory Commission to factor it in the tariff determination process.

2.2 CERC Regulations on Renewable Energy

The Central Electricity Regulatory Commission (CERC) has notified the CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources), Regulations, 2009 under which tariff determination aspects for various renewable energy

technologies, has been discussed. Although these Regulations are applicable for central sector and inter-State generation projects, under Section 61 of EA 2003, these would be a guiding factor for SERCs while dealing with matters related to energy generation from RE sources. Thus, the above-said CERC Regulations would provide the guiding principles while specifying the tariff regime for various RE technologies during the next Control Period (i.e. FY 2010-11 to FY 2015-16).

2.3 CERC Renewable Energy Certificate Regulations

Central Electricity Regulatory Commission (CERC), through a notification dated January 14, 2010 has published the CERC (Terms and Conditions for recognition and issuance of Renewable Energy Certificate (REC) for Renewable Energy Generation) Regulations, 2010. The said draft Regulations have been formulated in pursuance of Section 66 of Electricity Act 2003 which entrusts Appropriate Commission to formulate regulations to facilitate development of market. The applicability of these Regulations will enable purchase of RECs as a purchase of energy generated from renewable sources and accordingly will be allowed for compliance of the Renewable Purchas Obligation (RPO) target of Obligated Entities. The salient features of the Regulation are:

- i) Creation of a central level agency by the Central Commission for registration and issuance of REC;
- ii) The RE generators will have two sale options – either to sell energy at preferential tariff or to sell the electricity generated under REC mechanism where Price of electricity component would be equivalent to weighted average power purchase cost of the distribution company including short-term power purchase but excluding renewable power purchase cost.

- iii) Value of one REC will equivalent to 1 MWh of electricity injected into the grid;
- iv) The REC will be exchanged only in the Power Exchanges within the band of a floor price and a forbearance (ceiling) price to be determined by CERC from time to time;
- v) The eligible and obligated entities will have option of purchasing the REC to meet their Renewable Purchase Obligations (RPO).
- vi) There will also be compliance auditors to ensure compliance of the requirement of the REC by the participants of the scheme.

The said Regulations also outline various other features such as categories, denomination, pricing and validity of RE Certificates. Two categories of Certificates have been specified in the Regulations viz., Solar RE Certificates which will be issued to Eligible Entities for generation of electricity based on Solar as renewable energy source, and Non-Solar certificates will be issued to Eligible Entities for generation of electricity based on renewable energy sources other than Solar. While the Regulations enable a Central Agency to be designated by the Central Electricity Regulatory Commission for registration, issuance, accounting, settlement, monitoring and repository of Certificates, a State Agency shall be designated by State Electricity Regulatory Commission to act as an agency for accreditation and recommending the renewable energy projects for registration under the proposed REC framework.

2.4 Forum of Regulators (FOR) approved model Regulations for SERCs for REC Framework

A Model Regulations for recognition of Renewable Energy Certificate (REC) mechanism as part of RPO framework at State level was approved and notified by FOR through a draft notification during October, 2009. The draft Model Regulations aim at

providing an outline for framing RPO Regulations at State level and to bring in uniformity in recognising Renewable Energy Certificate mechanism across State, which would facilitate inter-State exchange of renewable energy through a common platform at national level. Specifying separate RPO targets for solar, identifying Renewable Energy Certificates (REC) as an instrument of RPO compliance and measures on default by obligated entities etc., are the main features of this Model SERC REC Regulations. On non fulfilment of RPO by Obligated entities in any year, these Regulations provide for creation of separate fund by obligated entities of such an amount, determined on the basis of the shortfall in units of RPO and the forbearance price to be decided by the Central Commission. SERC may outline conditions for utilisation of the funds for purchase of RECs and/or addressing concerns/constraints related to renewable energy capacity addition within State. Further, provisions for carry forward of RPO targets in case of genuine difficulty in complying with renewable purchase obligation because of non availability of certificates etc., has also been provided in the Model SERC REC Regulations.

2.5 CERC Generic Tariff for RE technologies.

Clause (1) of Regulation 8 of the CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 provides that “the Commission shall determine the generic tariff on the basis of suo motu petition at least six months in advance at the beginning of each year of the Control period for renewable energy technologies for which norms have been specified under the Regulations.” As the first year of the control period has already commenced with the notification of the said Regulations with effect from 16.9.2009, the Commission in due discharge of the mandate under Regulation 8(1) of RE Regulations has determined the generic tariff of the RE projects for the first year of control period (i.e. FY 2009-10) through this order (dated December 3, 2009) based on the financial principles and technology specific parameters.

2.6 Appellate Tribunal of Electricity (ATE) Judgement and its implication on RE framework of Maharashtra for new control period (FY 2013 to FY 2014)

In some of the recent appeals filed to the ATE by various appellants viz. a) Century Rayon (Appeal No. 57 of 2009), b) Lupin Ltd (Appeal No. 113 of 2009), c) Reliance Industries Ltd (Appeal No. 121 of 2009 and 45 of 2009) and d) Jindal polyfilms (Appeal No. 56 of 2009), certain issues pertaining to the current RPO framework in Maharashtra came up. The major issues highlighted in the appeals are given as under.

- Cogeneration CPP unit should be encouraged irrespective of type of fuel, since it is argued that the mandate of Section 86(1) (e) requires promotion of both cogeneration of power and generation of power through renewable sources.
- A captive user who is not connected to the grid is not an 'obligated entity' as defined by the RPS Order dated August 16, 2006, and should not be mandated to meet any RPS obligation at all.
- The RPO Order dated August 16, 2006 was intended for Distribution companies alone. Further, the appellant, a captive user, was not invited to participate in the discussion held in the pursuance of public notice before the issuance of the RPS Order and hence it did not have any notice of its being within the purview of renewable purchase obligation under consideration by MERC.

The ATE has passed its judgement on appeals No.113 of 2009 and No. 45 and No.121 of 2009 of the appellants Lupin Ltd and Reliance Industries Ltd respectively. The ATE was inter alia, pleased to dispose off these appeals with the direction to MERC to

consider the issues raised in the appeals for the forthcoming year. The relevant extract of the said Order of ATE is reproduced as under.

“The Ld. Senior Counsel for the Appellant would submit that the Statement made by the State Commission in para 10 would suffice to redress their grievance in this Appeal, as it is undertaken by the State Commission that for the forthcoming year, this issue will be considered by the State Commission after hearing the parties through public notice and the same may be recorded.

The relevant statement made by the State Commission as pointed out by the learned Senior Counsel for the Appellant is contained in para 10 middle. It is reproduced below:-

“Moreover, the Appellant is not prejudiced in any way by the applicability of the RPS Order dated 16.8.2006. In fact, the renewable purchase obligation specified under the impugned order, have been reduced by a subsequent order dated 7th August 2009 in Case No. 104, 122 and 125 of 2008 in the matter of Petition seeking waiver of RPS under the Commission’s Order dated 16.8.2006 in Case No. 6 of 2006 and /or review thereof. The operative part in this regard contained in the order dated 7th August 2009 is as under:-

“39. Further, considering year-to-year short fall in RE capacity addition the Commission is of the view that it would not be practical to expect that such shortfall can be made good on cumulative basis by the end of FY 2009-10. Hence, the Commission believes that in pursuance of Cl. 2.6.12 of RPS Order (Case 6 of 2006), it would be most appropriate to modify the RPS percentage requirement for FY 2007-08, FY 2008-09 and FY 2009-10 to be lower of (a) RPS target as specified under Cl. 2.6.7 or (b) actual achievement of RPS target in respect of each ‘Eligible Person’.”

In view of the above statement made by the State Commission in its Counter filed in this Appeal, we deem it fit to dispose of this Appeal by recording the same and direct the State Commission to consider this aspect for the forthcoming year after the issue of public notice. Accordingly, the parties are directed to approach the State Commission in the light of this Order. With these observations this Appeal is disposed of.”

The Order of ATE for the other two appeals (Appeal No. 56 and 57 of 2009) are pending as on date.

In the wake of above issues of the appellants and the ATE Orders thereof, this discussion paper has deliberated on the related issues in detail in the subsequent sections.

In view of above, it is envisaged that various stakeholders including such Appellants shall provide necessary inputs during the regulatory process for devising RPO framework in the State of Maharashtra for the new control period (FY 2010 to FY 2016).

Chapter 3: Development of Renewable Energy in Maharashtra

3.1 Historical Developments

Maharashtra has been bestowed with significant amount of renewable energy potential comprising of variety of renewable energy sources such as wind energy, small hydel power, and biomass fuels including bagasse from sugar industries, municipal solid waste, other industrial waste, and solar energy. While solar energy constitutes largest identified energy reserve and is being harnessed through solar photovoltaic and solar thermal projects extensively, harnessing of solar energy through grid connected power generation applications is at nascent stage. The following table indicates potential of various types of RE sources (excluding solar energy) in Maharashtra vis-à-vis potential in India:

Table3.1: Renewable Energy potential in Maharashtra (MW)

Sr. No.	Source	Potential in	Potential in	% of total potential
		Country (MW)	Maharashtra (MW)	
1	Wind	45000	4584	10.2%
2	Small Hydro Power (SHP)	10324	600	5.8%
3	Biomass	16000	781	4.9%
4	Bagasse co generation	5000	1250	25.0%
5	Urban waste	1700	287	16.9%
6	Industrial waste	1700	350	20.6%
	Total	79724	7852	9.8%

(Source: Maharashtra Energy Development Agency)

As seen from the above Table, the State of Maharashtra has around 10% of the total potential of RE in the country.

Maharashtra has been bestowed with significant amount of renewable energy potential comprising of variety of renewable energy sources such as wind energy, small hydel power, and biomass fuels including bagasse from sugar industries, municipal solid waste, other industrial waste, and solar energy. While solar energy constitutes largest identified energy reserve and is being harnessed through solar photovoltaic and solar thermal projects extensively, harnessing of solar energy through grid connected power generation applications is at nascent stage. The following table indicates potential of various types of RE sources (excluding solar energy) in Maharashtra vis-à-vis potential in India:

TABLE 3: Development of Renewable Energy in Maharashtra

Sr. No.	Source	Potential in India	Potential in Maharashtra	% of total potential	Achievement (31/03/2013)
		MW	^a MW		MW
1	Wind	49,130	5,967	12.09	2,991
2	Small Hydro Power (SHP)	15,000	732	7.10	265
3	Biomass	16,881	781	4.88	170
4	Bagasse co generation	5,000	1,250	25	1,033
5	Urban waste	1,700	287	16.88	0.0
6	Industrial waste	1,700	350	20.59	22.5
	Total	89,411	9,361	11.09	4,482

(Source: Maharashtra Energy Development Agency)

As seen from the above Table, the State of Maharashtra has around 11% of the total potential of RE in the country. Due to the long-term certainty provided by the prevalent regulatory framework and several other policy initiatives by the State

Government, there has been significant development of installed capacity based on renewable energy sources, particularly wind energy, pursuant to the Tariff Orders. Maharashtra has achieved 50% of the renewable energy potential as shown in the table and chart below:-

TABLE 4: Potential Vs Achievement (Maharashtra)

Sr. No.	RE Resources	Potential in Maharashtra (MW)	Achievement (30/03/2013) (MW)	Potential Vs. Achievement (%)	11th Five Year Plan Target (MW)	11th Five Year Plan – Target Achieved (MW)
1	Wind	5,967	2,991	54.72 %	1,500	1,126
2	Small Hydro	733	265	51.70 %	100	59
3	Bagasse Co-gen	1,250	1,033	82.70 %	1,000	438
4	Biomass	781	170	21.77 %	400	167
5	MSW & Liquid waste	287	0.0	0.0	10	0
6	Industrial Waste	350	22.5	3.55 %	350	0
7	Solar PV & Solar Thermal	35-49 MW / sq.km.	39.5		0	142
	Total	8,839.63	4,601	52.20 %	3,360	1,932

[Source: MEDA]

As seen from the above Table, only around 49% of the total assessed potential of RE has been harnessed till date, indicating that there is good scope for harnessing additional RE sources.

3.2 Status of RPS achievement during current Control Period (FY 2010-11 to FY 2015-16)

The Commission has earlier specified the RPS target of 3% for FY 2006-07 with an increase of 1% per annum for subsequent years of Control Period till the target reaches 6% in FY 2009-10. The above targets were specified on the basis of renewable energy potential in the State, capacity addition projections submitted by MEDA, RE developers, submissions made by licensees and actual installed RE generation capacity in the State. The Commission notes that during this Control Period, none of the eligible persons except TPC, were able to meet the RPS targets, mainly due to the reason of actual capacity addition being far lower than the expected and required capacity addition. Therefore, it has become necessary to specify appropriate minimum purchase targets for the next Control Period along with stringent monitoring and enforcement measures, which will be achievable by all eligible persons, provided adequate efforts are put in. Further, recent developments in terms of introduction of REC mechanism to enable inter-State exchange of renewable energy should also be taken into consideration while specifying target percentage for the next Control Period.

MEDA, in its Business Plan, has projected that more than 50% of RE potential within the State shall get harnessed during the five year period from FY 2007-08 to FY 2011-12. However, during the last two years, i.e., FY 2007-08 and FY 2008-09, the actual capacity addition was far lower than the expected capacity addition. Except wind energy, no other RE technology has achieved the targets in terms of capacity addition. The actual capacity addition during FY 2007-08 was 35.7% of expected capacity addition, while in FY 2008-09, actual capacity addition further reduced to 21.2% of expected capacity addition. The source-wise expected and actual capacity addition during the last two years has been shown in the following Table:

Table 3.3: Expected vs. Actual Capacity addition (MW)

Particulars	2007-08			2008-09		
	Expected	Actual Achievement	% Achievement	Expected	Actual Achievement	% Achievement
Wind Energy	600	268.15	44.7%	600	178.08	29.7%
Small Hydro	25	4.26	17.0%	40	0.00	0.0%
Biomass Power	100	4.00	4.0%	150	43.00	28.7%
Bagasse Co-generation	100	45.36	45.4%	150	0.00	0.0%
Municipal Solid Waste	75	0.00	0.0%	100	0.00	0.0%
Solar PV	0.3	0.00	0.0%	0.5	0.00	0.0%
Total (MW)	900.30	321.77	35.7%	1040.50	221.08	21.2%

(Source: Submissions by MEDA and various Utilities before MERC)

In terms of energy generation from RE sources and meeting the RPS targets, only TPC has successfully met the RPS targets while other distribution licensees and eligible persons were far from meeting RPS targets. On year on year basis, the RE procurement increased from 2.42% during FY 2007-08 to 3.36% during FY 2008-09. However, it is worthwhile to note that there is discrepancy in the submissions made by MSEDCL in respect of actual RE procurement during FY 2007-08 in its APR Petition (2187 MU) and that submitted under Case 104 of 2008 (3081 MU). The

distribution licensee-wise RPS obligation vis-à-vis actual RE procurement during FY 2007-08 and FY 2012 is shown in the following Table:

Actual RE procurement in Maharashtra during FY 2007-08 to FY 2011-12

Licensees	2007-08		2008-09		2009-10		2010-11		2011-12	
	RPO Obligation	% Achieved								
MSEDCL	4%	3.48%	5%	4.59%	6%	5.22%	6%	5.77%	7%	7.2%
TPC	4%	4.65%	5%	5.12%	6%	2.97%	6%	4.90%	7%	6.78%
Rinfra-D	4%	0.01%	5%	0.23%	6%	2.08%	6%	6.70%	7%	6.99%
BEST	4%	0.08%	5%	0.93%	6%	4.02%	6%	4.50%	7%	4.55%
Average	4.00%	2.06%	5.00%	2.72%	6.00%	3.57%	6.00%	5.47%	7.00%	6.38%

[Source: MERC case no. 99,100,101,102 of 2012]

3.3 Key issues in RE development in Maharashtra

- o Even though the regulatory framework for different types of RE technologies has been in place for some time now, the growth has been limited to harnessing of few renewable energy sources like wind energy and bagasse cogeneration. It is to be noted that in overall renewable energy capacity of 14,914 MW in the country, wind energy alone constitutes more than 70% of capacity. Growth of wind energy may be attributed to the pre-commissioning and post-commissioning assistance provided by the equipment manufacturers to the project developers while in other cases, all these risks are undertaken by the project developer.

Therefore, the issue of risk perception for other technologies need to be suitably addressed.

- Most of the renewable energy projects are located within the area of one distribution licensee, i.e., MSEDCL, while other three distribution licensees, which cater to urban areas, have practically no renewable energy potential in their respective area of supply except municipal solid waste based generation or small solar based applications, if any. This geographical constraint is posing difficulty to other distribution licensees as most of the project developers prefer to enter into contractual agreement with MSEDCL.
- Another issue highlighted by distribution licensees is the mismatch between contracted capacity and actual generation. Some of the distribution licensees have mentioned that though they have contracted for adequate renewable energy capacity for meeting the RPS target for that year, either the renewable energy project developer could not install the project on time or actual generation was lower than the envisaged generation, due to which they were not able to meet the RPS targets. Further, it appears that the contractual measures to enforce defaults such as delay in capacity addition or failure to add capacity has failed to ensure adequate availability of RE generation despite contracts being in place.
- Non-availability of sufficient quantity of renewable energy has been a major constraint in meeting RPS targets. The RPS targets have been specified on the basis of MEDA's assessment of renewable energy potential and likely capacity addition projections, projections by RE developers, and submissions by licensees/other eligible persons. However, the actual capacity addition has been

far lower than the envisaged capacity addition. The distribution licensees have raised concerns about the renewable energy capacity addition projections mentioned in the Technical Task Force Report prepared by MEDA for implementation of RPS framework.

- The incremental trajectory for RPS targets were specified considering the renewable energy growth on annual basis, and to compel distribution licensees to take measures for entering into long-term contracts with the renewable energy generators. In view of enforcement charge mechanism stipulated under RPS Order, the distribution licensees undertook measures for procurement of renewable energy. TPC and RInfra have taken initiatives for installing renewable energy projects whereas MSEDCL and BEST have relied on procurement contracts with RE developers. Due to pro-active measures taken by TPC, it has been able to meet the RPS target as specified in the RPS Order.
- In the recent past, some of the renewable energy project developers have raised the issue of review of existing applicable tariff to different renewable energy projects, mainly related to biomass projects, and bagasse based co-generation projects. The project developers have submitted that due to recent market changes and ever increasing prices of biomass fuel, the project is no longer viable with the current prevailing tariff and therefore, applicable tariff rate should be reviewed.

Chapter 4: Renewable Energy Obligation Framework

Maharashtra has been pioneering in terms of introducing Renewable Purchase Obligation (RPO) for distribution companies. The pool based RPO mechanism was specified in 2004, under which the post-facto settlement among the distribution licensees was done on the basis of actual energy consumption vis-à-vis share of renewable energy procurement during the year. In 2006, the pool based mechanism was replaced by Renewable Purchase Specification (RPS) mechanism under which minimum purchase targets were specified for each year of the Control Period as a forward approach to encourage long term development of renewable energy in the State. The salient features of existing RPS framework have already been described in Chapter 2.

In the RPO framework for new Control Period (FY 2010-11 to FY 2015-16), the following aspects need to be discussed:

- Eligible RE sources
- Operating Period
- Applicability of RPO targets to Obligated entities
- Structure of RPO targets
- RPO targets

4.1 Eligible RE Sources

For the purpose of determination of 'RPO Percentage', generation from all types of renewable energy sources as approved by the Ministry of New and Renewable Energy (MNRE), Govt. of India need to be considered. As on date, the Commission has issued Orders in case of following technologies and generation from these technologies would qualify for meeting RPO of the licensees:

- Non-fossil fuel (including bagasse) based co-generation projects (both, qualifying and non-qualifying co-generation projects)
- Wind Energy
- Biomass based on Rankine cycle technology
- Small Hydro Power
- Municipal Solid Waste
- Solar Power

Provided that any new technology could be qualified as 'renewable', only after the Commission has approved the technology in consultation with MNRE,if necessary.

However, for the above purposes, only generation from grid-connected renewable energy generation projects shall be considered, and renewable energy generation from 'off-grid' projects or stand-alone systems shall not be considered. This is because, off-grid generation based on renewable energy sources, typically, do not have separate metering arrangements. They add to the complexity by requiring additional levels of verification. Thus, if 'off-grid' based generation is to be included as 'eligible for RPO' then, (a) independent metering arrangement will have to be put in place, and (b) elaborate verification system will have to be institutionalized. Besides, as per provisions of Section 86 (1)(e) of EA 2003, the RPO needs to be specified as percentage of the Licensees' power purchase, hence, off-grid generation/procurement by Licensee, if any, may not be included as part of RPO.

Further, generation from grid connected renewable energy generating sources with installed capacity of 250 kW and above shall be considered as 'eligible RE source'. However, generation from grid connected renewable energy sources with capacity below 250 kW shall also be considered as 'eligible RE source' for RPO compliance, provided suitable metering and communication arrangement with State Load Despatch Centre is established by such renewable energy project.

Besides, generation from existing renewable energy generation projects commissioned under earlier policy and regulatory regime shall continue to be recognised as eligible renewable energy sources for the purpose of RPO compliance over the next Control Period.

As regards inter-State purchase of renewable energy is concerned, it is observed that Section 86(1)(e) of EA 2003 empowers SERCs to promote renewable energy, however, such promotional measures have been constrained as the framework developed by SERCs is applicable within the State boundary, therefore, it is difficult to regulate the inter-State transactions of renewable energy for RPO compliance purposes. Recently, CERC has notified CERC (Terms and Conditions for determination of tariff from Renewable Energy Sources) Regulations, 2009, which would be applicable for Central Sector generating stations or inter-State generating projects. Further, NAPCC envisages national level development of renewable energy projects, which means that States, which are deficit in renewable energy can meet the targets either by purchasing renewable energy from surplus States or through the REC mechanism. Further, proposed Renewable Energy Certificate (REC)¹ mechanism is expected to address the issue of inter-State exchange of renewable energy. However, the State regulatory framework should recognise the renewable energy generated in other State, as evidenced by REC issued for such RE generation in that State, for the purpose of RPO compliance by Obligated Entities (The entities with RPO target, such as distribution companies and other entities, who are required to purchase Renewable Energy have

been referred to as ‘Obligated Entities’ in the further discussion) in other State. With the availability of framework for inter-State transactions and NAPCC requirements, the inter-State sale/purchase of renewable energy can be recognized for RPO compliance purpose.

Thus, following renewable energy sources may be considered as Eligible Sources for RPO compliance by Obligated entities for the new control period is given below.

- Non-fossil fuel (including bagasse) based co-generation projects (both, qualifying and non-qualifying co-generation projects)
- Wind Energy
- Biomass power
- Small Hydro Power, Mini Hydro, Micro Hydro
- Municipal Solid Waste
- Solar Power including rooftop PV and other small solar power
- Renewable Energy Certificate issued for RE generation outside Maharashtra for the purpose of RPO compliance by Obligated Entities within Maharashtra.

4.2 Technology specific targets or generic targets

Under the current RPS framework, no RE technology-specific target was specified, in order to facilitate balanced growth of all types of renewable energy sources in the State. The Commission, in the Discussion Paper issued before the issuance of RPS Order had

discussed various options for specifying the RPS targets as under:

Option-1: Minimum contribution for particular RE resource

Option-2: Maximum contribution limit for particular RE resource

Option-3: Tiers or resource bands within RPS

Option-4: No specific limit for each RE resource within overall RPS percentage Discussed in this report.

Considering all the options with their relative merits and demerits, the Commission specified uniform targets without referring to minimum targets or maximum limits for a particular RE source or RE technology.

While devising the RPO framework for the next Control Period, it is proposed that the Commission may continue the existing approach of specifying generic targets. The reason being resource/technology specific RPS approach increases the complexity of RPO administration, reporting and compliance procedures, increase the cost of RPO compliance and may not lead to significant gain in specifying maximum limit for a particular RE resource, in case extent of harnessing of that RE resource does not exceed 50% of available potential of that RE resource. Further, it needs to be clarified that the percentage specified for a particular RE technology shall be minimum percentage and shall not be construed as ceiling percentage.

Further, the Central Government has initiated various measures for promotion of energy generation from new renewable energy sources like solar energy and mini/micro hydel power (less than or equal to 1 MW), which are abundantly available within State and can become a major energy source in future. However, capital cost and cost of generation thereof associated with the solar projects is a major hindrance in developing large-scale solar projects.

There may be further boost in development of solar projects with additional regulatory interventions. Specifying some percentage of RPO to be met through solar energy will help in developing the market for large scale solar projects and reduction in capital cost. Therefore, it would be appropriate to fix some percentage to begin with, which may be kept as 0.25% in RPO target to be met through solar energy.

Considering all the above factors, it is proposed to specify generic target for all renewable energy technologies except for Solar PV /Solar Thermal and Mini/Micro hydro power. A percentage of RPO has been specified for Solar PV and Solar Thermal based technology and Mini/Micro hydro power. The year-wise Solar, Mini/Micro hydro power and Non-Solar RPO targets for the new control period are given in section 4.5 of this Discussion Paper.

4.3 Applicability of RPO to Obligated Entities

Under the current RPO framework, Renewable Purchase Obligation was applicable to distribution licensees, and to captive/open access consumers as per the philosophy outlined under Section 86(1)(e) of Electricity Act, 2003.

However, some stakeholders have raised the issue of applicability of RPS mechanism to open access consumers and captive users.

In this regard, Section 86(1)(e) of EA 2003 requires the percentage to specified on the basis of consumption within the area of distribution licensee rather than the consumption by distribution licensees alone, as reproduced below:

“86. (1) The State Commission shall discharge following functions, namely -

...

(e) promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of total consumption of electricity in the area of distribution licensee”. (Emphasis added)

While Section 86(1)(e) of EA2003 provides that such percentage should be applicable on the ‘consumption’ within area of distribution licensee, the intention is clearly to apply such percentage on entire consumption in the area of distribution licensee irrespective of who is supplying such energy. Further, as per Section 86 1 (e) of EA 2003, obligation to purchase renewable energy and percentage specification thereof should be applicable not only to ‘distribution licensees’ but also to all consumers including open access consumers and captive users to the extent of their consumption procured from sources other than concerned distribution licensee in whose area, such consumption takes place. The said Section provides for specification of percentage applicable on the ‘consumption’ of all ‘Persons’ within area of distribution licensee and not to procurement of energy by the distribution licensee alone. Thus, it appears that the intention of the legislature is to apply such percentage on entire consumption in the area of distribution licensee irrespective of who is supplying such energy. In view of above, it is suggested that RPO should also be applicable for captive users and open access consumers in view of the said provision.

Further it needs to be noted that Section 86(1)(e) of EA 2003 which provides legal basis for applicability of RPO has sought to apply it on ‘consumption’ of all ‘Person(s)’ irrespective of source of generation to meet such ‘consumption’ i.e. captive generating source or open access generating source or sourcing from licensee etc. The Section 86(1)(e) of EA 2003 has sought to specify such percentage for sale of electricity to all ‘Person(s)’ and not limited it to be applied to distribution licensee(s) alone. The definition of ‘Person’ as defined under Section 2(49) also covers all entities including

any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person. Besides, if Renewable Purchase Specification (RPS) obligation is levied only on distribution licensees and if eligible open access consumers are exempted from applicability of RPS then, it will not be fair to non-eligible open access consumers of the distribution licensees as the cost of renewable energy procurement is required to be borne by 'non-eligible open access consumers alone. While it is clear that renewable energy generation within the State needs to be promoted, it is equally important that the costs and benefits of such harnessing are equitably distributed amongst all concerned. Accordingly, it would only be appropriate that Open Access consumers and Captive users are also subjected to RPS regime.

While devising the RPO framework for the next Control Period, it has been proposed that the minimum RPO targets shall be applicable to all Distribution Licensees in the State of Maharashtra as well as to Open Access consumers and Captive Users within the State of Maharashtra, subject to following conditions:

(a) Any person who owns a grid connected Captive Generating Plant with installed capacity of 1 MW and above (or such other capacity as may be stipulated from time to time) and consumes electricity generated from such plant for his own use; shall be subjected to minimum percentage of RPO to the extent of his consumption met through such captive source;

However, the minimum renewable power purchase obligation shall not be applicable in case of Standby (or Emergency back-up) Captive Generating Plant facilities.

(b) Any person consuming electricity procured from conventional fossil fuel based generation through Open Access as per Section 42 (2) of the Act and subject to condition that Contract Demand for such Open Access consumer

shall not be lower than 1 MVA; shall be subjected to minimum percentage of RPO to the extent of his consumption met through such open access source;

The so referred minimum capacity may be revised by MERC from time to time through separate Order. Further, it would be worthwhile to mention that a study on the REC mechanism has already been carried out by MNRE at the national level alongwith notification of REC Regulations by Central Commission and publishing of Model REC Regulations at State level by Forum of Regulators. The REC mechanism, once put in place, will address the issue of operationalising RPO targets to captive users and open access consumers apart from distribution licensees. The REC mechanism has been described in detail in Chapter-5.

4.4 Operating period for RPO regime

The current RPS regime is co-terminus with the first MYT Control Period, i.e., it ends on March 31, 2010. The issue to be addressed here is what should be the operating period for the new RPO regime? It is well recognised that a longer tenure for the regulatory and policy framework increases the certainty as perceived by the investors and will help to accelerate the process of harnessing of renewable energy. Risk perception of the investors and developers can be mitigated with steady policy and regulatory regime and with assurance of no significant mid-course changes to various terms and conditions outlined under the framework. From off-takers' perspective as well, this shall facilitate their long term planning and procurement process.

The last RPO control period was for duration of four years from FY 2006-07 to FY 2009-10. In order to ensure long term sustainability of regulatory framework and to boost investor confidence, it would be appropriate to specify a longer tenure for the new RPO control period. In these circumstances, there are two options available for tenure for proposed RPS policy regime.

Option-1: Six years (from FY 2010-11 to FY 2015-16), which may be co-terminus with

MYT Control Period.

Option-2: Ten years (from FY 2010-11 to FY 2019-20), which may be co-terminus with NAPCC target.

The Commission is also simultaneously formulating the MYT mechanism, which shall be effective from FY 2011-12 till FY 2015-16. Though there is no direct linkage between the MYT mechanism and RE Regulations, however, for consistency in approach between conventional and renewable generation sources, it is desirable to have a concurrent period for MYT and RPO framework. Further, the cost implication of MYT Regulations should be factored in the RPO framework or vice-versa. Hence, it is proposed that the operating period for RPO regime shall be co-terminus with the Control Period under new MYT regime. The RPO framework shall be valid until March 31, 2016 (i.e., up to the year 2015-16), from the date of notification of the RPO Regulations.

4.5 Promotion of Mini/Micro hydel power projects

In order to promote Mini/Micro hydel projects (with installed capacity less than or equal to 1 MW), it is proposed that Distribution Licensee(s) shall meet at least upto 0.1% per year of its Non-Solar (other RE) RPO obligation for the period from 2010-11 to 2012-13 and at least upto 0.2% of its Non-solar (other RE) RPO obligation for the period from 2013-14 to 2015-16 by way of purchase from Mini Hydro or Micro Hydro power project.

4.6 RPO Regulatory Charges and Enforcement provision for RPO

For the current Control Period, the Commission specified enforcement charges for non-compliance of RPS targets. The enforcement mechanism is expected to serve as disincentive for the Obligated Entities for not meeting their RPS targets. Further, the Commission preferred to introduce enforcement charge in a gradual manner with one year (i.e. FY 2006-07) being allowed as transition period wherein no enforcement

charge was applicable. Accordingly, the Commission ruled that during the first year of RPS operating framework, i.e., FY 2006-07, there shall not be any charge towards enforcement. However, the Eligible Persons shall be liable to pay at the rate of Rs 5.00 per unit of shortfall in FY 2007-08, Rs 6.00 per unit of shortfall in FY 2008-09, and Rs 7.00 per unit of shortfall in FY 2009-10. However, during each year of the Control Period, all distribution licensees except TPC, were far short of meeting their RPS targets specified by the Commission. In 2008, non-compliant distribution licensees' namely MSEDCL, BEST and RInfra filed Petitions (Case Nos. 104, 122 and 125 of 2008) before the Commission for waiver of RPS targets and enforcement charges, and for review of the existing RPS mechanism.

Apart from other issues, RInfra also raised the issue of the Commission's powers to specify enforcement charges as per Electricity Act, 2003. The Commission, while passing the Order in the said matter, has clearly mentioned that the enforcement charges are well within the jurisdiction of the Commission and are intended to ensure promotion of energy generation from renewable energy sources as mandated under EA 2003. The relevant text of the Order dated August 7, 2009 is reproduced below:

“In case the “enforcement charges” were a penalty then there could not have been a quid pro quo. Nonetheless, quid pro quo is built in the Order dated 16.8.2006 in that the collections from enforcement will have to be deposited in a separate account by MEDA, and will be used to support the research and development efforts, institutional capacity building, training, public awareness related to renewable energy. This will in turn benefit the Eligible Persons. These features can never be there in any penalty. This distinguishes the “enforcement charges” from penalty. Penalty is a punishment inflicted by law for its violation. A penalty is a temporary punishment or sum of money imposed by statute to be paid as a punishment for the commission of a certain offence. Penalty is a liability composed as a punishment on a party committing a breach or contravention or

unlawful act. P. Ramanathan Aiyer's 'The Law Lexicon' (Justice YV Chandrachud) states that the words "penal" and "penalty" strictly and primarily denote punishment, whether corporal or pecuniary imposed or enforced for a crime or offence against the laws. In view of the above, there is a fallacy in the contentions raised by the Petitioners questioning the "enforcement charges" on the ground that it is a penalty.

The National Electricity Policy mandates that "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...adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources."

Section 86(4) of the EA 2003 provides as under:-

"(4) In discharge of its functions the State Commission shall be guided by the National Electricity Policy, National Electricity Plan and tariff policy published under section 3."

The "enforcement charges" specified in the Order dated 16.8.2006 is a promotional measure to give impetus to generation of electricity from renewable sources of energy.

..."

Specifying enforcement provision for RPO compliance purpose is well within the scope of the Commission, otherwise, there would be no mechanism to ensure RPO compliance by Obligated Entities. While specifying charges towards enforcement of RPO (hereinafter referred as RPO Regulatory charges), the following factors have been considered by the Commission, which is still valid for next Control Period as well:

- The levy of RPO Regulatory charge should be applicable only if the entities

under obligation do not meet their RPO requirement, for reasons solely attributable to them.

- In this context, it is noted that generation based on renewable energy sources is 'infirm' in nature and effectively dispatched as and when available. Further, availability of renewable energy resources such as biomass, wind, small hydel is dependent on several factors such as rainfall, harvesting/cropping patterns, irrigation techniques, crop residue generation and utilisation patterns, seasonal aspects such as weather conditions, etc. Hence, there could be significant variation in availability of energy from renewable energy sources during the year as compared to that estimated at the beginning of the year.
- Thus, an 'Obligated Entity' may exceed its requirement to procure RE energy in a particular year or may fall short in meeting the requirement, on account of several factors beyond its reasonable control and despite adequately contracting for such RE procurement. Under such uncontrollable circumstances, the 'Obligated Entity' should not be held responsible for failure to achieve the 'minimum percentage' obligation for RE procurement.
- At the same time, if it is established that the 'Obligated Entity' has adequately contracted for procurement of RE with RE generator or developer and RE generator/developer fails to add RE capacity or fails to supply RE due to poor operation and maintenance practices, failure to procure adequate quantities of fuel, etc., thereby failing to supply 'normative quantum of renewable energy' computed at threshold level of PLF or CUF, as the case may be, then, such 'enforcement charge levies' should also be applicable on such RE generator/developer to the extent of shortfall in supplying RE energy.
- Further, the RPO Regulatory charge, if recovered, should not be allowed as 'pass

through' expenditure under the Aggregate Revenue Requirement (ARR) of the licensees and the licensees will have to bear such costs thereof.

In the next Control Period, the immediate issue that needs to be addressed is about the quantum of RPO Regulatory charges and mechanism for levying RPO Regulatory charges to ensure adequate compliance by stakeholders. The following Enforcement mechanism has been proposed for the new control period.

- If the Obligated Entity does not fulfil the RPO target during any year and also does not purchase the required quantum of RECs, the Obligated Entity have to deposit into a separate fund, to be created and maintained by such Obligated Entity, an amount as may determine by the Commission on the basis of the shortfall in units of RPO, Regulatory Charge and the Forbearance Price decided by the Central Commission; separately in respect of solar and non-solar RPO:
- The Regulatory charges shall be equivalent to the highest applicable preferential tariff during the year for solar or non-solar RE generating sources or any other rate as may be stipulated by the Commission; Further the RPO Regulatory Charges, if recovered, shall not be allowed as pass through in the Aggregate Revenue Requirement in case the Obligated Entity is a distribution licensee.

Chapter 5: Impact of RPO on Power Purchase Cost for MSEDCL

Maharashtra State Electricity Distribution Company Limited is one of the four distribution licensee's in Maharashtra. MSEDCL is one of the biggest and state government owned distribution licensee.

Erstwhile Maharashtra State Electricity Board was looking after Generation, Transmission & Distribution of Electricity in the State of Maharashtra barring Mumbai. But with enactment of Electricity Act 2003, MSEB was unbundled into 4 Companies viz. MSEB Holding Co. Ltd., Maharashtra State Electricity Distribution Co. Ltd., Maharashtra State Power Generation Co. Ltd. and Maharashtra State Electricity Transmission Co. Ltd. on 6th June 2005.

MSEDCL has to fulfil its renewable purchase obligation by purchasing power from the renewable sources. The RPO target for the current financial year is 9%. The RPO obligation is basically for the promotion of the renewable sources of energy generation.

Because of high cost of the renewable sources of energy as compared to the conventional sources of energy. So the quantum of energy which is purchased from renewable sources of energy gets added to the power purchase cost of the licensee.

This impact should be of the range of the 3% to 9% according to Prayas Energy Group paper on the Impact of RPO on power purchase cost.

5.1 Calculation of the Impact of RPO on PPC

Cost of RE procurement is compared against the average cost of power purchase by MSEDCL. A simulation exercise is undertaken to assess the long term impact on the average cost of power purchase per unit of the licensee and the same has been presented in the following Table. Exercise is based on assumptions of demand growth, consumption requirement of MSEDCL, sources and mix of power procurement, escalation in the power procurement cost of other sources, % specification for RPO and tariff rates for RE procurement as per existing tariff orders etc.

Item	Unit	FY10-11	FY11-12	FY12-13	FY13-14	FY14-15	FY15-16	FY16-17	FY17-18	FY18-19	FY19-20	FY 20-21	FY21-22
Total Energy Requirement	MUS	85357	94967	102565	115437	144779	162008	173349	185483	198467	212359	227225	243130
PPC without RE	Rs./Unit	2.94	3.16	3.17	3.41	3.66	3.94	4.33	4.77	5.24	5.77	6.35	6.98
Cost of Power Purchase without RE	Rs. Crores	250950	300096	325131	393640	529891	638312	751293	884271	1040788	1224974	1441795	1696992
RPO Level	%	6	7	8	9	9	9	10	11	12	13	14	15
RPO Level-Solar(incl in total RPO)	%	0.25	0.25	0.25	0.5	0.5	0.5	0.75	0.75	0.75	1	1	1
Conventional Energy	MUs	80236	88319	94360	104609	131749	147427	156014	165080	174651	184753	195413	206661
Renewable energy purchase	MUS	5121	6648	8205	10828	13030	14581	17335	20403	23816	27607	31811	36470
>Non-Solar	MUS	5109	6631	8185	10774	12965	14508	17205	20250	23637	27331	31493	36105
>Solar	MUS	13	17	21	54	65	73	130	153	179	276	318	365
RE Tariff	Rs./Unit	4.11	3.88	4.52	4.88	5.27	5.69	6.15	6.64	7.17	7.75	8.37	9.04
Conv. Energy Purchase Cost	Rs. crores	235893	279089	299121	356716	482201	580863	676163	787002	915893	1065728	1239943	1442443
RE purchase Cost	Rs. Crores	21049	25793	37088	52842	68669	82964	106609	135518	170841	213876	266167	329552
Total PPC	Rs. Crores	256942	304882	336208	409558	550870	663828	782773	922519	1086734	1279603	1506110	1771996
Per unit cost of power	Rs./Unit	3.01	3.21	3.28	3.55	3.80	4.10	4.52	4.97	5.48	6.03	6.63	7.29
Difference in PPC	Rs./Unit	0.07	0.05	0.11	0.14	0.14	0.16	0.18	0.21	0.23	0.26	0.28	0.31
%age difference in PPC	%	2.39	1.59	3.41	4.04	3.96	4.00	4.19	4.33	4.41	4.46	4.46	4.42

5.3 Assumptions

1. The extra quantum of renewable power which MSEDCL has to procure during the FY2013-14 as ordered by the MERC in MERC Case no. 102 of 2012 has been considered in this model.
2. The energy requirements are taken from studying the ARR petition filed by MSEDCL to MERC.
3. The energy requirement for the FY 16 to FY 22 is taken from analysing the past trend of the growth in energy requirement. Then, it comes out to be 10% and the energy requirement is escalated by 10%.
4. The power purchase cost of the conventional sources is taken from ARR and True-Up petitions.
5. The power purchase cost is escalated by 8% from FY 16 to FY 22.
6. The RPO targets are taken from the MERC REC RPO regulations 2010.

5.4 Conclusion

1. The impact of RPO on PPC comes out to be in the range of 2.5% to 4% which is acceptable by MERC.
2. This impact is also in line with Prayas Energy group Paper which states the impact to be in the range of 3% to 7 %.

Chapter 6: Recommendations

Maharashtra has a large potential for electricity generation from renewable but the current exploitation is only about 50%. So there are some of the areas where more attention has to be given.

- The RPO should be specified in parallel to National Electricity Policy and the targets of the NAPCC i.e. 15 share of RE in the energy mix by the year 2020. So the RPO targets should also increase progressively as envisaged in the National Electricity Policy. The increase should be as much as 1% every year.
- Off-grid power plant should be promoted in case of no supply or poor quality supply in particular area.
- Policy for the Roof top solar should be formulated as the falling rates of electricity generated from solar projects have caused a lot of excitement.

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