Discussion Paper

On

Development of

Renewable Energy Framework for Maharashtra

For

New Control Period (FY 2010-11 to FY 2015-16)

Maharashtra Electricity Regulatory Commission

March 2010

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Abbreviation

ACOS	Average Cost of Supply
APERC	Andhra Pradesh Electricity Regulatory Commission
BEST	Brihanmumbai Electric Supply and Transport Undertaking
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CERC	Central Electricity Regulatory Commission
CSERC	Chhattisgarh State 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
KERC	Karnataka Electricity Regulatory Commission
KSERC	Kerala State Electricity Regulatory Commission
kWh	Kilo Watt Hour
MEDA	Maharashtra Energy Development Agency
MERC	Maharashtra Electricity Regulatory Commission
MNRE	Ministry of New and Renewable Energy
MPECS	Mula Pravara Electric Co-operative Society
MSEDCL	Maharashtra State Electricity Distribution Company Limited
MSETCL	Maharashtra State Electricity Transmission Company Limited
MSW	Municipal Solid Waste
MU	Million Units
MW	Mega Watt
MYT	Multi Year Tariff
NAPCC	National Action Plan for Climate Change
NEP	National Electricity Policy
PPA	Power Purchase Agreement
RE	Renewable Energy
REC	Renewable Energy Certificate
RERC	Rajasthan Electricity Regulatory Commission
RInfra	Reliance Infrastructure Ltd
RPO	Renewable Purchase Obligation

RPS	Renewable Purchase Specification
Rs	Rupees
TP	Tariff Policy
TPC	The Tata Power Company Limited
SERC	State Electricity Regulatory Commission
SHP	Small Hydro Projects
SLDC	State Load Despatch Centre
STU	State Transmission Utility
UNFCCC	United Nation Framework Convention on Climate Change

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.

Approach for RE framework for new Control Period (FY 2010-11 to FY 2015-16)

In this Discussion Paper, all the aspects relevant for growth of renewable energy have been discussed, as listed below:

- Legal and Policy framework
- Renewable Energy developments in Maharashtra
- Renewable Purchase Obligation framework
- Renewable Energy Pricing framework
- Grid Connectivity framework
- Monitoring and implementation framework

2 Legal and Policy Framework for Renewable Energy

2.1 Legal Framework

2.1.1 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 sources.

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".*

2.1.2 *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)***

2.1.3 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.

2.2 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) <u>Non-fossil fuel based cogeneration projects</u>

- 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) <u>Solar Power Projects</u>

- 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) <u>Renewable Purchase Obligation (RPO) Order</u>

- 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) <u>Renewable Purchase Specification (RPS) Order</u>

- 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).

2.3 Recent Regulatory and Policy Developments

2.3.1 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 nay 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 (DMRPS or SERC specified).* ***Appropriate authorities may also issue certificates that procure renewables based power in excess of the national standard, Such certificates may be tradable, to***

enable 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)***

2.3.2 *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.

2.3.3 *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).

2.3.4 *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.

2.3.5 *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.

2.3.6 *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.

2.4 Appellate Tribunal of Electricity (ATE) Judgement and its implication on RE framework of Maharashtra for new control period (FY 2010 to FY 2011)

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 sunder:-

"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).

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 Country	Potential in Maharashtra	% of total potential
		(MW)	(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.

Due to the long-term certainty provided by the prevalent regulatory framework and several other policy initiatives by State Government, there has been significant development of installed capacity based on renewable energy sources, particularly wind energy, pursuant to the Tariff Orders, as depicted in the following Table:

Table 3.2: Renewable Energy installed capacity in Maharashtra (MW)

Sr. No.	Source	Potential in Maharashtra	Achievement (31st March, 2009)	Potential Vs. Achievement
		(MW)	(MW)	
1	Wind	4584	1948.8	42.5%
2	Small Hydro Power (SHP)	600	211.3	35.2%
3	Biomass	781	95.0	12.2%

Sr. No.	Source	Potential in Maharashtra	Achievement (31st March, 2009)	Potential Vs. Achievement
		(MW)	(MW)	
4	Bagasse co generation	1250	262.0	21.0%
5	Urban waste	287	0.0	0.0%
6	Industrial waste	350	6.1	1.8%
	Total	**7852**	**2523.1**	**32.1%**

(Source: Maharashtra Energy Development Agency)

As seen from the above Table, only around 32% 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 2006-07 to FY 2009-10)

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 alongwith 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 Utilties 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 2008-09 is shown in the following Table:

Table 3.4: RPS obligation vis-à-vis actual RE procurement during FY 2007-08

Licensees	FY 2007-08						
	Energy Input	RPS Obligation		MSEDCL submissions in APR Petition		MSEDCL submission under Case 104 of 2008	
				RE procurement	% Achievement	RE procurement	% Achievement
	(MU)	%	(MU)	(MU)	%	(MU)	%
MSEDCL	78734.00	4.0%	3149.36	2187.00	2.78	3081.53*	4.11*
BEST	4608.38	4.0%	184.34	3.67	0.08	3.67	0.08
TPC	2686.83	4.0%	107.47	125.08	4.66	125.08	4.66
R Infra	9207.57	4.0%	368.30	2.24	0.02	2.24	0.02
MPECS	601.02	4.0%	24.04	0.00	0.00	0.00	0.00
Total	**95837.80**	**4.0%**	**3833.51**	**2317.99**	**2.42**	**3212.52**	**3.35**

(Source: APR Order for FY 2008-09 of respective Utilities and Petitions submitted by Utilities)

*(*the figures include third party sale also and the achieved percentage is derived as a percent of total consumption of 74873 MU)*

Table 3.5: RPS obligation vis-à-vis actual RE procurement during FY 2008-09

Licensees	FY 2008-09				
	Energy Input	RPS Obligation		RE procurement	% achieved
	(MUs)	%	(MUs)	(MUs)	
MSEDCL	80446.00	5.0%	4022.30	2994.00	3.72%
BEST	4797.50	5.0%	239.88	59.29	1.24%
TPC	2651.47	5.0%	132.57	156.34	5.9%
R Infra	9513.57	5.0%	475.68	63.76	0.67%
MPECS					
Total	**97408.54**	**5.0%**	**4870.43**	**3273.39**	**3.36%**

(Source: APR Order for FY 2008-09 of respective Utilities)

3.3 Key issues in RE development in Maharashtra

- 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.

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

[1] Discussed in Chapter-5

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 RPO assessment for new Control Period (FY 2010-11 to FY 2015-16)

National Action Plan for Climate Change (NAPCC) issued by Prime Minister of India envisages minimum 5% of RE procurement target for FY 2009-10, which is to be increased by 1% for next 10 years. SERCs may set higher percentages than this minimum at each point in time. Therefore, considering these targets, minimum renewable purchase obligation for next Control Period as per NAPCC may be as follows:

Table 4.1: RPO targets as per NAPPC

S. No.	Year	Minimum Renewable Purchase Obligation
1.	2010-11	6%
2.	2011-12	7%
3.	2012-13	8%
4.	2013-14	9%
5.	2014-15	10%
6.	2015-16	11%

(Source: NAPCC)

However, renewable energy sources are not evenly distributed across the States, therefore, availability of RE sources in the State needs to be factored in while specifying RPO targets, as envisaged under Tariff Policy. Clause 6.4 of Tariff Policy requires SERCs to specify minimum percentage of renewable energy after taking into account the availability of renewable energy in the region and its impact on retail tariff. The relevant text of Clause 6.4 is reproduced below:

> *"(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**." **(Emphasis added)***

Therefore, it is necessary to ascertain the renewable energy potential vis-à-vis achievable capacity addition before specifying RPO targets. As per MNRE estimates, the State of Maharashtra has total renewable energy potential of 7852 MW while MEDA has estimated

RE potential of approximately 10031 MW. The source-wise renewable energy potential as estimated by MNRE and MEDA is shown in the following Table:

Table 4.2: Renewable Energy potential assessment by MNRE and MEDA

Sr. No.	Source	Potential in the State as per MNRE	Potential in the State as per MEDA
		(MW)	(MW)
1.	Wind	4584	6500
2.	Small Hydro	600	600
3.	Biomass	781	781
4.	Bagasse co generation	1250	1250
5.	Urban waste	287	400
6.	Industrial waste	350	500
	Total	**7852**	**10031**

(Source: MEDA submission)

The renewable energy capacity installation in the State has been much lower than that envisaged, during the last two years. As shown in Table 3.3, the RE capacity addition during FY 2007-08 was 321.77 MW against the expected capacity addition of 900 MW while in FY 2008-09, the capacity addition was 221.08 MW against the expected capacity addition of 1040.50 MW.

On overall basis, the State achieved renewable purchase of 2.42% and 3.36% of total energy input during FY 2007-08 and FY 2008-09, respectively.

As a conservative approach, it may be appropriate to consider that only 50% of the RE capacity addition projected in Technical Task Force Report prepared by MEDA will take place on year-on-year basis. Beyond FY 2011-12, it has been assumed that capacity addition shall take place at the same level as that during FY 2011-12. Accordingly, the projected RE capacity addition during next Control Period is shown in the following Table:

Table 4.3: Projected Renewable Energy Capacity addition in next five years

S. No.	Source	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
1.	Wind	300	300	300	300	300	300
2.	Biomass	50	25	25	25	25	25
3.	Bagasse Cogeneration	100	50	50	50	50	50
4.	Municipal Solid Waste	0	0	0	0	0	0
5.	Industrial Waste	50	100	100	100	100	100
6.	Small Hydro	10	10	10	10	10	10
7.	Solar Thermal, Solar PV and others	50	50	50	50	50	50
	Total	**560**	**535**	**535**	**535**	**535**	**535**

(Source : MEDA Business Plan and ABPS workings)

On the basis of capacity utilisation factor, auxiliary consumption norms and transformation losses approved by the Commission in the respective technology specific Orders, the RE availability during next five-year period has been computed. Further, energy requirement for next five years has been considered as per long-term forecast indicated in the 17th Electric Power Survey (EPS) published by Central Electricity Authority. The energy requirement vis-à-vis RE availability has been shown in the following Table:

Table 4.4: Renewable Energy availability during next five years

	RE Availability	Energy requirement	RE avail. as a percentage of energy requirement
Year	**MU**	**MU**	**%**
2010-11	7193.3	117918.0	6.1%
2011-12	9033.6	125661.0	7.2%
2012-13	10874.0	133049.9	8.2%
2013-14	12714.3	140873.2	9.0%
2014-15	14554.7	149156.5	9.8%
2015-16	16210.0	160000.0	10.1%

(Source : ABPS workings)

On the basis of above analysis, year-wise RPO targets for next Control Period of five years may be as follows:

Table 4.5: Proposed Year wise RPO target for Next Control Period

S. No.	Year	Minimum Renewable Purchase Obligation
1.	2010-11	6%
2.	2011-12	7%
3.	2012-13	8%
4.	2013-14	9%
5.	2014-15	10%
6.	2015-16	10%

Thus, after considering a portion of the Solar specific RPO targets to be met through purchase of Solar energy sources as discussed in section 4.2, the following Solar and Non-Solar RPO target percentages has been proposed for the new control period, starting from March 31, 2010.

Year	Minimum Quantum of purchase (in %) from renewable energy sources (in terms of energy equivalent in kWh)		
	Solar	Non-Solar (other RE)	Total
2010-11	0.25%	5.75%	6.0%
2011-12	0.25%	6.75%	7.0%
2012-13	0.50%	7.50%	8.0%
2013-14	0.75%	8.25%	9.0%
2014-15	1.00%	9.00%	10.0%
2015-16	1.00%	9.00%	10.0%

Promotion of Mini/Mico 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 dis-incentive 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 a '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;
- Besides, the fund so created shall be utilised, as may be directed by the Commission

5 Renewable Energy Certificate Mechanism for Maharashtra

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 against current level of around 3.5%. Further, NAPCC envisages that such target will increase by 1% for the next 10 years, thus, NAPCC envisages renewable energy to constitute approximately 15% of the energy mix of India by the year 2020. This would require a quantum jump in deployment of renewable energy across the country. Strong policy measures and a proactive regulatory framework and innovative financing instruments would be required, if the desired level of penetration of renewable energy is to be achieved. 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.

Accordingly, **Ministry of New and Renewable Energy (MNRE)** engaged **ABPS Infrastructure Advisory Pvt. Ltd.** (ABPS Infra) to develop the 'Conceptual Framework for Proposed REC Mechanism in India'. The national level REC mechanism was developed by studying the existing REC schemes prevailing in various countries, their applicability and relevance with respect to India and her States. Further, the REC mechanism has also been deliberated at FOR - Task Force for Renewable Energy Certificate mechanism and their view point also has been carefully considered while finalising the scheme of REC mechanism for India. This Chapter presents the conceptual framework for REC Mechanism in Maharashtra.

5.1 Drivers for REC Mechanism in Maharashtra

The EA 2003 stimulated the development of RE based power generation by mandating **SERCs** with the function of RE promotion within the State. Under EA 2003, the SERCs set targets for purchase from renewable energy sources. This target is termed as Renewable Purchase Obligation (RPO) or Renewable Purchase Specification (RPS).

In pursuance of Section 86(1)(e) of EA 2003, MERC issued the RPS Order in 2006 to stimulate RE based power generation. Although Maharashtra is abundantly gifted with variety of renewable energy (RE) sources, the State has been finding it difficult to achieve its RPS target. This can be seen from the following Table, which summarises RPS compliance levels of obligated entities in Maharashtra after issuance of RPS Order:

Table 5.1: Review of RPO Compliance of Utilities in Maharashtra

Utility	Year	RPO Target	APR Petition	APR Order (Approved)
			RPS achieved	RPS achieved
		%	%	%
MSEDCL	FY 2006-07	3%	2.47%	2.47%
	FY 2007-08	4%	2.78%	2.78%
	FY 2008-09	5%	3.78%	3.45%
TPC-D	FY 2006-07	3%	0.41%	3.47%
	FY 2007-08	4%	4.66%	4.65%
	FY 2008-09	5%	5.90%	5.90%
RInfra-D	FY 2006-07	3%	0.00%	0.00%
	FY 2007-08	4%	0.02%	0.02%
	FY 2008-09	5%	0.67%	0.67%
BEST	FY 2006-07	3%	0.00%	0.00%
	FY 2007-08	4%	0.08%	0.08%
	FY 2008-09	5%	1.24%	1.24%

(Source: Tariff Orders of respective Utilities)

(Note: The figures of FY 2006-07 and FY 2007-08 shows the actual compliance while FY 2008-09 are based on the projections made by respective Utilities)

Further, the site specific nature of RE power generation has imposed limitations on RE purchase even within the State. This is apparent from the consolidation of large number of RE projects in the area of MSEDCL. This has been also projected as one of the concerns by the obligated entities, which could not comply with their RPO target.

While one of the Utilities in the State, viz., TPC, has been meeting its individual RPS targets, the other licensees have been continuously seeking waiver from RPS target or exemption from levy of enforcement charge. Thus, in current scenario, in spite of having almost 10% of nation's total identified RE potential, the RE growth in Maharashtra has certain limitations due to State specific development issues.

The issues associated with RPO compliance in various States are somewhat similar in nature. Existing legal framework under EA 2003 puts responsibility on SERCs for promotion of renewable energy. However, the Regulations developed by the SERCs differ from each other on many counts. Further, these Regulations do not recognize purchase of renewable energy from outside the State for the purpose of fulfilment of RPO target set by the SERC for the distribution Utility in the State. The requirement of scheduling and higher long-term

open access charges have been posing major barriers for States having abundant RE to undertake inter-State sale of their surplus RE to the States, which do not have sufficient RE based power. Consequently, the States with lower RE potential have to keep their RPO target at a lower level. In addition, the unit cost of the RE based non-firm power is higher than that of the conventional power sources in some cases particularly with old depreciated plants using domestic coal at administered prices. As a result, RE abundant States have no motivation to produce RE based power higher than that required to satisfy the RPO mandate within the State. On the other hand, RE scarce States are not able to procure RE generation from other States. In case, inter-State exchange of renewable energy through REC is enabled, it would provide a major boost not only for growth of renewable energy within the country but also provide multiple options to obligated entities for meeting their RPO targets.

5.2 Objectives for REC Mechanism in Maharashtra

A mechanism that will enable and recognize inter-State RE transactions will facilitate for further promotion and development of RE sources in Maharashtra. Such a mechanism will also enable all the SERCs to raise their States' RPO targets even if necessary resources are not available in their own State. In case of Maharashtra, the following primary objectives have been identified for REC mechanism:

- Effective implementation of RPO mechanism in Maharashtra
- Increased flexibility for participants to carry out RE transactions
- Overcoming geographical constraints to harness available RE sources
- Reduce transaction costs for RE transactions
- Create competition among different RE technologies
- Development of all encompassing incentive mechanism
- Reduce risks for local distribution licensee.

5.3 Approach and Methodology

Renewable Energy Certificate (REC) mechanism is a market-based instrument to promote renewable energy and facilitate fulfilment of renewable energy purchase obligations amongst various stakeholders. RECs have been used extensively as a successful market based policy instrument to promote renewable energy in many countries, such as Australia, Japan, US, Netherlands, Denmark and UK. However, these schemes vary in detail and need to be customized for local legislations and market situations. Further, federal structure of governance as found in India and electricity being part of the concurrent list poses unique

challenges for development of such scheme. Accordingly, ABPS Infra, while assisting MNRE, recognised the involvement of various stakeholders such as State Electricity Regulatory Commissions, State Utilities, RE developers, State Nodal Agencies, etc., in the development and implementation of REC Mechanism.

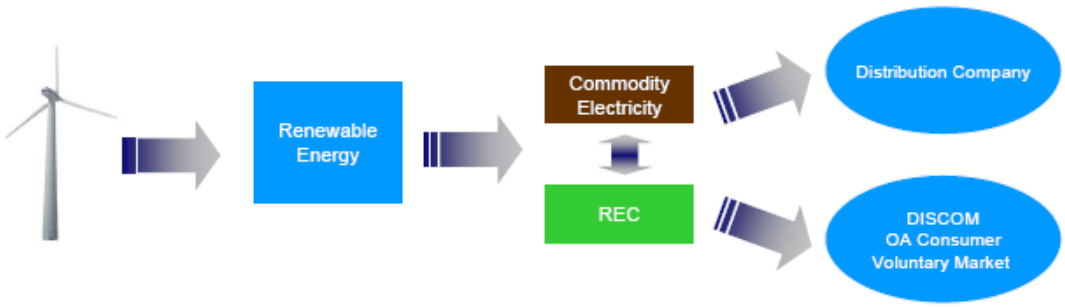
Further, the REC approach was presented to the Forum of Regulators and subsequently before Task Force constituted by FOR on REC mechanism. The detailed deliberations and suggestions made during FOR meeting held at Chennai on January 30, 2009 and Task Force meeting held at Delhi on March 2, 2009 have also been taken into consideration while finalising the proposed REC mechanism. Hence, it is envisaged that participation of Maharashtra in national level common REC mechanism, developed by MNRE/FOR, will help the State to comply with its RPO target. Also, considering the State's identified and unexplored RE potential, such participation is more likely to fetch benefits in terms of increased investments in State's RE sector.

5.4 Overview of REC Mechanism

Internationally, purchase of REC is deemed as purchase of power generated from RE sources. It is acknowledged that renewable energy generation entails production of certain environmental attributes apart from electricity generation *per se*. Thus, RE generator can sell two different products on account of renewable energy generation. These products are the electricity and the environmental attributes associated in the form of RE Certificate. It has been proposed to adopt the same philosophy for REC mechanism in India.

The schematic in Figure 5.1 presents the concept of REC mechanism and also represents the revenue model for the RE generator in the context of REC mechanism.

Figure 5.1: Concept of REC mechanism



In the proposed mechanism, one REC will be issued to the RE generator for one MWh electrical energy fed into the grid. The RE generator may sell electricity to the distribution company and associated RECs to the same distribution company or to any other Obligated Entity. The RE generators may sell RECs to the entities with RPO target in their State or outside their State. The purchase of RECs will be deemed as a purchase of power generated from renewable sources and accordingly will be allowed for compliance of RPO target. The REC mechanism will enable Obligated Entities in any State to procure RECs generated in any of the States in India and utilise the same to satisfy its RPO target.

Thus, REC mechanism will address the issues of scarcity of RE sources in some of the States, which currently have negligible RPO targets in view of the limited RE potential in the State. In addition, in RE rich States, the REC mechanism will reduce the risks for Obligated Entities for continued procurement of renewable power beyond their RPO targets.

Important features of REC mechanism

1. REC mechanism is ***NOT*** an incentive scheme. Rather, it will enable sale and purchase of renewable component across the State boundaries.
2. REC mechanism will co-exist with all current incentive based schemes, since most of these schemes are based on certification of generation.
3. RE Certificate will not represent any fiscal attribute such as 'Accelerated Depreciation', hence, it will be different than Production Tax Credits.
4. Though RECs represent environmental attribute, it will not be related to carbon credits. These two mechanisms will operate independent of each other.

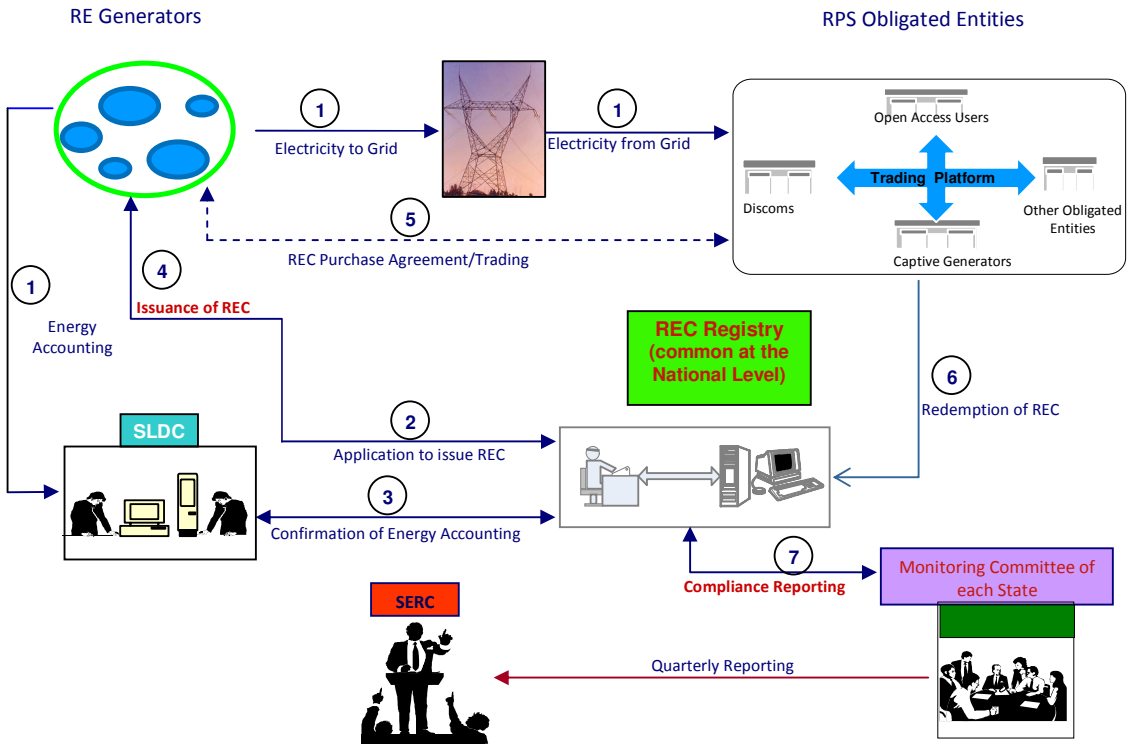
5.5 Overview of Proposed Operational Framework for REC Mechanism

The operational scheme for the proposed REC Mechanism has been developed taking into consideration experiences of prevalent RE based tradable certificate schemes in countries such as United Kingdom, Australia, etc. Although all the operational frameworks are similar in principle, the countries have customized their operational schemes to comply with their prevalent legal and regulatory framework. The operational framework for India as presented below has also been customized to comply with existing legal and regulatory framework in India.

The schematic in Figure 5.2 represents a flow diagram for various processes involved in the REC mechanism. The numbers indicate the chronological sequence of seven identified key

processes. This operating framework needs to be put in place in various States, which will enable implementation of the developed REC mechanism at the national level.

Figure 5.2: Schematic of Operational Framework for REC Mechanism



The operational framework depicted above does not envisage any major modification to the existing arrangements for renewable energy procurement. The proposed framework entails appointment of an agency at national level to facilitate the registration of eligible RE generators, issuance of RECs and maintenance of record of procurement of RECs by Obligated Entities.

The identified seven key processes can be elaborated as under:

Step 1: Electricity Generation and Feeding to the Grid

The electricity generated in RE project is injected into the grid. This electricity is consumed in real time by load prevalent in the system, which in turn is accounted against the consumption by the entities which had contract with that particular RE project. The metering of quantum of electricity injected into the grid and energy accounting will be done by the State Load Despatch Centre (SLDC).

Step 2: Request for issuance of REC

The RE Generator will send a request to the REC Issuance Registry (i.e. Central Agency) to issue the RE certificates equivalent to the amount of electricity injected into the grid and as certified by the SLDC.

Step 3A: Confirmation of Electricity Generation

The REC Registry and SLDC shall establish the procedure for exchange of information about actual electricity generated by registered RE projects on regular basis. The SLDC shall submit the report for the energy accounts of RE projects to the Central Agency, as per established procedures on regular basis.

Step 3B: RE Generator Accreditation and Registration

The State Agency shall provide its report to the Central Agency for accreditation and recommending the RE project for registration. The RE projects will have to be accredited with State Agency and will also have to be registered with Central Agency.

Step 4: Creation and Issuance of RECs

Referring to the generation report submitted by SLDC and State Agency, the REC Registry (Central Agency) will create and issue appropriate number of RECs to the concerned RE Generator (Eligible Entity).

Step 5: REC Sale by RE Generator (Eligible Entity)

Once the RECs are issued to the RE Generator (Eligible Entity), sale/purchase of RECs amongst various RE Generators and Obligated entities is proposed to be undertaken only through Power Exchange operational under the guidance of CERC.

Step 6: Surrender/Redeeming of RECs

The Obligated Entities can procure the RECs over the Exchange Platform and need to surrender the RECs to the SERCs to meet their RPS obligation. This will facilitate convenient and effective mechanism for ensuring the RPO compliance by the obligated entities. REC Registry shall maintain record of RECs issued and RECs received for redemption on regular basis.

Step 7: Compliance Reporting

It is envisaged that the Central Commission in consultation with the National level Registry (i.e. Central Agency) may appoint from time to time Compliance Auditors to inquire into and report on the compliance of REC Regulations by the person applying for registration, or on the compliance by the renewable energy generators in regard to the eligibility of the Certificates and all matters connected thereto.

Further, REC registry will prepare a State-specific and Obligated Entity Specific REC Procurement report on the basis of the RECs redeemed by each of the Obligated Entities and send it to the State level Monitoring Committee. In addition, the report will also provide the details of RECs issued to each of the RE generators in that State. Further, State level Monitoring Committee will verify the information provided in the REC Procurement report and provide the summary of status of RPS compliance of individual obligated entities in its State to the SERC on quarterly basis.

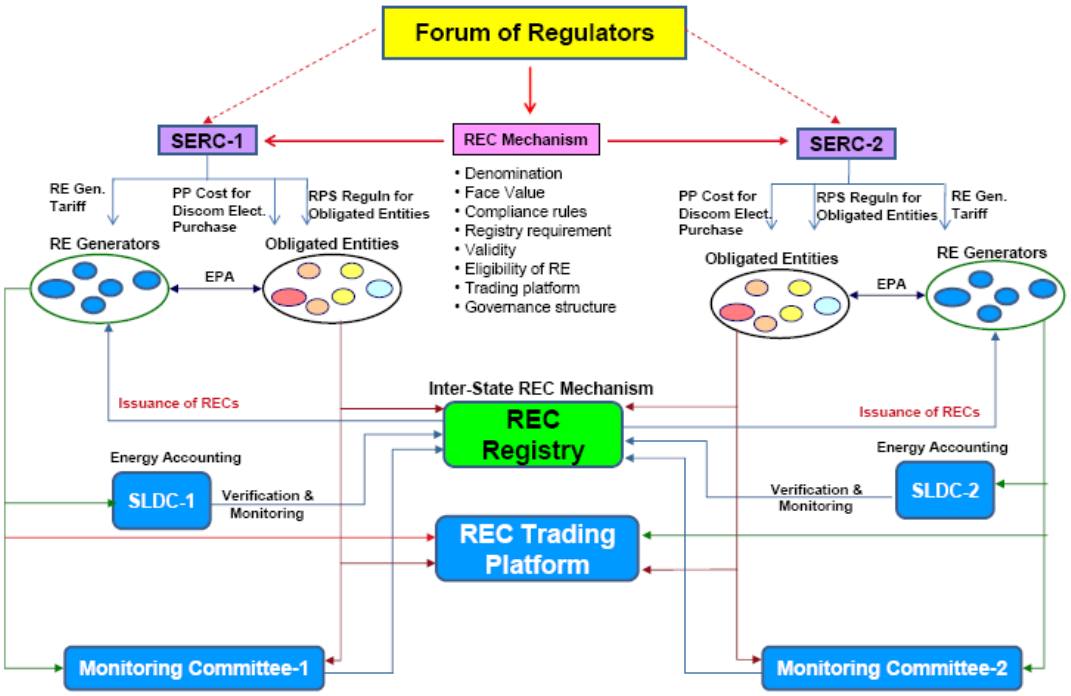
As depicted from the schematic in Figure (5.2), the State Load Despatch Centres (SLDC) and proposed new institutions such as National level REC Registry and State level Monitoring Committees will play a pivotal role in day-to-day operation of REC mechanism. The success of the proposed REC mechanism will depend on adoption of precise definition of the roles and responsibilities of these institutions, adoption of the appropriate governance structures and capacity building to undertake defined roles and responsibilities.

The above framework can be operationalized using existing State level institutions, except that the State level Monitoring Committee can be newly established or an existing institution can be identified to carry out its tasks. Here, it may be noted that the REC registry and REC Exchange platform will be common at the national level.

5.6 Institutional Framework for the Proposed REC Mechanism

The schematic diagram in Figure 5.3 below presents the institutional framework for implementation of the proposed REC mechanism.

Figure 5.3: REC Mechanism: Institutional Framework at National Level



For successful implementation of the proposed REC mechanism, regulatory oversight through Forum of Regulators (FOR), various State Electricity Regulatory Commissions (SERCs) and Central Electricity Regulatory Commission (CERC) will be important. It is envisaged that Forum of Regulators shall perform an important task of development of harmonized Regulations for implementation of REC mechanism across the States.

5.7 Pricing Options for Electricity and REC components

The REC mechanism entails pricing of two components, namely, electricity component and RE component representing environmental attributes of RE generation. There are multiple options for pricing of 'electricity component', such as market based approach, UI price linked approach, average power purchase cost of utility approach, and normative RE feed-in tariff linked approach, etc. The merits and de-merits of various approaches have been discussed in detail under Chapter-7.

Further, REC pricing mechanism across the States in India needs to address unique situation where electricity market is still governed/regulated to a great extent and the preferential feed-in tariff mechanism will have to continue as per provisions under Tariff Policy. Under the circumstances, REC price will have to be determined on notional basis,

however, the same could be discovered through market mechanism based on volume and exchange of RECs.

Based on deliberations covered under Chapter-7, most feasible option for RE pricing is to link the electricity component with average power purchase cost of host utility, and link REC component with notional fixed price. Further, it is important to focus on the basic purpose of introduction of REC mechanism in India, which is to facilitate the inter-State exchange/transactions of RE so that all the States will be able to meet the long term RPS target specified under NAPCC. This purpose distinguishes REC mechanism proposed for India from that in most of the other countries, which have REC mechanism as an incentive mechanism. Therefore, it is proposed that the effective electricity component prices shall be equivalent to average power purchase cost of the host Utility.

REC Component Price	**= Market based pricing**
Electricity component Price	**= Average power purchase cost of Host Utility**

The suggested approach seems to be the most feasible solution in the present electricity market scenario. However, with the progressive development of the electricity sector, the pricing methodologies for Electricity component and REC component need to be reviewed at periodic intervals. The FOR Task Force on REC has supported the proposed approach for pricing of electricity component and REC component.

5.8 Solar REC

Since it is proposed in this Discussion paper to have Solar specific RPO targets, it is also proposed to have separate RECs, specific to Solar Energy generation, for fulfilment of Solar specific RPO targets by the Obligated Entities. Moreover, the recently issued Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 and the FOR approved SERC (Renewable Purchase Obligation and its compliance) Regulations, 2009, provides for separate RECs namely Solar REC and Non Solar REC also mandates that the obligation to purchase electricity from generation based on solar as renewable energy source can be fulfilled by purchase of solar certificates only, and the obligation to purchase electricity from generation based on renewable energy other than solar can be fulfilled by purchase of non-solar certificates.

5.9 Key Design Parameters for REC Mechanism

Apart from the pricing aspect, several other key design parameters as mentioned below have been evaluated for development of REC mechanism in the Indian context.

- **Categories of Certificates:** As discussed in the previous section, there shall be two categories of certificates, viz., solar certificates issued to eligible entities for generation of electricity based on solar as renewable energy source, and non-solar certificates issued to eligible entities for generation of electricity based on renewable energy sources other than solar.

- **Eligible RE sources and technologies**: Renewable Energy Sources such as Small Hydro, Wind, Biomass, Bio-Fuel Cogeneration, Urban or Municipal Waste, Solar including its integration with the Combined Cycle, and such other sources as recognised and approved by MNRE. Further, there shall be two categories of RECs, one for generation based on Solar technology and another for all other (non-solar) RE technologies.

- **Eligible RE generator/Project:** Considering the current status of infrastructure availability, it will be appropriate to focus and give priority to grid-interactive RE technologies only and based on the status after a few years, the off-grid RE technologies may be included. This will enable the development of grid-interactive RE technologies up to commercial maturity and then such mature technologies can easily be transferred to the off-grid RE projects. Therefore, it is proposed that grid connected RE projects with 250 kW and above shall be eligible. The FOR Task Force has also concurred with this suggestion and has recommended that the grid connected renewable energy generators of at least 250 kW should be allowed to participate in the REC Mechanism. Existing RE projects have already been covered under particular tariff and regulatory regime. Further, the long term contracts for the same are already put in place. Hence, it will not be appropriate to subject existing RE projects to be part of REC mechanism at this stage. Therefore, it is suggested that existing projects may be allowed to participate in REC scheme after the expiry of their existing PPA.

  Accordingly, all Grid connected generating companies which have obtained accreditation from state agencies and which do not have power purchase agreement

to sell electricity at a preferential tariff determined by Appropriate Commission and sell electricity to the distribution licensee of the area in which generating company is located, at a price not exceeding the pooled cost of power purchase of such distribution licensees or to any other licensee or to an open access consumer at a mutually agreed price or through power exchange at market determined price shall be eligible for receiving renewable energy certificates.

- **Obligated Entities:** It is recommended that distribution licensees, captive users and open access consumers should be considered as Obligated Entities for the purpose of RPO target under REC mechanism, in accordance with provisions of Section 86(1)(e) of EA 2003.

- **REC Issuing Authority:** A national level REC Registry has been proposed to be created and CERC may formulate rules for creation of such national level entity in accordance with the harmonized policies to be developed by FOR for operation of REC mechanism at national level.

  Central Agency as directed by Central Electricity Regulatory Commission shall issue the REC upon ascertaining corresponding generation/energy accounting for the accredited RE generating stations.

- **Creation and Redemption of RE Certificate:** In the Indian context, it is proposed that RECs will be issued for the RE generation injected into the grid and duly accounted in the Energy Accounting System as per the Indian Electricity Grid Code or the State Grid Code. It is envisaged that the RECs shall be issued only in 'electronic form' to avoid issues in paperwork and also in view of the fact that the security/verification protocols, etc., can be easily implemented in case of 'electronic form'. RECs shall be redeemed when RECs are presented to common REC Registry for redemption by the owner of RECs or when shelf life of the RECs expires. Whether redeemed specifically or expired due to expiry of life, owner of the RECs shall be allowed to account these RECs for compliance with the RPO.

- **Sale/Purchase of REC** : Power Exchanges are expected to provide the platform for sale and purchase of RECs. While any trading platform could be used for exchange

of RECs, at this point of time there is no clarity about the volume and liquidity in the market. It is envisaged that CERC in consultation with FOR would undertake the assessment of market, liquidity requirements, costs involved in setting up of the market and necessary fee structure.

Accordingly, it is proposed that the sale and purchase of REC will only be through Power Exchange operating under the guidelines issued by the Central Electricity Regulatory Commission.

- **Denomination of RE Certificate:** The RECs are proposed to be denominated in energy (MWh) terms in order to be consistent with RPO percentage obligation to be specified in energy terms. With the proposed denomination in energy terms, SERCs can continue to specify the RPO target as a percentage of energy consumption, which can easily be converted into the equivalent number of RECs, , required for achieving the RPO target.

- **Form of RE Certificate:** Proposed REC needs to contain all the information such as Unique Certificate Number, Name of the Issuing Body, Generator Identity, Type of Generation Technology, Installed Capacity of the Generator, Location of the Generator, and Signature of the Authorized person, in its electronic form. In addition, information about date of issuance of certificate and validity of certificate may also be provided on the proposed RE Certificate.

- **Issuance of RE Certificates** : The eligible entities shall apply to the Central Agency for issuance of certificates within three months after corresponding generation from eligible renewable energy projects. The Certificates shall be issued by the Central Agency within fifteen days from the date of application by the eligible entities on the basis of units of electricity generated and injected into the grid.

- **Pricing of Certificate:** The CERC shall determine price band i.e. upper limit (forbearance price) and the lower limit (floor price) within which REC transactions can be undertaken over Power Exchange. This price will be determined by the Central Electricity Regulatory Commission from time to time. The determination of floor price and forbearance price would be guided by several factors such as variation in cost of generation for different RE sources across States, variation in

pooled power purchase cost of Utilities across States, expected renewable energy capacity addition, and renewable purchase obligation targets set by different State Commissions.

It is important to ensure threshold level of revenue certainty through floor price to instil confidence amongst investors, lenders, project developers at least during initial stage of introduction, whereas forbearance price is necessary to avoid price volatility, else it may defeat the very purpose of facilitating RPO compliance by Obligated Entities through REC mechanism. The Regulations also envisage introduction of floor price and forbearance (or ceiling) price, separately for solar RECs and non-Solar RECs

- **Shelf life of REC:** The RECs shall remain valid for 365 days from the date of issue of such certificates.

6 Renewable Energy Pricing Framework

6.1 Background to Pricing philosophy

Pricing is one of the most important factors, which influences the economics of operation of any activity. Presently, prices for electricity generated by central sector generating stations and State sector generating stations are regulated by the Appropriate Regulatory Commissions through cost-plus approach. The tariff for power procurement by distribution licensees from renewable energy sources are also determined by the SERCs on the basis of preferential 'cost-plus' tariff approach. For the new operative period, it is proposed to follow a similar pricing philosophy where tariff for renewable energy sources shall be determined on the basis of 'cost-plus return' approach. Under the preferential tariff regime based on 'cost plus preferential return' approach, Maharashtra has witnessed significant renewable energy capacity addition.

6.2 Pricing principles for New RE projects in the New Control Period

It is proposed to have a pricing mechanism where all the new renewable energy projects commissioned during the Control Period, i.e., after March 31, 2010, shall have an option of following either a Preferential Tariff method, or adopt the REC mechanism for pricing of the electricity generated from the project. By providing such an option in pricing mechanism to the RE Projects, they are free to adopt the mechanism which they find to be suitable for their project. However, projects that opt for either preferential tariff or REC based mechanism shall have to continue with the selected pricing mechanism for the entire Tariff Period or until validity of PPA; whichever is later.

Besides, it is clarified that such new renewable energy project will have to exercise its choice for selection of appropriate Pricing Mechanism prior to execution of the PPA with distribution licensee or with open access consumer, as the case may be. This will ensure stability in the prices to both lenders and distribution licences and as well as provide tariff certainty over the PPA period.

6.3 Pricing framework under Preferential Tariff Mechanism

Some of the major factors to be looked into while designing a preferential tariff framework are: appropriate tariff structure, setting of operating cost norms and capital cost norms, setting of suitable indexation mechanism in order to factor the fluctuations in the market

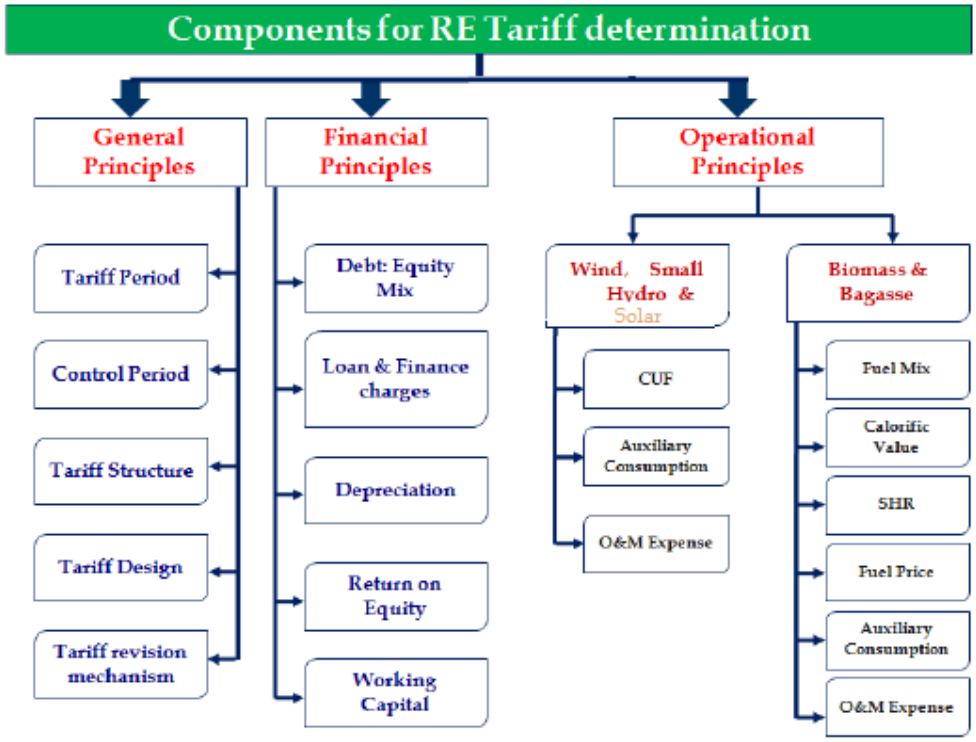
conditions etc,. It is necessary to carry out an extensive study of the flowing nature so as to decide upon the parameters of the tariff framework.

1. Detailed review of the tariff orders and regulations notified by the various SERCs and the approaches considered in determining the norms for tariff for a specific RE technology.
2. Scrutiny and analysis of the actual project cost details and information about performance parameters in respect of existing RE projects based on information gathered from financial institutions and also available in the public domain.
3. Comparative analysis of project cost and performance parameters in respect of similar RE technology applications in the international context.
4. Feedback/views/comments of the various stakeholders received on the discussion paper issued by the various Electricity Regulatory Commissions in the subject matter.

It can be noticed that, a similar approach was adopted by CERC while formulation of the CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009. Besides, in the context of existing legal and Regulatory framework, CERC Tariff Regulations act as a guiding principle for State Electricity Regulatory Commissions in terms of Section 61(a) of the Electricity Act 2003. Hence, after considering the extensive background study conducted by CERC, acceptance of the CERC tariff framework and upon relying on the enabling provisions of the Electricity Act 2003, it is proposed to adopt CERC tariff framework for setting the preferential tariff framework of Maharashtra for the new operating period. However, while adoption; the same has been suitably modified at various instances to fit into conditions/features specific to the State of Maharashtra.

The tariff norms have been categorised broadly under three sections, namely General Principles, Financial principles and technology specific principles. On the basis of RE technologies covered under the Regulations, the Explanatory Memorandum has been divided into 8 sections as under:

- General Principles
- Financial Principles
- Technology specific Principles: ***Wind Energy***
- Technology specific Principles: ***Small Hydro Power, Mini Hydro, Micro Hydro***
- Technology specific Principles: ***Biomass Power***
- Technology specific Principles: ***Non-fossil fuel based Cogeneration***
- Technology specific Principles: ***Solar PV Power Projects, Rooftop PV projects***
- Technology specific Principles: ***Solar Thermal Power Projects***



6.3.1 General Principles

Under this section, the general principles for RE tariff determination such as Control Period, Tariff Period, Tariff Structure, Tariff Design, Tariff review mechanism etc. has been discussed.

Control Period or Review period

The Control Period refers to the period for which the norms outlined under these Regulations shall remain valid. Tariff determination for all renewable energy projects commissioned during the Control Period (or Review Period) shall be governed by the conditions and norms outlined under these Regulations. The control period and review period under these Regulations is proposed to be in line with the RPO control period as discussed in section 4.4 of this Discussion Paper. However, the benchmark capital cost for Solar PV and Solar Thermal projects is proposed to be reviewed annually and bi-annually as is specified in the CERC RE Tariff Regulations, 2009.

Tariff Period

'Tariff Period' refers to the period for which 'preferential tariff' to be determined as per the proposed tariff regulations shall be applicable.

Technology	Tariff Period
Small Hydro	35 years
Solar PV and Solar Thermal	25 years
Other RE technology	13 years

The above specified tariff periods are in line with the CERC RE Tariff Regulations, 2009.

Project Specific Tariff

The renewable energy technologies such as Solar PV, Solar thermal, hybrid solar thermal MSW projects and biomass power other than rankine cycle technology are still under nascent stage of development. Significant grid connected capacity is yet to be developed and hence information about actual project cost or performance parameters for the purpose of determination of norms is not available. Therefore it is proposed that till the maturity of such technology, a project specific tariff on case to case should be specified. Further, developing generic norms for such new RE technologies is not preferred, the preferential tariff for such RE technologies can determined on case-to-case basis upon detailed scrutiny including availing expert inputs in the process. Therefore, the Regulatory framework must have enabling provisions for tariff determination for such technologies, as and when need arises. Therefore, it has been proposed in the draft Regulation that the tariff for all new renewable technologies, for which tariff norms has not been specified by the Commission, will be determined on case to case basis on the basis of petition filed by concerned generating company or licensee, as the case may be. The above approaches are in line with the CERC RE Tariff Regulations, 2009.

Tariff Structure and Tariff Design

A single-part tariff with two components, viz., fixed cost component and fuel cost component, is proposed for renewable energy technologies having fuel cost component, like biomass power projects and non-fossil fuel based co-generation projects. Further, for all other RE technologies, single part tariff with single component of fixed cost is proposed. Besides a generic tariff shall be determined on levellised basis for all the RE technologies for the Tariff Period. For the purpose of levellisation, the discounting factor equivalent to weighted average cost of capital shall be considered. The same is in line with the CERC RE Tariff Regulations, 2009.

6.3.2 Financial Principles

Capital Cost

CERC in its RE Tariff Regulations, 2009 has arrived at capital cost norms for various technologies on the basis of cost benchmarking principles. The capital cost norms so arrived at were for the base year FY 2009-10. However CERC has also provided suitable escalation rates/indexation mechanism for deriving capital cost for RE technologies over the subsequent years of the control period. In addition, CERC notifies the capital cost of RE technologies on a annual and bi annual basis through its Generic Tariff Order/Notifications. The same is proposed to be considered for the purpose of the current MERC Regulations for respective years of its control period, starting from FY 2010-11.

Subsidy or incentive by the Central/State Government

It is proposed to take into consideration any incentive or subsidy offered by the Central or State Government, including accelerated depreciation benefit if availed by the generating company, for the renewable energy power plants while determining the tariff under these Regulations. However, in a recent development, MNRE has notified a revised GBI scheme where there is specific mentioning that such incentive schemes shall be available to the wind projects over and above the tariffs determined by the central or state level Regulatiory Commissions. Hence, it is proposed that in case any Central Government or State Government notification specifically provides for any Generation based Incentive over and above tariff, the same shall not be factored in while determining Tariff.

Other Financial Principles

As regards all other Financial Principles, it is proposed to follow the principles as outlined in the CERC RE Tariff Regulations, 2009.

6.3.3 Technology specific parameters

Under this section, technology specific parameters such as Capital Cost norm, capital cost indexation mechanism, Capacity Utilisation Factor, Auxiliary Consumption, O&M Expenses, Fuel mix, Calorific Value, Station Heat rate, fuel price etc., for individual renewable energy sources have been discussed, separately. The technology specific parameters proposed under these Regulations are a broad adoption of such parameters as specified in CERC RE Tariff Regulations with certain modifications made, wherever found necessary.

Technology specific parameters for wind energy

Parameters	Norms	Remarks
Capital Cost	Rs. 467 Lakhs/MW for FY	Computed applying indexation

	2010-11	mechanism for FY 2010-11; Shall be updated upon revised Notification by CERC for FY 2010-11.
Capital cost indexation mechanism	$CC(n) = P\&M_{(n)} \times (1+F_1+F_2+F_3)$	Indexation to factor changes in Wholesale Price Index for Steel and Electrical Machinery
CUF	20% (200-250W/m^2)	Separate CUF for diff. Annual Mean Wind power density (W/m^2)
	23% (250-300 W/m^2)	
	27% (300-400 W/m^2)	
	30% (>400 W/m^2)	
O&M expenses	Rs. 6.90 Lakh/MW for FY 2010-11	Annual escalation of 5.72%

Technology specific parameters for Small Hydro Project

Parameters	Norms	Remarks
Capital Cost	Rs. 499 Lakh/MW for FY 2010-11 (>1 MW upto 5 MW) Rs. 454 Lakh/MW (5 MW to 25 MW)	Capital cost specified for States other than Himachal Pradesh, Uttarakhand and North Eastern States by CERC; Computed applying indexation mechanism for FY 2010-11; Shall be updated upon revised Notification by CERC for FY 2010-11
Capital cost indexation mechanism	$CC(n) = P\&M_{(n)} \times (1+F_1+F_2+F_3)$	Indexation to factor changes in Wholesale Price Index for Steel and Electrical Machinery
CUF	30%	CUF specified for States other than Himachal Pradesh, Uttarakhand and North Eastern States by CERC;
Auxiliary Consumption	1%	As stipulated by CERC
O&M expenses	Rs. 18 Lakh/MW (>1MW& up to 5MW) Rs. 12.7 Lakh/MW (5 MW	Annual escalation of 5.72%; Base year FY 2010-11

	to 25 MW)	
Tariff for Mini/Micro hydro (Installed capacity less than or equal to 1MW)	Rs 0.50/kWh over and above tariff for SHP with capacity >1MW& up to 5MW	Such preferential tariffs provided in order to promote utilization of the vast untapped potential of such category of SHPs in the State.

Technology specific parameters for Biomass based Projects

Parameters	Norms	Remarks
Capital Cost	Rs. 403 Lakh/MW for FY 2010-11	Computed applying indexation mechanism for FY 2010-11; Shall be updated upon revised Notification by CERC for FY 2010-11
Capital cost indexation mechanism	$CC(n) = P\&M_{(n)} \times (1+F_1+F_2+F_3)$	Indexation to factor changes in Wholesale Price Index for Steel and Electrical Machinery
PLF	During Stabilisation-60% After stabiliisation-70% From 2nd year onwards-80%	Stabilisation period shall not be more than 6 months from COD
Auxiliary Consumption	10%	As stipulated by CERC
SHR	3800 kcal/kWh	As stipulated by CERC
O&M expenses	Rs. 21.4 Lakh/MW	Annual escalation of 5.72%; Base year FY 2010-11
Fuel mix	Plant to be designed for using Multiple Non-fossil fuel	This ensures increased PLF of the plant and factor the seasonal availability of such fuels
Fossil fuel use	Restricted to 15% annually	As stipulated by CERC
Compliance Monitoring	Compliance monitoring of fuel use to be done by MEDA	MERC shall reimburse to MEDA the reasonable expenses incurred in connection with the compliance monitoring activities in respect of biomass power projects.
Calorific Value	3611 kcal/kg	As stipulated by CERC for State of Maharashtra

Fuel Cost	1859 Rs/MT	Computed for FY 2010-11 as per fuel price indexation mechanism; Shall be updated upon revised Notification by CERC for FY 2010-11
Fuel Price Indexation	$P_{(n)} = P_{(n-1)} * \{a * (WPI_{(n-1)} / WPI_{(n-2)}) + b * (1+IRC)_{(n-1)} + c * (Pd_{(n-1)}/Pd_{(n-2)})\}$	Developer have the option to revise annual fuel price based on the indexation mechanism or by escalation factor of 5%, not both

Technology specific parameters for Non-fossil fuel based Cogeneration Projects

Parameters	Norms	Remarks
Capital Cost	Rs. 398 Lakh/MW for FY 2010-11	Computed applying indexation mechanism for FY 2010-11; Shall be updated upon revised Notification by CERC for FY 2010-11
Capital cost indexation mechanism	$CC(n) = P\&M_{(n)} \times (1+F_1+F_2+F_3)$	Indexation to factor changes in Wholesale Price Index for Steel and Electrical Machinery
PLF	60%	180 days (crushing)+ 60 days (off-season) = 240 days operating days; As stipulated by CERC
Auxiliary Consumption	8.5%	As stipulated by CERC
SHR	3600 kcal/kWh	As stipulated by CERC
O&M expenses	Rs. 14.1 Lakh/MW	Annual escalation of 5.72%; Base year FY 2010-11
Fuel mix	Plant to be designed for using Multiple Non-fossil fuel	This ensures increased PLF of the plant and factor the seasonal availability of such fuels
Fossil fuel use	Restricted to 15% annually	As stipulated by CERC
Compliance Monitoring	Compliance monitoring of fuel use to be done by MEDA	The Commission shall reimburse to MEDA the reasonable expenses incurred in connection with the compliance monitoring activities in respect of non-fossil

		fuel based co-generation projects.
Calorific Value	2250 kcal/kg	As stipulated by CERC for State of Maharashtra
Fuel Cost	1159 Rs/MT	Computed for FY 2010-11 as per fuel price indexation mechanism; Shall be updated upon revised Notification by CERC for FY 2010-11
Fuel Price Indexation	$P_{(n)} = P_{(n-1)} * \{a * (WPI_{(n-1)} / WPI_{(n-2)}) + b * (1+IRC)_{(n-1)} + c * (Pd_{(n-1)}/Pd_{(n-2)})\}$	Developer have the option to revise annual fuel price based on the indexation mechanism or by escalation factor of 5%, not both

Technology specific parameters for Solar PV Power Project

Parameters	Norms	Remarks
Capital Cost	Rs. 1690 Lakh/MW for FY 2010-11	Based on draft notification by CERC for FY 2010-11. Applicable to SPV with installed capacity >3 MW
CUF	19%	As stipulated by CERC
O&M expenses	Rs. 9.5 Lakh/MW for FY 2010-11	Annual escalation of 5.72%
Tariff for Solar Rooftop PV projects (Installed capacity less than or equal to 3MW)	Rs 0.50/kWh over and above tariff for SPV projects with capacity >3MW	Such preferential tariffs provided in order to promote utilization of the vast untapped potential of Solar Rooftop PV projects in the State.

Technology specific parameters for Solar Thermal Power Project

Parameters	Norms	Remarks
Capital Cost	Rs. 1530 Lakh/MW for FY 2010-11	Based on draft notification by CERC for FY 2010-11.
CUF	23%	As stipulated by CERC
O&M expenses	Rs. 13.70 Lakh/MW for FY 2010-11	Annual escalation of 5.72%

6.4 Pricing framework under REC mechanism

With the introduction of REC mechanism, the renewable energy based generating sources would have two distinct products, viz., electricity and REC. A suitable pricing mechanism for each component needs to be devised, which is compatible with the existing regulatory and policy framework.

The recently notified CERC (Terms and Conditions for recognition and issuance of Renewable Energy Certificate (REC) for Renewable Energy Generation) Regulations, 2010 has outlined the detailed principle and framework for REC pricing, and the same shall be adopted for setting REC pricing framework for the State of Maharashtra. Accordingly, from Utility's perspective, the most preferred option is to link the electricity component to average power purchase cost of host Utility and REC component with market price discovered through Exchange Mechanism. The target percentage under RPO framework with enforcement charge shall provide an assured market off-take for RECs. Further, it is important to have focus on the basic purpose of introduction of REC mechanism in India, which is to facilitate the inter-State exchange/transactions of RE so that all the States will be able to meet the long term RPS target specified under NAPCC. This purpose distinguishes REC mechanism proposed for India from that in most of the other countries, which rather have their REC mechanism as an incentive mechanism. Accordingly, RE pricing framework for the new Control Period is proposed as under:

REC Component Price	**= Market based pricing as per Power Exchange**
Electricity component Price	**= Average power purchase cost of Host Utility**

In addition, CERC shall determine price band i.e. upper limit (forbearance price) and the lower limit (floor price) within which REC transactions can be undertaken over Power Exchange. This price will be determined by the Central Electricity Regulatory Commission from time to time. The determination of floor price and forbearance price would be guided by several factors such as variation in cost of generation for different RE sources across States, variation in pooled power purchase cost of Utilities across States, expected renewable energy capacity addition, and renewable purchase obligation targets set by different State Commissions.

It is important to ensure threshold level of revenue certainty through floor price to instil confidence amongst investors, lenders, project developers at least during initial stage of introduction, whereas forbearance price is necessary to avoid price volatility, else it may defeat the very purpose of facilitating RPO compliance by Obligated Entities through REC mechanism. The Regulations also envisage introduction of floor price and forbearance (or ceiling) price, separately for solar RECs and non-Solar RECs.

The suggested approach seems to be the most feasible solution in the present electricity market scenario. However, with the progressive development of the electricity sector, the pricing methodologies for Electricity component and REC component need to be reviewed at periodic intervals.

The subsequent chapters discuss in detail on the proposed pricing principles applicable to existing RE projects.

6.5 Pricing principles for Existing RE projects in New Control Period

Existing RE projects have already been covered under particular tariff and regulatory regime. Further, the long term contracts for the same are already put in place. Hence, it will not be appropriate to subject existing RE projects to be part of REC mechanism at this stage. Therefore, it is suggested that existing projects may be allowed to participate in REC scheme only after the expiry of their existing PPA. It has also been accepted and recommended by the FOR Task Force that the RE Generators already having PPA with the distribution licensees for contracted quantum would not have the option to participate in the REC Mechanism till the validity of their PPA. It is clarified that no prior termination of PPA shall entitle existing RE project to participate in REC mechanism.

Thus, Tariff Rate, Tariff structure and other conditions for Existing RE project(s) have already been covered under respective RE Tariff Orders and the same shall continue to be operative during next Control Period as well.

7 Grid Connectivity Framework

Most of the renewable energy projects are located in remote areas, which have sparse transmission/distribution system and which has been a major hindrance in harnessing the energy from such renewable sources. Some of the sources like wind and small hydro are site specific and therefore, generation has to be done only at the identified sites.

In order to overcome this bottleneck, the Electricity Act 2003 under Section 86 (1)(e) has entrusted the responsibility on SERCs to develop suitable framework for providing grid connectivity to such renewable energy projects.

7.1 Existing Grid Connectivity Framework

The Commission, while specifying the tariff for respective RE technologies, has discussed the framework for grid connectivity. The Commission has maintained that project developer shall be responsible for the development of evacuation infrastructure up to the metering point (or interconnection point) while beyond this point, the concerned transmission/distribution licensee shall be responsible for the development of evacuation infrastructure. The responsibility specified under previous Orders is as follows:

Technology	Description
Responsibility of Project Developer	• Developer to bear the cost of project switchyard and interconnection facilities at the project site up to the point of energy metering.
Responsibility of Licensee	• Concerned licensee (transmission or distribution) to bear the cost of transmission lines and associated facilities beyond the point of energy metering for the evacuation of power.
Operational Mechanism for evacuation infrastructure development	• 50% of the cost of works to be carried out by the STU for power evacuation purposes is to be provided as interest free advance to the STU by the project holder. • Advance to be refunded in five equal annual instalments, commencing from

	one year after the date of commissioning of the project. • However, subsequently the Commission has clarified through Case 34 of 2007, the role of STU and transmission licensee(s) in development of evacuation infrastructure, wherein it has been ruled that the transmission licensee(s) shall alone be responsible for development of evacuation infrastructure beyond the interconnection point.

7.2 Policy and Regulatory Developments for Grid Connectivity

7.2.1 Govt of Maharashtra Non-conventional Policy

The Government of Maharashtra in its Non-conventional Policy dated October 14, 2008 has detailed the methodology for grid connectivity of RE technologies.

> *"MSEDCL/MSETCL and MEDA will conduct a joint survey for the installation of HV and EHV substations and associated transmission and distribution lines required for the project. Based on the technical specifications of MSEDCL/MSETCL, the private developers shall undertake the work of erecting HV & EHV substations and necessary EHV transmission and distribution lines under supervision of MSEDCL/MSETCL.*
>
> *MEDA will reimburse the 50% of expenses incurred by private developers for erecting and commissioning of evacuation arrangement from Green Energy Fund after the private developer has commissioned and handed over the evacuation arrangement to MSEDCL/MSETCL."*

7.2.2 FOR Report on Policies on Renewables

The Forum of Regulators in its Report 'Policies on Renewables' has discussed the grid connectivity related framework under which, it has been recommended that grid connectivity should be provided by the transmission and distribution licensees. Further, the technical standards for providing grid connectivity to RE projects should be specified separately. The FOR recommendations on grid connectivity framework is given below:

> *"7.5.2 Technical standards for providing grid connectivity for RE-based power stations should be developed expeditiously. The FOR recommends that the CEA should undertake development of such standards through its Grid Connectivity Regulations. Connectivity standards for solar*

PV and solar thermal power projects, for both grid connected and rooftop systems, should also be formulated.

7.5.3 Grid connectivity should be optimally provided by transmission licensees and distribution licensees for RE sources, through their capex plans submitted to the appropriate commissions for approval. The recovery of costs of transmission and evacuation infrastructure for RE sources should be addressed through the regulatory process of approval of ARR of transmission or distribution licensee. The transmission charges should be computed in a rational manner, ensuring that initial projects in an area are not burdened by the total cost of network expansion. It is further recommended that the concessional transmission charges could be levied on RE being sold within the State keeping in view the spirit of the EA for promoting RE.

7.5.4 A separate co-ordination mechanism should be established for RE in SLDCs and STUs to ensure smoother operations and grid integration of RE sources, while also including the creation and maintenance of databases regarding future RE projects."

The responsibility for development of evacuation infrastructure has been a matter of debate. The Tariff Orders issued by MERC as well as recommendations by FOR do not clearly spell out the project boundary at which the responsibility of project developer ends and STU responsibility commences for development of evacuation infrastructure. In the Tariff Orders, the Commission has specified the energy metering point as the project boundary but energy metering point itself has no fixed definition and can be changed on the basis of mutual agreement between the Parties. Therefore, the project boundary should be defined in the regulatory framework so as to facilitate smooth development of evacuation infrastructure.

7.2.3 Provisions of notified CERC Regulations on Renewable Energy

The Central Electricity Regulatory Commission in its CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 has defined Inter-connection point for each RE technology. Responsibility for development of evacuation infrastructure up to inter-connection point has been entrusted to project developer while appropriate licensee has been made responsible for development of evacuation infrastructure beyond inter-connection point. The relevant text of the abovementioned Regulations is given below:

"2(1)(j):

*(j) **'Inter-connection Point'** shall mean interface point of renewable energy generating facility with the transmission system or distribution system, as the case may be;*

For wind energy projects, inter-connection point shall be line isolater on outgoing feeder on HV side of the pooling sub-station;
For small hydro, biomass and bagasse cogeneration projects, interconnection point shall be line isolator on outgoing feeder on HV side of generator transformer;…"

7.3 Proposed Grid Connectivity Framework for new Operating Period

For wind energy projects and Solar Photovoltaic Projects, inter-connection point may be line isolator on outgoing feeder on HV side of the pooling sub-station, and for small hydro, biomass and bagasse cogeneration projects and Solar Thermal Power Projects, the inter-connection point may be line isolator on outgoing feeder on HV side of generator transformer. The licensees shall be responsible for development of evacuation infrastructure beyond inter-connection point while developer/generating company will have to develop evacuation infrastructure from generation facility up to the inter-connection point at its own expense.

8 Monitoring and Implementation Framework

8.1 Existing MERC Framework for monitoring and implementation

In the past, under RPO/RPS frameworks for renewable purchase by distribution licensees, the Maharashtra Energy Development Agency (MEDA) has played an important role in monitoring and implementation. In order to ensure the fulfilment of RPS targets set for different entities, the Commission entrusted MEDA with the responsibility to devise suitable mechanism for RPS monitoring. The related text of the Order is reproduced below:

> *"**2.9.6** MEDA has developed RPO Operating mechanism in consensus with the licensees. While noting the concerns raised by InWEA and Prayas, the Commission directs MEDA to assess suitability of extending the existing RPO Operating Mechanism to the RPS framework to undertake reconciliation and settlement of renewable energy transactions amongst eligible persons. MEDA will have to develop and implement suitable operating framework to accommodate all 'Eligible Persons' under this Order. Though the final settlement is to be carried out at the end of the year, MEDA will have to develop a system for monitoring of RPS on monthly basis.*
>
> ***3.1.8 RPS Operating Mechanism**: MEDA shall be responsible for administering this RPS framework in the State. While noting the concerns raised by InWEA and Prayas, the Commission directs MEDA to assess feasibility of extending the existing RPO Operating Mechanism to undertake reconciliation and settlement of renewable energy transactions carried out under this RPS framework. As RPS settlement for 2006-07 will have to be carried out at the end of 2006-07, 6 months is available to MEDA for implementation of above 'RPS Operating framework'. The Commission directs MEDA to put in place 'RPS Operating Framework' within stipulated timeframe.*
>
> ***2.10.9** The Commission is of the opinion that the primary responsibility of enforcing and reporting such incidences of non-compliance rests with MEDA. 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, etc."*

8.2 Actual Status of monitoring and implementation mechanism

In the RPS Order, RPS targets were applicable to distribution licensees, captive users, and open access consumers. Therefore, separate monitoring mechanism for each of the obligated entities was to be devised by MEDA. However, MEDA has been able to devise the monitoring framework for distribution licensees alone. MEDA, in its Technical Task Force Report, has mentioned that it has encountered the problem of collection of data from various

agencies as no specific powers have been vested with MEDA in this regard. The relevant text is reproduced below:

> *"The MEDA encountered difficulties in collection of data from the 'eligible persons' due to absence of operational framework and also due to absence of specific power enabling MEDA to authoritatively collect this data. However, exercise during the first year of the RPS regime enabled all the stakeholders to imbibe the idea of RPS."*

8.3 Effectiveness and key issues in existing monitoring mechanism

Not enough steps have been taken by MEDA for extending the RPS operational framework to open access and captive users. One such reason may be lack of capacity in MEDA to devise and operationalise the operational framework for all stakeholders. MEDA should have co-ordinated with SLDC and other agencies to get the energy transaction information (generation, procurement, consumption and sale) for different Obligated Entities. Further, the energy accounting meters as required under Intra-State ABT are still to be installed at different interface points, which has also delayed the process of separate energy accounting for open access and captive users.

8.4 Monitoring Mechanism for RPO under new Control Period

In order to ensure proper implementation of the provisions of new RPO regime, it is required that role of various entities involved in monitoring and implementation be clearly defined. Further, a Monitoring Committee can be set up, which has representation from various stakeholders for supervising the effective monitoring and implementing of the RPO provisions.

Under the monitoring mechanism, MEDA will have to play an important role as was the case during the previous RPS regime. The other Stakeholders like SLDC, Distribution Companies, Transmission Companies and Consumer Representatives can also have representation in the Monitoring Committee. Such Monitoring Committee can be formed under the aegis of Grid Co-ordination Committee (GCC). While role of SLDC and its statutory responsibility for State-wide energy accounting is well recognised, the Monitoring Committee can play a pivotal role specifically in addressing the following issues:

(a) Addressing issues of energy accounting and monitoring of renewable energy transactions;

(b) Facilitating the implementation of these Regulations and the rules and procedures developed under RPO Regulations;

(c) Assessing and recommending remedial measures for issues that might arise during the course of implementation of these Regulations and the rules and procedures developed under these Regulations;

(d) Guiding the State Agency in the matters related to implementation of these Regulations;

(e) Such other matters as may be directed by the State Commission from time to time.

It is suggested that a Monitoring Committee shall be constituted under the aegis of Grid Co-ordination Committee (GCC), within thirty (30) days of notification of RPO Regulations. Every member of GCC shall have representation on the Monitoring Committee.

8.4.1 Role of MEDA

MEDA will be nodal agency for monitoring the RPO mechanism during the next Control Period. MEDA had encountered the problem of data collection from various agencies during the earlier RPS regime. Therefore, it is deemed appropriate to settle this matter upfront so that smooth monitoring and implementation of RPO during the next Control Period could be ensured. Accordingly, Monitoring Committee under aegis of GCC has been envisaged to guide/co-ordinate/facilitate MEDA and other stakeholders to perform their respective roles.

As regards RPO fulfilment by the distribution licensees, they shall furnish the summary statement of energy procured from different RE on monthly basis to MEDA. Further, at the end of each financial year, each distribution licensee shall submit the detailed statement of energy procurement from various RE sources, duly certified by the auditors.

For open access users as well as captive users, SLDC shall provide the information related to open access and captive transactions from RE sources to MEDA on monthly basis. MEDA will compile the information furnished by different Stakeholders to compute the RPO fulfilment by different stakeholders. The summary statement of RE procurement by different Obligated Entities shall be published by MEDA on quarterly basis on its website.

The non-compliance of fulfilment of RPO targets shall be reported by MEDA to the Commission on annual basis. MEDA shall prepare and submit to the Commission the

detailed statement of RPO targets vis-à-vis actual procurement by the different Obligated Entities, and shortfall/surplus thereof , and amount of Enforcement Charges to be levied on different entities, if any.

8.4.2 Role of SLDC

The SLDC will have to play an important role in monitoring the RPO compliance by open access users and captive users as well as energy accounting of renewable energy generators. It is preferred that SLDC forms a Sub-Load Despatch Centre specifically catering to activities related to accounting of renewable energy generation and monitoring of renewable energy related transactions. The SLDC is the nodal agency for facilitating and accounting of energy transactions, including renewable energy transactions, taking place at the intra-State level. The SLDC will prepare the summary statement of open access and captive transactions for RE generators and submit it to MEDA.

8.4.3 Role of Distribution Licensees

The distribution licensees shall provide the information related to existing and new contracts entered and energy procurement from various RE generators to Monitoring Committee every month.

9 Subsidy and Incentives

The renewable energy technologies are in different stages of development. Some of the technologies are in nascent stage while some others have achieved significant progress. In order to facilitate and provide impetus to the development of renewable energy sector, the Central Government has extended various financial and fiscal benefits. Some of these benefits were generic in nature while some others were technology specific. Over a period of time, the nature of policy support has been varying. At the initial stage, most of the benefits were linked to capacity installation. Now, focus has shifted to linking the incentives to the actual electricity generation. The common policy benefits extended by Central Government are as follows:

- Capital / interest subsidy
- Accelerated depreciation
- Tax holiday
- Concessional custom duty/duty free import
- Generation based incentive

Capital subsidy has been withdrawn for wind and other commercial Renewable Energy projects. It is now limited to Small Hydro Power (SHP) projects located in specific areas and demonstration RE projects. Further, the Central Government has announced Generation Based Incentive (GBI) scheme for solar and wind projects, albeit for pilot schemes. GBI are preferred over capital subsidies, as they promote renewable energy generation rather than mere capacity addition. Further, it is also acknowledged that GBI would be necessary if renewable sources such as Solar Power are to be promoted at the scale envisaged under National policies, otherwise it would impose significant burden on consumer tariff.

On similar lines, the State Governments have also extended various policy benefits for attracting investment in renewable energy in their respective States. Some of these benefits are monetary in nature while some others are non-monetary in nature. The common policy benefits extended by State Governments are as follows:

- Concessional land allotment
- Single window clearance
- Sales tax exemption/reduction
- Transport duty reduction
- Exemption/reduction in Electricity Duty

Some of the State and Central level policy benefits are still available to RE projects and some others have been withdrawn over the years. As per EA 2003 and Tariff Policy, the Regulatory Commissions are required to specify preferential tariff to different RE technologies till RE technologies attain maturity level and competitive procurement is done. The SERCs have adopted cost-plus approach while determining the tariff. In this matter, the issue arises whether the Commission should take into account the policy benefits available to RE projects.

9.1 MERC Approach for Subsidy and Incentive in Tariff Orders

The Commission has factored in Income tax holiday, capital subsidy and sales tax exemption, etc., while computing the tariff for different RE technologies. The Commission has taken into account the capital subsidy available to SHP projects while issuing Tariff Orders for Small Hydro Projects, as reproduced below:

> *"3.18 MNES offers subsidy with an objective to improve the economic viability of SHPs and make the renewable energy projects competitive with the conventional projects. Subsidy is intended for facilitating repayment of term loans taken by the developer from financial institutions. The subsidy is released in one go after commissioning of the project and energy generation for minimum period of three months. As per the circular No. 14 (5) 2003 – SHP issued by MNES, GOI dated 29th July 2003, SHPs developed by private sector are entitled for capital subsidy equal to 20% of the project cost limited to Rs 75 lakhs plus Rs 12.5 Lakhs/MW. Thus a typical 2 MW capacity project is entitled for capital subsidy of Rs 100 Lakhs. Thus, for the purpose of determination of tariffs for SHP, the Commission has considered Rs.100 lakhs as subsidy available to the project for working out the tariff of a typical 2 MW SHP project i.e. Rs. 50 lakhs per MW. Further, as proposed by GOMWRD, the subsidy has been assumed to be available during first year of operation and hence the carrying cost for the corresponding loan amount has been considered in first year interest expenses."*

In another Tariff Order for wind energy, the Commission has not considered the accelerated depreciation benefit while computing the tariff so as to provide sufficient incentives for attracting the investment in renewable sector. The relevant text of Para 2.2.8B of Wind Tariff Order dated November 24, 2003 is reproduced below:

> *"Further, to ensure sustained growth, to reach the critical mass, during the current plan period itself, it is essential to attract a large number of investors in the sector. The Commission intends to fix the tariff for the current plan period i.e., upto 2007, Therefore, the Commission has decided that the income tax benefit through accelerated depreciation should not be factored*

into the cash-flow calculations. The Projects should be financially viable and bankable without consideration of this benefit. The income tax benefit through accelerated depreciation should be treated as an incentive over and above the normal profitability. This would help ensure healthy growth and attract substantial investment in the sector."

In the recent past, the Commission has issued the Tariff Order for Solar Power projects availing GBI benefit announced by MNRE. In this Order, the tariff has been announced after fully taking into account the maximum amount of GBI offered by MNRE.

9.2 Approach by other SERCs for Subsidy and Incentive

Uttarakhand Electricity Regulatory Commission (Tariff and Other Terms for Supply of Electricity from Non-conventional and Renewable Energy Sources) Regulations, 2008 has following provisions related to capital subsidy treatment in the tariff computation:

"19 (3) Capital subsidy shall not be reduced from the capital cost for depreciation purposes. However, the generator will have to carry out any renovation or replacement or additional capitalisation work through depreciation available to it.

…

20 (1) In case of all RE Projects, debt–equity ratio as on the date of commercial operation shall be 70:30 for determination of tariff.

Provided that subsidy available from MNRE shall be considered to have been utilized towards pre-payment of debt leaving balance loan and 30% equity to be considered for determination of tariff."

Karnataka Electricity Regulatory Commission (KERC), in its Order dated January 18, 2005, in the matter of Determination of Tariff in respect of Renewable Sources of Energy has not considered the incentive extended by the Government while computing tariff, as reproduced below:

"(ii) ***Consideration of Incentives allowed by the Government-*** *Whether the incentives in the form of tax concessions, direct subsidies etc. from the central and state Governments need to be factored in the Tariff or not ?*

KPTCL in their response furnished in August 2004, have suggested to factor in the incentives provided for the projects of renewable sources of energy, while determining the tariff. The developers of renewable sources of energy and KREDL/IREDA have stated that the incentives should not be factored in, and if so factored in, it will defeat the very purpose of providing the incentives to promote the projects and that the developers will be left with no incentive.

After examining the responses of the stakeholders, the Commission agrees with the view expressed by the developers and KREDL/IREDA."

Rajasthan Electricity Regulatory Commission (RERC), while issuing the Tariff Order for Wind and Biomass projects, has considered the accelerated depreciation benefit while computing the tariff for new wind and biomass projects to be commissioned in the State pursuant to new Tariff Regulations, 2009.

Kerala State Electricity Regulatory Commission (KSERC) in its KSERC (Power Procurement from Renewable Sources by Distribution Licensee) Regulations, 2006, has not factored in the capital subsidy available to the small hydro projects. The relevant text of the Annexure – I of Regulations is reproduced below:

"While determining the project cost, the Commission has adopted Cost / MW for both existing and new projects. The capital subsidy or interest subsidy more or less nullifies the higher interest rate for one category vis-à-vis the other one. As the Commission considered the capital cost without adjusting for capital subsidy, interest rate is considered without adjusting for the interest rate subsidy. Hence Commission approves the interest rate of 9% for new projects."

For solar projects covered under GBI scheme of MNRE, all SERCs have considered the maximum amount of incentive declared by the Government while computing the tariff for such projects.

9.3 Recent Regulatory Developments for subsidy and incentives

The Forum of Regulators in its Report on "Policies on Renewables" has made following recommendations for consideration of incentives during the tariff determination process:

"6.4.2 GBIs are preferable to capital subsidies for promotion of RE technologies.

6.4.3 GBI would be necessary if renewable sources such as solar power are to be promoted at the scale envisaged in the national policies, otherwise the burden on consumer tariff would be unbearable.

6.4.4 GBI should be announced upfront, for being factored into the tariff to be set by ERCs. The GBI should be fixed with the objective of making the costs of energy from different renewable sources comparable. However, any GBI announced by the government as an incentive over and above the tariff, such as for wind projects in lieu of accelerated depreciation, need not be factored into the tariff by SERCs."

Recently, CERC in its CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009, has considered all subsidy and incentive announced by the Central and/or State during tariff determination. Further, CERC has factored in accelerated depreciation benefit, if availed, by the project for the purpose of determination of applicable tariff. The relevant text of notified Regulations is as follows:

> ***"22. Subsidy or incentive by the Central/State Government***
> *The Commission shall take into consideration any incentive or subsidy offered by the Central/ State Government, including accelerated depreciation benefit, if availed by the generating company, for the renewable energy power plants while determining the tariff under these Regulations."*
> *Provided that the following principles shall be considered for ascertaining income*
> *tax benefit on account of accelerated depreciation, if availed, for the purpose of tariff determination:*
> *i. Assessment of benefit shall be based on normative capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and corporate income tax rate.*
> *ii. Capitalisation of RE projects during second half of the fiscal year.*
> *iii. Per unit benefit shall be derived on levellised basis at discount factor equivalent to weighted average cost of capital."*

9.4 Proposed Approach for the New Control Period

The term 'GBI' has been used both, for Wind and Solar energy projects, however, purpose behind both the schemes appear to be different. The GBI for solar projects is meant for offsetting the higher cost of generation of electricity and developing commercial large size grid connected projects. In case of GBI for wind projects, the purpose is to promote IPP based projects, which are not eligible for accelerated depreciation benefit. As GBI for wind power projects is in lieu of other policy benefit, therefore, it has been specifically mentioned in the Policy note that it shall be over and above the tariff determined by the Commission. In the wake of such notifications, it is proposed that for the new control period, such Generation based Incentive shall not be factored in while determining Tariff in case any Central Government or State Government notification specifically provides for any Generation based Incentive over and above tariff,.

Further, while devising the RPO framework for the next Control Period, it has been proposed that the following principles need to be considered for ascertaining income tax benefit on account of projects availing the benefits of accelerated depreciation, for the purpose of tariff determination:

- Assessment of benefit shall be based on normative capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and Corporate Income Tax Rate;
- Capitalisation of RE projects during second half of the fiscal year;
- Per unit benefit shall be derived on levellised basis at discount factor equivalent to weighted average cost of capital;

10 Open Access for RE Transactions

The Electricity Act, 2003 provides the framework for open access and captive consumption in addition to the conventional arrangement of sale to distribution licensee. Accordingly, MERC has notified the Open Access Regulations for transmission and distribution, and the applicable charges have been determined by the Commission from time to time. The following two issues related to open access transactions need to be discussed:

- Wheeling charges for RE transactions
- Banking provision

10.1 Wheeling charges for RE transactions

Open Access, as envisaged under the EA 2003, provides the option to the generator to wheel the power from the point of generation to the point of use for captive consumption or sale to other parties, by using the transmission and/or distribution licensee's network. The regulatory and policy framework for open access has become a key factor in investment decision analysis, if electricity generated from RE project is to be used for captive consumption or sold to parties other than the distribution licensees (third party). High open access charges will increase the landed cost of electricity, defeating the objective of open access. The Commission, in its various Orders issued from time to time, has specified the applicable charges for wheeling of electricity within the State of Maharashtra. Such charges have been specified on voltage basis, therefore, the open access user pays charges only to the extent of transmission and/or distribution assets used for wheeling of electricity from one place to another.

10.2 Banking

Energy generation from non-firm RE sources depends upon nature's vagaries and the generation curve varies during the day, while at the same time, consumption remains under the control of end consumer. For instance, wind generation is the highest during the monsoon months, whereas the consumption of the contracted Open Access consumer may not be commensurate to absorb the entire generation during the monsoon months. Therefore, to reduce the mismatch between generation and consumption, a special provision of financial banking was made by the Government of India during initial phase for promoting generation from renewable energy sources. In later years, the same has been adopted by State Government and subsequently by the Regulatory Commissions as a measure to promote energy generation from RE sources. Here, it

would be worth mentioning that EA 2003 has explicitly not stated banking as a function of distribution licensees. However, Section 86(1)(e), which provides for promotional treatment to energy sources, enables the Commission to specify banking as a promotional measure.

10.3 Approach for Wheeling and Banking for New Control Period

While devising the wheeling and banking related framework for next Control Period, the following aspects need to be discussed:

- How should open access be facilitated for renewable energy transactions?
- Can differential wheeling charges be specified for RE based transactions?
- Whether banking facility should be extended to all RE sources?
- What should be the settlement mechanism for banking arrangement for different RE technologies?
- Should banking be extended to inter-State RE Projects?

In this regard, MERC is simultaneously reviewing the existing framework for transmission and distribution open access. Therefore, it would be appropriate to discuss this matter in detail during the open access review exercise.

11 Sharing of CDM Benefits

Under the Kyoto Protocol, Clean Development Mechanism (CDM) is one of the mechanisms for mitigating carbon emission by implementing sustainable development projects in developing countries. Revenue generated from the sale of Certified Emission Reductions (CERs) has created a potential market for significant capacity addition in renewable energy based projects. It has been observed that project developers are benefiting though this additional revenue stream in addition to the revenue stream assured through the preferential tariff specified by SERCs. Therefore, it has been debated that when all financial risks associated with the project have been covered through the preferential tariff on cost plus approach, should the additional revenue from sale of CERs not be shared between the project developer and the consumers, who are bearing the preferential cost of renewable energy.

11.1 Policy and Regulatory Framework for sharing of CDM benefits

11.1.1 Tariff Policy provisions

Clause 5.3(i) of the Tariff Policy envisages that CDM benefits should be taken into consideration while fixing the tariff for electricity projects, which are benefited through CDM mechanism, as reproduced below:

> *"Tariff fixation of all electricity projects that result in lower Green House Gas (GHG) emissions than the relevant base line should take into account the benefits obtained from Clean Development Mechanism (CDM) into consideration, in a manner as to provide adequate incentive to the project developers."*

However, in the policy and legal framework, the percentage sharing of such benefit between the project developer and the beneficiaries has not been clearly specified. Therefore, CDM sharing mechanism devised by SERCs varies considerably across the States.

11.1.2 MERC approach for CDM sharing

MERC issued the first Tariff Order for bagasse based projects in early 2002 and at that time, CDM was in its inception stage and therefore, CDM sharing finds no reference in that Order. In the Wind Tariff Order dated November 24, 2003, the Commission has stated that the benefits available to renewable projects should be factored in on a case to case basis, as reproduced below:

"The Commission understands that several renewable energy projects may be eligible for the benefits available through the "Clean Development Mechanism" under Kyoto Protocol. While these benefits are not available to a large number of projects which are on the verge of commercial viability, they can be availed of in future. Since the consumer is supporting the renewable energy projects by way of higher tariffs, it is essential that any such credits secured by a project should be shared on an equitable basis by the developer with the utility and its consumers. The Commission shall review the tariff structure for RE Projects that become eligible for CDM or similar credits, and devise a system, which will enable sharing of benefits between the consumers and the project developers at that stage."

The Commission expressed similar views while issuing Order on date August 08, 2005 in the matter of Tariff for Power procurement for Biomass projects. MERC while issuing Order in the matter of Determination of Tariff for Small Hydel Power (SHP) Projects dated November 09, 2005 has not considered CDM sharing for small hydro projects, as reproduced below:

"It is clarified that in the determination of tariffs for SHPs, the Commission has not taken into consideration any CDM benefit that might be applicable."

Recently, the Commission through an Order dated May 08, 2009, while determining the tariff framework for solar projects to be installed in Maharashtra ruled that the CDM sharing aspect would be addressed in the next Control Period. The relevant text of the Order is reproduced below:

"The Commission is of the view that the aspect of sharing of CDM benefits and methodology thereof needs to be consistent across RE technologies and has to be addressed separately. Further, existing framework for tariff determination for various renewable energy technologies is valid upto March 31, 2010. The aspect of sharing of CDM benefit could be taken up through separate regulatory process to be undertaken for the next Control Period."

Further, MERC has issued an Order dated November 17, 2008 on MEDA's petition for Sharing of CDM Benefits. MEDA, under this Petition, submitted a mechanism for sharing of Clean Development Mechanism (CDM) benefits in the State of Maharashtra. However, the Commission observed that for arriving at the proposed sharing mechanism, MEDA has used some hypothetically estimated figures. In this context, to collect sufficient data, the Commission granted time to MEDA. After repeated time extensions, the Commission observed that as it was already eight months since the hearing in the matter and further extension of three months would amount to eleven months. Hence, the Commission informed MEDA vide its letter dated September 8, 2008 that further extension as requested

has not been granted by the Commission and further directed MEDA to file a fresh Petition before the Commission, in the matter, complete in all respects, with all the supporting data etc.

11.2 Approach adopted by other SERCs for CDM sharing

- The Gujarat Electricity Regulatory Commission (GERC), in its Order dated August 11, 2006, specified that the project developer needs to share 25% of the gross benefits received from the CDM projects with the distribution licensee, as reproduced below:

  "21. Sharing of benefits from Clean Development Mechanism (CDM)
  In the discussion paper, the Commission had proposed that 25% of benefits received from the CDM projects are to be shared by the Developer with the Distribution licensee.
  The proceeds of the carbon credits will accrue to the wind energy generator and will reduce costs correspondingly. Therefore the Commission, after considering all the aspects decides to pass on 25% of the gross CDM benefit to the Distribution Licensee.

  However, through the Draft Order No. 2 of 2009, on determination of WEG tariff, GERC has proposed to adopt the methodology as specified in the explanatory Memorandum of 'CERC Terms and Conditions of tariff, Regulations for 2009-14'for framing the CDM benefit sharing mechanism in the State of Gujarat."

- The Tamil Nadu Electricity Regulatory Commission (TNERC), in its Wind Tariff Order dated March 20, 2009, has dealt with the matter of CDM sharing between project developer and the distribution licensees as per the mechanism proposed by Forum of Regulators. The relevant text of Para 8.5 of the mentioned Order is reproduced below:

  "Undoubtedly, a promoter of wind energy is required to put in considerable efforts to secure the benefits of Clean Development Mechanism and therefore, there is merit in the views of certain stakeholders that the entire credit should accrue to the promoter as it obtains now. Some State Commissions have permitted the distribution licensee to share 25% of the CDM benefits. The Forum of Regulators has considered this issue and has recommended that CDM benefits should be shared on gross basis starting from 100% to developers in the first year and thereafter reducing by 10% every year till the sharing becomes equal (50:50) between the developer and the consumer in the sixth year. Thereafter, the sharing of CDM benefits will remain equal till such time the benefits accrue. The Commission accepts the formula recommended by the Forum of Regulators."

- The Andhra Pradesh Electricity Regulatory Commission (APERC), in its Tariff Order dated May 1, 2009 in the matter of determination of Tariff / Power Purchase Price in respect of New Wind Based Power Projects, has specified the CDM sharing of 90:10 between the developer and distribution license. The relevant text of Para 8 is reproduced below:

  "The CDM benefits shall be shared in the ratio of 90:10 between the developer and the DISCOM."

- The Rajasthan Electricity Regulatory Commission (RERC) in Tariff Regulations, 2009 under Clause 42 has specified the CDM sharing of 75:25 between project developer and distribution licensee. The relevant text Of Tariff Regulations, 2009 is reproduced below:

  "42. Sharing of Clean Development Mechanism (CDM) credit
  Sharing of Clean Development Mechanism (i.e. CDM) credit during the current Control Period, shall be in the ratio 25:75 between distribution licensee and project developer respectively.
  Provided that the share of 25% obtained by the distribution licensee shall be fully passed on to the consumers. In case the distribution licensee itself is the project developer, then 75% shall be retained by the distribution licensee and balance 25% shall be passed on to the consumers."

- The Karnataka Electricity Regulatory Commission (KERC) has considered it appropriate not to share any revenue generated from carbon credits accrued by renewable project. The relevant text of Para 8 of Order in the matter of determination of Tariff in respect of Renewable Sources of Energy, dated January 18, 2005, is reproduced below:

  "The Commission is of the view that since the tariff is being determined for renewable sources of energy also under the cost plus approach with reasonable ROE, considering incentives separately may not be required. Similarly the issue of carbon credit is still in its infancy and any order to share such benefit between the developer and KPTCL may act as counterproductive for new investments. ***Hence the Commission does not consider it necessary to factor in such benefits in the tariff****."*

- The Chhattisgarh State Electricity Regulatory Commission (CSERC) in its CSERC (Terms and Conditions for determination of generation tariff and related matters for

electricity generated by plants based on non-conventional sources of energy) Regulations, 2008 has specified no CDM sharing for first 5 years from SHP and biomass projects, as reproduced below:

> *"**10. Clean Development Mechanism (CDM) benefits:** CDM benefits received, if any, by any biomass based plants or SHP will be not be taken into account for the purpose of tariff determination for a period of five years from the date of commercial production."*

11.3 Recent Regulatory Developments on CDM sharing

One such initiative to bring uniformity across the States was through the Forum of Regulators (FOR). FOR in its report on 'Policies on Renewables', released in November 2008, highlighted the deliberations of FOR Working Group to identify some of the critical issues and a few recommendations in the context of sharing of CDM benefits.

The FOR Working Group acknowledged that the project developer puts in significant effort to avail the CDM benefit and hence, there should be a sound basis for modalities and computation to share the benefits between the developer and concerned beneficiary. The Forum of Regulators, in its Report 'Policies on Renewables' has proposed the CDM sharing in incremental manner till it achieves 50-50 sharing, between project developer and licensee, as reproduced below:

> *"The CDM benefits should be shared on the gross basis, with 100% to the developers in the first year after commissioning, and thereafter reducing by 10% every year and sharing that with the beneficiaries till the sixth year. Sixth year onwards the share of both the entities should remain equal till the time those benefits accrue".*

CERC, in its CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009, has proposed the same methodology as recommended by FOR in its report.

11.4 Approach for CDM benefit sharing for Next Control Period

The various issues that needs to be addressed while devising the RE framework for next Control Period are:

- Whether CDM sharing should be proposed considering the expiry of current Control Period for Kyoto Protocol in 2012?
- Whether CDM should be shared as per mechanism proposed in FOR Report?

- How should revenue generated from CDM be factored in while computing the tariff?

The first Control Period specified under Kyoto Protocol is from 2008 to 2012. There is some degree of uncertainty about the continuance of CDM mechanism in the next Control Period. Further, there has been discussion in international forums about specifying the emission reduction targets for fast developing countries like India and China as well. Therefore, considering uncertainty about the status of CDM, the issue is whether the Commission should specify the CDM sharing mechanism for next Control Period.

In this regard, it is to be noted that CDM benefit would be available to the projects, which are registered with UNFCCC for this Control Period, therefore, for all such projects, CDM benefit may be taken into consideration by the Commission.

As regards the mechanism for sharing of CDM benefits between the project developer and the beneficiaries, SERCs have specified varying revenue sharing mechanism for different RE technologies. For the next Control Period, it is proposed that there should be uniform mechanism for sharing of CDM benefits for all RE technologies. Hence, it is proposed to adopt the CDM sharing mechanism recommended by the FOR in its Report on Policies for Renewables as well as adopted by CERC under RE Tariff Regulations, 2009 as reproduced below.

> *The proceeds of carbon credit from approved CDM project shall be shared between generating company and concerned beneficiaries in the following manner, namely:-*
> *a) 100% of the gross proceeds on account of CDM benefit to be retained by the project developer in the first year after the date of commercial operation of the generating station;*
> *b) In the second year, the share of the beneficiaries shall be 10% which shall be progressively increased by 10% every year till it reaches 50%, where after the proceeds shall be shared in equal proportion between the generating company and the beneficiaries.*

Further, there has been debate over whether revenue sharing should be done on net basis, i.e., net of all expenditure incurred by the developer for availing the benefits. The expenditure incurred from initiation to the project registration varies from project to project. Further, the annual verification fees need to be paid by the project developer. Considering the recurring nature of expenditure, it would be difficult to specify CDM sharing on net revenue basis. Therefore, CDM sharing has been proposed from second year in an

incremental manner so that project developer retains maximum revenue so as recover the expenditure incurred for project registration and annual verification.

Another aspect on CDM benefit is how should it be factored in while determining the tariff? One of the possible mechanisms is to consider the standard emission factor for different RE technologies and on that basis, computation for CDM benefit may be done. However, all RE projects are not eligible for CDM benefit, therefore, it would be inappropriate to generalise the CDM benefit sharing for RE projects. Other mechanism may be to deal with this aspect on case to case basis. The Projects which are eligible for CDM benefit should compulsorily intimate the Distribution licensee/beneficiaries and share the CDM benefits as per the methodology specified by the Commission. This mechanism is simple and easy to operate and at the same time, removes the anomalies of earlier mechanism.

Therefore, it is proposed that CDM benefit should not be factored in at the time of determination of tariff for RE projects and the projects that avail CDM benefit shall share it as per the proposed methodology.