

India: Implementing incentives focused on energy

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INDIA'S CLIMATE POLICY PRIORITIES: ENERGY EFFICIENCY AND RENEWABLE ENERGY

Two of the eight missions under the National Action Plan on Climate Change (NAPCC) focus on solar energy and energy efficiency. Several initiatives have been recently taken by central and states governments and are likely to play a role in determining the overall success of the country's climate policy. But it is still early days for making any substantive evaluation of the policy instruments being implemented in India.

MARKET-BASED MECHANISMS FOR RENEWABLE ENERGY TARGETS

The principal instruments related to renewable energy are similar to those being implemented in developed countries: preferential tariffs for renewable energy, Renewable Purchase Obligations (RPO) and a variety of subsidies and other incentives. In early 2011 trading of Renewable Energy Certificates (REC) has been allowed in order to make the RPO more flexible and efficient. Time will be the test of the overall impact of such measures, and of the role played by renewable sources in the Indian energy mix.

INDIA'S ENERGY EFFICIENCY POLICY: THE PAT SCHEME

The Perform, Achieve and Trade (PAT) scheme, a first-of-its-kind initiative in the developing world, intends to enhance the cost-effectiveness of energy efficiency in energy-intensive industries by certifying energy savings and enabling their trading. Other energy efficiency policy instruments seek to accelerate the shift to energy efficient appliances, create mechanisms that would help to finance demand-side management programmes, provide fiscal incentives that may supplement the creation of energy efficiency markets, etc.

TOWARDS A LOW-CARBON DEVELOPMENT STRATEGY

Apart from the already mentioned policies, no substantive regulatory measures have yet been implemented in sectors such as transportation, or specific industry sectors. An expert group of the Planning Commission is thus in the process of finalising a roadmap for low-carbon inclusive growth, which is one pillar of the 12th Five Year Plan (2012-2017), including sector-specific proposals as well as suggestions for enabling legislation, rules and policies.

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Note: At the time of this Working Paper going to press, the Ministry of Power has notified rules to implement the PAT scheme. The rules provide for establishment of energy consumption norms and standards for the designated consumers (DCs) in notified sectors, procedures for monitoring and verification and issuance of ESCerts. Negotiability between ESCerts and RECs has however not been provided for as of now. Simultaneously, another notification has been made regarding energy consumption norms and standards for the DCs in the notified sectors.



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LIST OF ACRONYMS

BEE	Bureau of Energy Efficiency	MTEE	Market Transformation for Energy Efficiency
CDM	Clean Development Mechanism	NAPCC	National Action Plan on Climate Change
CERC	Central Electricity Regulatory Commission	NLDC	National Load Dispatch Centre
CFL	Compact Fluorescent Lamps	NMEEE	National Mission on Enhanced Energy Efficiency
DC	Designated Consumer	PAT	Perform Achieve Trade
DENA	Designated Energy Auditors	PoA	Programme of Activities
DISCOM	Distribution Companies	PV	Photovoltaic
EA	Electricity Act, 2003	PXIL	Power Exchange India Limited
ECA	Energy Conservation Act, 2001	RE	Renewable Energy
EE	Energy Efficiency	REC	Renewable Energy Certificate
EEFP	Energy Efficiency Financing Platform	RPO	Renewable Purchase Obligation
ESCerts	Energy Savings Certificates	SAPCC	State Action Plan on Climate Change
ESCO	Energy Service Company	SERC	State Electricity Regulatory Commission
FEEED	Framework for Energy Efficient Economic Development	UNFCCC	United Nations Framework Convention on Climate Change
GOI	Government of India	VAT	Value Added Tax
GRIHA	Green Rating for Integrated Habitat Assessment		
IEX	India Energy Exchange		
JNNSM	Jawaharlal Nehru National Solar Mission		
MoEF	Ministry of Environment and Forests		
MNRE	Ministry of New and Renewable Energy		

1. INTRODUCTION

The objective of this paper is to identify the nature of incentives available in India to address climate change, specifically by encouraging Renewable Energy (RE) and Energy Efficiency (EE) initiatives, both of which are fundamental to India's climate change strategy. Higher fossil fuel prices, energy security concerns and environmental considerations constitute the composite factors behind the regulatory impetus for RE and EE in India. However, the practical impetus for RE and EE initiatives can be clearly traced to the overall policy thrust to address climate change.

India has a federal governance structure. Under this, energy is a subject over which both the Central and State Governments have jurisdiction to legislate. The policy and legislative landscape on RE and EE in India therefore comprises initiatives at both central and State levels. At the central level, the Electricity Act mandates that RE should be an integral component of any national policy on electricity, and this was reflected in the National Electricity Policy of 2005, which highlighted the need for RE because it was 'environmentally friendly'. The specific nexus with climate change emerged three years later under the National Action Plan on Climate Change (NAPCC). The NAPCC has eight missions that address different issues.¹ Six

of the missions (on solar energy, energy efficiency, water, sustainable habitat, "green India", and knowledge management for climate change) have been approved so far, and are at various stages of implementation.

Additionally, low-carbon, inclusive growth is one of the pillars of the 12th Five-Year Plan (2012-2017). The Planning Commission of India, which designs 'five-year plans' providing the broad policy thrust for implementation by the Government, has constituted an expert group that is in the process of finalising its suggestions for low carbon strategies to be implemented in India.

Policies and incentive schemes for various sources of RE have been formulated and implemented at the central level by the Central Government's Ministry of New and Renewable Energy (MNRE). At the State level, sector-specific incentives have been formulated by several State Governments. Some States have also formulated policy documents that focus on special incentives for RE, building on actions envisaged at the central level. In respect of energy efficiency, the Bureau of Energy Efficiency (BEE), constituted under the Ministry of Power, is the nodal agency responsible for various programmes and schemes, including implementation of the national energy efficiency mission under the NAPCC.

The overall focus of the Government in the past two years has been to conceptualise and frame a mix of both mandatory and voluntary measures

1. The eight missions conceptualised under the NAPCC are as follows: (i) National Solar Mission; (ii) National Mission for Enhanced Energy Efficiency; (iii) National Mission on Sustainable Habitat; (iv) National Water Mission; (v) National Mission for Sustaining the Himalayan Ecosystem; (vi) National Mission for a

"Green India"; (vii) National Mission for Sustainable Agriculture; (viii) National Mission on Strategic Knowledge for Climate Change

that would steer greater focus and investment in clean energy initiatives. The strategy and policy framework for this emerges from the NAPCC. Additionally, as already noted, an expert group of the Planning Commission is in the process of finalising a roadmap for low-carbon growth, including sector-specific proposals for the 12th Five Year Plan (2012-2017), as well as suggestions for enabling legislation, rules and policies. This is a significant mandate considering that low-carbon inclusive growth is one of the pillars of the 12th Five-Year Plan.

The recommendations of the Planning Commission's expert group are likely to have a significant bearing on the evolution and implementation of the various strategies and programmes that are currently being considered. The group, in its interim report, noted that by implementing existing policies, India can achieve an emission intensity reduction of nearly 25% by 2020 compared to 2005 levels, accounting for a growth rate of 8%, and a 24% reduction at 9% growth. It further notes that with external development assistance and technology transfer, a 35% emission intensity reduction by 2020 could even be possible.

The expert group recognises the fact that the component of RE in India's current energy mix is negligible, and needs to be enhanced. Its recommendations include those pertaining to RE and EE, fuel efficiency in the transportation sector, and emission reductions in industries like steel, cement, oil and gas via the adaptation of new technologies.

There have been numerous criticisms of the Planning Commission's interim report, in that it is not ambitious enough in laying out a clear roadmap for achieving emission reduction targets. Our paper does not seek to evaluate this aspect. Instead, the focus of this paper is on the regulatory mix of incentives that have been envisaged and are being implemented by the Central and State Governments, and which are likely to play a role in determining the overall success of the country's climate policy. In this regard, it is important to note that apart from RE and EE, no substantive regulatory measures have as yet been implemented in sectors such as transportation, or specific industry sectors. The focus of our paper will therefore be on the incentives and subsidies being granted to RE and EE sectors in India.

It is still early days for making any substantive evaluation of the policy instruments being implemented in India. However, the level of seriousness and commitment of both the Central and State Governments is evidenced in the steps towards implementation that are already being taken, especially in relation to RE. The principal instruments in this regard are similar to those being implemented in

developed countries of the EU – preferential tariffs for RE, Renewable Purchase Obligations, Renewable Energy Certificates, and a variety of subsidies and other incentives. Each of these instruments has shown a significant positive impact, as well as certain pitfalls, in the energy markets of EU countries. These have not necessarily been taken into account while framing and implementing these measures in Indian markets, and time will be the test of the overall impact of such measures.

In relation to EE, the Government has enacted a National Mission on Enhanced Energy Efficiency (NMEEE). The Government's estimate is that the size of the market for energy efficiency in India is approximately Rs. 740 billion², and that implementation of the NMEEE has the potential for reducing carbon dioxide emissions by 98.55 million tonnes annually.³ One of the innovative market-based mechanisms that is being envisaged to implement the NMEEE is the 'Perform, Achieve and Trade' (PAT) scheme, which will allow businesses in notified energy-intensive sectors that use more energy than stipulated to buy tradable energy saving certificates, or Escerts, from those using less energy, thereby creating a market estimated by the government. Commentators have observed that while the concept of PAT is broadly based on the EU ETS, there is no exact parallel to the PAT scheme in any other country; and in that sense it is a unique scheme.

We summarise below some of the trends in regulatory developments that seem to hold promise for the future of RE and EE in India:

- The last three years, in particular, have seen gradual market expansion to include the establishment of large-scale grid-connected solar power plants, through the installation of solar PV panels on rooftops of buildings or in open land. These developments were given a welcome and significant thrust in January 2010 with the announcement of the National Solar Mission and its emphasis on grid-connected solar plants. The plan has an ambitious target of generating 20 000 MW of grid-connected solar power by 2022, in addition to another 2 000 MW of off-grid installations, as a key measure to upscale and mainstream the use of renewable energy towards addressing the twin issues of ensuring

2. In order to stick to Indian national monetary values (as legally published) and to avoid any approximation due to the conversion of currencies, we voluntarily maintain all monetary values expressed in current Rupees (Rs.). The reader who would like to have a quick estimation of the values in Euros can take an approximate conversion factor of € 1.5 for Rs. 100.

3. Bureau of Energy Efficiency, PAT Consultation Document, January 2011

energy security and combating global climate change.

- Towards this end, projects for 200 MW and 350 MW capacity have been awarded respectively in the first and second batches of Phase I of the National Solar Mission.
- In addition to developments at the central level, the States of Gujarat and Rajasthan have taken significant steps in the development of solar projects. The State of Gujarat has reportedly signed power purchase agreements for over 950 MW of solar power already. The State of Rajasthan's solar policy seeks to develop the State as a global hub of solar power, with targeted capacity addition of 10 000-12 000 MW in the next decade. Also, the State of Karnataka has proposed the installation of 200 MW of solar power by 2015-16 under its solar policy.
- India has a total wind power capacity of 13 184 MW (as of January 2011), with the States of Tamil Nadu, Maharashtra, Gujarat and Rajasthan taking the lead in this regard.
- Renewable Purchase Obligations and Renewable Energy Tariffs have been notified by all the States in India, and there are penal provisions for the enforcement of these.
- Renewable energy also plays a significant role in the Government's rural electrification policy. The MNRE has been supporting programmes for the deployment of RE devices and systems such as biogas plants, biomass gasifiers, solar cookers and solar thermal systems in rural areas of the country. It has also been implementing the "remote village electrification" programme through State agencies, to provide electricity using RE in remote unelectrified villages and hamlets that are not connected to the grid.
- Energy efficiency measures, both voluntary and mandatory, are being formulated and implemented progressively.
- The PAT scheme, once operational, holds the promise of being a significant market-based mechanism to achieve EE goals.
- These developments provide an indication of the Government's commitment to operationalising clean energy policy. We will discuss below specific developments in this regard.

2. CLIMATE CHANGE ACTION PLANS

2.1. National Action Plan on Climate Change ("NAPCC")

As discussed earlier, six of the eight missions envisaged in the NAPCC have been approved, while the missions on sustainable agriculture and sustaining

BOX 1

OVERVIEW OF THE INSTITUTIONAL FRAMEWORK AT THE CENTRAL AND STATE LEVEL FOR RE & EE

RENEWABLE ENERGY

CENTRAL LEVEL

- Planning Commission, which provides the broad policy thrust to the Central Government;
- Ministry of New and Renewable Energy (MNRE), which is the nodal agency of the Central Government for all matters relating to non-conventional/renewable energy;
- Central Electricity Regulatory Commission (CERC), which is responsible for specifying the norms for tariff determination;
- Indian Renewable Energy Development Agency (IREDA), which functions as the financing arm of the MNRE and secures funds to lend to end-users, manufacturers and entrepreneurs;
- Rural Electrification Corporation Limited, which provides financial assistance to State electricity boards and State Government departments for rural electrification projects sponsored by them.

STATE LEVEL

- State Electricity Regulatory Commissions (SERC) issue regulations/orders on the determination of tariffs and other relevant charges for the sale and distribution of electricity, and the determination of renewable purchase obligations.
- Renewable Energy Development Authorities in different States have a key role to play in coordinating the regulatory frameworks for RE.

ENERGY EFFICIENCY

CENTRAL LEVEL

- Planning Commission, which provides the broad policy thrust to the Central Government.
- Bureau of Energy Efficiency (BEE), operating under the Ministry of Power, spearheading energy efficiency efforts in the country;

STATE LEVEL

- State Designated Agencies (SDA) have been notified under the provisions of the ECA in all States/UTs to implement the ECA and EE measures in their respective States.

the Himalayan ecosystem have received in-principle approval but are still being developed. The main features of these missions are as follows:

- **The National Solar Mission**, which sets forth specific goals relating to the use of solar thermal and photovoltaic technologies in energy generation. It recommends three implementation stages leading up to an installed capacity of 20 000 MW by the end of 2022;
- **The National Water Mission** seeks to prepare a comprehensive water database and to assess the impact of climate change on water resources; to promote citizen and State actions for water conservation, augmentation and preservation; to increase water use efficiency by 20%; and to promote basin-level integrated water resources management;
- **The National Mission for Enhanced Energy Efficiency** recommends mandating specific

energy consumption decreases in large energy-using industries, including a system for companies to trade energy savings certificates. It also highlights the use of incentives, including reduced taxes on energy-efficient appliances;

- **The National Mission on Sustainable Habitat** seeks to promote energy efficiency as an essential component of urban planning. It calls for extending the Energy Conservation Building Code, and emphasises urban waste management and recycling, including power production from waste;
- **The National Mission for a Green India** acknowledges the importance of forests for environmental improvement through climate mitigation, food security, water security, biodiversity conservation and livelihood security of forest-dependent communities. It proposes taking steps regarding the quality of forests and ecosystem services.
- **The National Mission on Strategic Knowledge for Climate Change** calls for the establishment of a Climate Science Research Fund, improved climate modelling capacities, and increased international collaboration.

2.2. State Action Plan on Climate Change (“SAPCC”)

The State Governments are also drafting their respective State Action Plan on Climate Change (SAPCC) to complement the NAPCC, as required by the Ministry of Environment and Forests (MoEF). The MoEF has circulated a set of guidelines to the States for the preparation of their respective SAPCC, which *inter alia* require the State (i) to address State-specific priority issues while creating an enabling environment for the implementation of NAPCC at State level, and (ii) to link with national policies and programmes for consistency and to identify financial and policy support that may be available.⁴

The States were advised to finalise their SAPCCs by 31 March 2011, which was later extended to 30 September 2011. However, as of 29 September 2011, only 16 States were reported to have submitted their SAPCCs to the MoEF. These draft SAPCCs identify State-specific climate change problems, assess ongoing initiatives, identify gaps in existing programmes and list the required institutional structures, funds, and policy measures. In doing so, sectors like agriculture, forests and biodiversity, energy, human welfare and urban development are discussed in some detail.

4. See draft report on “Karnataka State Action Plan on Climate Change”, 17 September 2011

Specifically in relation to RE and EE, the draft SAPCCs mostly record the existing MNRE and State Government-specific schemes being implemented in the respective States to encourage RE. They identify the key priorities for the State in the development of RE and EE, and propose broad action points (such as detailed studies and data collection) for further action.

3. RENEWABLE ENERGY (“RE”)

3.1. Legislation

The legislative framework to support policy mandate regarding RE in India is primarily provided by the Electricity Act, 2003 (EA), under which the electricity regulatory commissions have been constituted at the Central and State levels.

The EA provides the legislative framework for three critical mechanisms for encouraging RE in India, namely: (i) a separate tariff for RE sources; (ii) Renewable Purchase Obligations (RPO); and (iii) Renewable Energy Certificates (RECs).

3.2. Key Fiscal incentives: Tariffs, RPOs, RECs

(i) Renewable energy tariffs

The mandate to set preferential tariffs for energy from RE sources was set out in the National Tariff Policy in 2006, which recognised that it would take some time before non-conventional technologies can compete with conventional sources in terms of the cost of electricity. It therefore mandated procurement of electricity by distribution companies (DISCOMs) at preferential tariffs to be determined by the appropriate electricity regulatory commission.

The EA specifies several factors that need to be taken into account by both the CERC and SERCs while determining tariffs, including the “promotion of cogeneration and generation of electricity from renewable sources of energy”.⁵ The mandate for tariff setting in India is within the jurisdiction of the CERCs and the SERCs.

The CERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources) Regulations, 2009, notified in September 2009 (**CERC RE Regulations**), provide the basis on which CERC has been setting tariffs on an annual basis. CERC RE regulations are applicable to wind,

5. Section 61, EA.

small hydro, biomass, non-fossil fuel-based co-generation, solar thermal and solar PV projects, as more specifically defined in the CERC RE Regulations. The generalised levelised tariff (calculated by carrying out levelisation for the ‘useful life’⁶ of each technology considering the discount factor for the time value of money) for RE projects, as specified by the CERC for 2011-12, is provided in Appendix A. In addition, private developers have the option to apply for project-specific tariffs on a case-to-case basis for specific categories of projects.

The CERC is currently holding public consultations to revise the CERC RE Regulations, *inter alia* amending certain key parameters on the basis of which RE tariffs are determined.

At the State level, the SERCs have been determining tariffs for RE projects (including solar thermal, solar PV, wind, biomass, small hydro) located within their jurisdiction. The SERCs base their orders on the CERC RE Regulations. However, the RE tariffs vary across the different States of India. For example, the State of Tamil Nadu offers the highest solar PV tariff of Rs. 18.45/kWh and a solar thermal tariff of Rs. 15.51, and on the other hand the State of Karnataka offers the lowest tariff of Rs. 14.50/kWh for solar PV, and Rs. 11.35/kWh for solar thermal. In addition, the wind power tariff for one of the zones in the State of Uttarakhand is the highest, at Rs. 5.15/kWh, and in the State of Kerala is only Rs. 3.14/kWh.

To illustrate the range of tariffs applicable in different States, Appendixes B and C provide details regarding preferential tariffs specified by SERCs for solar (thermal and PV) and wind power projects respectively.

(ii) Renewable Purchase Obligations

The EA, under Section 86(1)(e), mandates each SERC to promote the generation and cogeneration of electricity from renewable energy sources by specifying a percentage of total electricity consumption in the area of a distribution licensee for the purchase of electricity from such sources. The EA does not use the term ‘RPO’. This term has been used and defined under the CERC (Terms and Conditions for Recognition and Issuance of Renewable Energy Certificates (REC) for Renewable Energy Generation) Regulations, 2010, as “the requirement specified by the State Commissions under clause (e) of sub section (1) of Section 86 of the Electricity Act,

2003, for the “obligated entity” to purchase electricity from renewable energy sources”.⁷

The National Tariff Policy was amended in 2011 to require SERCs to fix solar-specific RPOs, which may start with 0.25% by the end of 2012-2013 and go up to 3% by 2022.⁸ Thus, the SERCs have the mandate to specify the total RPO, and within that the solar-specific RPO.

The SERCs of 26 States have so far issued orders/regulations specifying RPOs. Except for West Bengal, all other States specifying RPOs have also notified the solar-specific RPOs. Notable amongst the States which are yet to announce RPOs is Delhi. Appendix D specifies the RPO percentages in the SERC orders and regulations of different States. These vary on certain aspects, such as the RPO percentage, the nature of obligated entities, the eligible renewable energy sources for fulfilling the RPO and the enforcement/compliance mechanism.

Enforcement and penalties

The EA provides for certain penalties for non-compliance with directions issued by the SERCs/CERC, which would also be applicable in the case of non-compliance with RPOs. These include: a penalty not exceeding Rs. 100,000 for each instance of non-compliance, and in case of continuing failure, an additional penalty, which may extend to Rs. 6 000 for every day during which the failure continues after contravention of the first direction.

The SERCs have specified in their orders and regulations specific enforcement mechanisms and penalties in the event of the contravention of RPOs. Most SERCs⁹ provide that if an obligated entity does not fulfil the RPO during any year, the SERC may direct the obligated entity to deposit into a separate fund, to be created and maintained by that obligated entity, such amount as the SERC may determine on the basis of the shortfall in units of RPO and a forbearance price decided by the CERC. This fund will then be used for activities specified by the SERC. Some SERCs also provide that in case of ‘genuine difficulty’ in complying with the RPO because of the non-availability of certificates, the obligated

6. Sub-clause (y) of clause(1) of Regulation 2 of the CERC RE Tariff Regulations defines ‘useful life’ in relation to a unit of a generating station (including the evacuation system) to mean a specified duration from the date of commercial operation of such a generation facility.

7. Clause 2(m) of the CERC (Terms and Conditions for recognition and issuance of Renewable Energy Certificates for Renewable Energy Generation) Regulations, 2010.

8. Ministry of Power, “Clarification regarding Para 6.4 of the Tariff Policy- regarding”, 19 April 2011, No. 23/2/2005-R&R (Vol-V)

9. For example, in Gujarat, Maharashtra, Himachal Pradesh, Karnataka, Haryana, Tamil Nadu, Punjab, Delhi, Uttar Pradesh, Madhya Pradesh, Uttarakhand, Rajasthan, Jammu and Kashmir, Rajasthan, Nagaland, Meghalaya, Jharkhand, Orissa, Tripura, Bihar, Goa, Manipur and Mizoram.

entity can approach the SERC to carry forward the compliance requirement into the next year.¹⁰

In this context, it is important to note that RPO percentages have been revised downwards by various SERCs. For instance, the SERCs of the States of Nagaland, Chhattisgarh, Rajasthan, Tamil Nadu, and Himachal Pradesh have reviewed and reduced the RPO percentages specified by them earlier. One of the reasons for such a downward revision has been the recognition of difficulties faced in fulfilling the RPO. For example, the order of the SERC in the State of Himachal Pradesh notifying a downward revision in the RPO records *inter alia* that sufficient solar power capacity has not been developed within Himachal Pradesh for the obligated entities to fulfil their RPO, and other RE technologies are yet to be tested in the State.¹¹

(iii) Renewable Energy Certificates

As discussed earlier, the National Tariff Policy recognises renewable energy certificates (RECs) as a desirable mechanism to enable the purchase of RE power in different States in similar proportions.¹² The REC mechanism has been operational in India since March 2011.

The CERC notified the CERC (Terms and Conditions for Recognition and Issuance of Renewable Energy Certificate (REC) for Renewable Energy Generation) Regulations, 2010, (REC Regulations)¹³. These REC Regulations are applicable throughout India except in the State of Jammu and Kashmir. The REC Regulations aim to address the mismatch between the availability of renewable energy sources in States and the requirement placed on certain entities to meet their RPO by purchasing RECs. One REC represents 1 MWh of electricity that is generated from renewable sources and is injected into the grid.¹⁴ “Renewable energy sources” under the REC

10. For example, Haryana, Tamil Nadu, Kerala, Karnataka, Punjab, Delhi, Assam, Nagaland, Meghalaya, Jharkhand, Orissa, Tripura, Bihar, Goa, Manipur, Mizoram

11. Himachal Pradesh Electricity Regulatory Commission, “Himachal Pradesh Electricity Regulatory Commission (Renewable Power Purchase Obligation and its Compliance) (First Amendment) Regulations, 2011”, dated 3 October 2011

12. See Para 6.4(1) (ii) of the National Tariff Policy; Ministry of Power, “Clarification regarding Para 6.4 of the Tariff Policy- regarding”, 19 April 2011, No. 23/2/2005-R&R (Vol-V)

13. Notified on 14 January, 2010 and amended *vide* the CERC (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) (First Amendment) Regulations, 2010 on 29 September 2010.

14. See Regulation 7(6) of the REC Regulation

BOX 2 FRAMEWORK FOR THE APPLICATION AND ISSUANCE OF RECS

1. Accreditation through State Agencies.

State Agencies endorse the RE generator and recommend its registration.

19 States have notified State Agencies, however the following States do not: (i) Delhi, (ii) Tamil Nadu, (iii) Goa, (iv) West Bengal, (v) Uttarakhand, (vi) Meghalaya, (vii) Nagaland, (viii) Andhra Pradesh, (ix) Karnataka, (x) Arunachal Pradesh.¹

2. Registration through Central Agency- National Load Dispatch Centre (NLDC)

The NLDC notified as the ‘central agency’ for registration of RE generators as eligible entities *vide* CERC order dated 29 January 2010. Registration can be done only after receipt of certificate of accreditation from the State Agency.

3. Issuance by NLDC

The State Load Despatch Centre (SLDC) certifies the energy injected into the grid.

The eligible entity applies to the NLDC to issue the REC certificates based on SLDC certification.

Application for issuance of RECs can be made on 1st or 15th of every month to the NLDC, and the NLDC shall issue the RECs within 15 days of the date of application.

4. Trading through power exchanges

Trading of RECs amongst eligible entities and obligated entities shall be undertaken through power exchanges only, or in any other manner specified by the CERC.

Only single transfers are permitted, and repeated trade of the same REC is not possible.

The CERC has also notified the Power Market Regulations, 2010.²

5. Forbearance price and floor price

The price of RECs is discovered on power exchanges, within the floor price (minimum price) and the forbearance price (maximum price) fixed by the CERC.³

For FY 2011-12, the floor price and forbearance price for RECs are as follows: > Solar: Rs 12 000/MWh - Rs 17 000/MWh; > Non-solar: Rs 1 500/MWh - Rs 3 900/MWh

For FY 2012-13 to 2016-17, the floor price and forbearance price for RECs will be as follows: > Solar: Rs 9 300/MWh - Rs 13 400/MWh; > Non-solar: Rs 1 500/MWh - Rs 3 300/MWh

6. Surrender of RECs

Obligated entities can surrender the RECs purchased from power exchanges to the State Electricity Regulatory Commissions or any other specified agency.

The NLDC is required to maintain a record of RECs sold and purchased.

1. NLDC

2. Notification No L-1/13/2010 dated 20 January 2010.

3. Regulations 2(f) and 2(g) read with Regulation 9 of the REC Regulations.

4. CERC Order dated 1 June 2010 Petition No. 99/2010 in the matter of Determination of Forbearance price and Floor Price for REC framework.

5. CERC Order dated 23 August 2011, Petition No. 142/2011 (Suo Motu) in the matter of Determination of Forbearance and Floor Price for the REC framework to be applicable from 1 April 2012.

Regulations are renewable sources such as small hydro, wind, solar including its integration with combined cycle, biomass, bio-fuel cogeneration, urban or municipal waste and such other sources as recognised or approved by the MNRE.¹⁵

Entities engaged in the generation of electricity based on RE sources and to which RECs are issued in accordance with the RE Regulations are termed “eligible entities”¹⁶. The eligible entities sell the RECs to “obligated entities”, which include distribution licensees, open access consumers, and captive power plant consumers, which have to purchase the RECs to enable them to meet their RPO.

Institutional mechanism for RECs

The legal framework for the issuance of RECs is based on institutional mechanisms at both the central and State levels. Box 2 below summarises the framework for the application and issuance of RECs, and specifies the agencies involved at each step.

Types of RECs: Solar and Non-solar

The REC Regulations provide for two types of RECs: solar and non-solar. **Solar RECs** will be issued to eligible entities for the generation of electricity based on solar power, and **Non-Solar RECs** will be issued for the generation of electricity based on renewable energy sources other than solar.¹⁷

Validity of RECs

The validity of RECs is 365 days from the date of issuance. These certificates are deemed to have been extinguished after they have been exchanged by way of sale or purchase at the power exchange.¹⁸

Trading in RECs: Experience so far

Trading in RECs commenced as of February and March 2011 respectively at the India Energy Exchange (IEX)¹⁹ and the Power Exchange India Limited (PXIL)²⁰. The REC trading information available from IEX and PXIL indicates that only non-solar RECs are being traded. Trading in solar RECs has not occurred to date because there have been no solar RECs available for purchase, though there has been some demand for them.²¹

At the end of November 2011, 459 285 RECs had reportedly been issued, and 326 628 RECs had been redeemed in India.²²

3.3. Other fiscal incentives

A. Grants/ Subsidies

The MNRE has notified various schemes that seek to promote different categories of RE projects through financial assistance for the development of the RE project. The financial support is typically in the form of capital subsidies, interest subsidies and viability gap funding.

To illustrate this, a few examples are provided below:

(a) *Generation-based incentives*: A generation-based incentive (GBI) is the payment of a certain sum linked to the RE power generated. The MNRE has GBI schemes for solar PV and solar thermal power projects, which provide for payment of a certain specified sum for each unit of electricity produced by the RE plant.²³ GBI is also being used by the MNRE to incentivise rooftop PV and small solar power projects²⁴ and wind power projects²⁵.

(b) *Capital and interest subsidies*: Some examples of schemes providing financial assistance are as follows:

- The MNRE provides financial support through a combination of a 30% subsidy and/or 5% interest bearing loans for solar off-grid projects. In addition, a capital subsidy of 90% of the benchmark cost is available for solar off-grid applications in identified States (including Sikkim, Himachal Pradesh and Uttarakhand).²⁶ Interest and capital subsidies are also provided to encourage the use of solar water heaters.²⁷
- Financial support is provided to banks and micro-financing institutions so that they may

22. Renewable Energy Certificate Registry of India

23. Guidelines for Generation Based Incentive (GBI) for Grid Interactive: (i) Solar PV Power Generation Projects (January 2008) (“GBI Solar PV Guidelines”); and (ii) Solar Thermal Power Generation Projects (March 2008) (“GBI Solar Thermal Guidelines”)

24. See MNRE’s “Rooftop PV and Small Solar Power Generation Program”

25. See MNRE’s “Scheme for Generation Based Incentives for Wind Power Projects”

26. See MNRE’s “Guidelines for Off-Grid and Decentralized Solar Applications”

27. See MNRE’s “Scheme for Accelerated development and deployment of Solar Water Heating systems in domestic, industrial and commercial sectors”

15. Regulation 2(l) of the REC Regulation.

16. Regulation 2(e) and 4 of the REC Regulation

17. Regulation 4 of the REC Regulation.

18. Regulation 10 of the REC Regulation.

19. IEX

20. PXIL

21. See IEX and PXIL

extend loans to support the installation of solar home lighting and other small solar power systems.²⁸

- The MNRE's Small Hydro Power Programme (up to 25 MW capacity) provides for central financial assistance to develop SHPs through five different schemes (for the identification of new potential SHP sites; to set up SHP projects in the private/cooperative/joint sector and in the public sector; for the renovation of existing SHPs and for the development of water mills and micro hydel projects up to 100 kw).²⁹

B. Direct tax benefits

RE projects may avail of benefits available generally to power plants under the Income Tax Act, 1961, subject to fulfilment of criteria specified therein, for example:

(a) *Accelerated Depreciation*: RE projects may avail of benefit for accelerated depreciation up to 80% of the project cost in the first year, and additional depreciation at the rate of 20% for projects commissioned after March 2005 with new plant and machinery³⁰.

(b) *Tax holiday*: Income tax exemption on earnings for 10 years³¹ may also be availed by RE projects.

C. Indirect tax benefits

(a) RE projects may benefit from a series of indirect tax benefits at the central level on customs duty, excise duty and central sales tax.

- (i) A concessional customs duty and exemption from central excise duty has been provided to certain machinery required for the initial setting up of solar PV and solar thermal power generating units.³²
- (ii) A customs duty exemption at 5% has been provided for a series of equipment required in wind power plants.³³

- (iii) An excise duty exemption has been provided for wind operated electricity generators and their components, water pumping wind mills, wind aero-generators and battery chargers,³⁴ and specified goods for the manufacture of rotor blades for wind operated electricity generators.³⁵

(b) At the State level, different State governments have notified indirect tax benefits for RE projects. These benefits have been notified either through RE policies that cover all categories of RE projects, or through RE technology-specific schemes (for instance, State level solar power or small hydro power policy).

- (i) In the State of Karnataka, RE projects benefit from a 100% exemption from entry tax on "plant and machinery and capital goods" for the initial three years from the date of commencement of the project; and also a 100% exemption on raw materials, inputs, component parts and certain consumables for five years from the commencement of commercial production.³⁶
- (ii) In the States of Orissa³⁷, Punjab³⁸, Maharashtra³⁹, and Haryana⁴⁰, the power generated from RE projects is exempted from electricity duty.
- (iii) In the State of Jammu and Kashmir, pursuant to the small hydro power policy for projects up to 25 MW, power generation, transmission equipment and building used in these projects are exempted from entry tax.⁴¹
- (iv) In the State of Punjab, octroi on energy generation and RE devices/equipment/machinery for RE projects is exempted.⁴²

28. See MNRE Scheme for Incentives to banks/ micro financing institutions to support installation of solar home lighting and other small solar systems through loans (17 August 2009)

29. MNRE's "Small Hydro Power Programme (up to 25 MW capacity)" dated 11 December 2009

30. Section 32 of Income Tax Act, 1961 read with Rule 5 of the Income Tax Rules, 1962.

31. Section 80IA of the Income Tax Act, 1961.

32. These concessions were made effective *vide* notification 30/2010 (customs) and notification 15/2010 (central excise), both dated 27 February 2010, and issued by the Department of Revenue (Ministry of Finance).

33. For instance, wind operated electricity generators up to 30 KW and wind operated battery charges up to 30 KW; parts of wind operated electricity generators for the manufacture or maintenance of wind operated electricity generators, namely special bearings, gear box, yaw components, sensors, brake hydraulics, flexible

coupling, brake callipers, wind turbine controllers, and parts of these goods; blades of rotor of wind operated electricity generators, for the manufacture, maintenance of wind operated electricity generators; etc.; Notification No 21/2002 customs dated 1 March 2002 and amended by Notification No.11/2006 customs dated 1 March 2006

34. Notification No. 6/2002, 1 March 2002

35. Notification No 29/2005 dated 31 May 2005; <http://www.cbec.gov.in/excise/cx-circulars/cx-circulars-05/duty4specified-guds.htm>

36. Karnataka Renewable Energy Policy 2009-14

37. Policy Guidelines on Power generation from Non-Conventional Energy Sources in Orissa, Government of Orissa

38. Punjab New and Renewable Sources of Energy Policy, 2006

39. Incentives declared by State Government of Maharashtra for Private Sector Wind Power Projects for projects commissioned after 1 April 2003

40. Haryana Government, "Policy for Promoting Generation of Electricity through Renewable Energy Sources"

41. J&K policy on Development of SHP projects up to 25 MW

42. Punjab New and Renewable Sources of Energy Policy, 2006

- (v) In the State of Andhra Pradesh, an exemption from general sales tax is provided for the sale of a series of RE equipment such as flat plate solar collectors, solar water heaters and systems, solar cookers of various sizes, biogas plants, solar PV cells, biomass devices, and wind mills, etc⁴³.

D. Creation of 'green' funds

The RE policy of the Karnataka Government provides for the constitution of a "green energy fund" that will facilitate RE project financing and energy efficiency measures. The contributions to this fund will be through levy of a "green energy cess" of Rs. 0.05 per unit on the electricity supplied to commercial and industrial consumers.⁴⁴

Similarly, the Punjab Government's policy on RE provides for an RE fund that will finance research and development and demonstration projects, and encourage the commercialisation of RE projects.⁴⁵

E. Transmission Charges

The renewable energy policy in the State of Orissa provides that no transmission charges will be levied for captive power plants or RE maintenance for a period of five years from the date of commissioning.⁴⁶ Similarly, the wind power policy of the Andhra Pradesh State Government envisages concessions in transmission charges for wind power projects established in the State.⁴⁷

3.4. Non-fiscal incentives

Project developers in India typically find the process of land acquisition and obtaining various government clearances daunting and time consuming. In this context, it is relevant to note that a few State-level policies provide impetus to RE projects by offering non-fiscal incentives, such as assistance in the acquisition of land for RE projects, and facilitate the procedures for obtaining necessary clearances from various government agencies.

A. Assistance in the acquisition of land for RE projects

43. G.O.Ms No.55 dated 31 January 2000; Government of Andhra Pradesh

44. Karnataka Renewable Energy Policy 2009-14

45. Punjab New and Renewable Sources of Energy Policy, 2006

46. Policy Guidelines on Power generation from Non-Conventional Energy Sources in Orissa, Government of Orissa

47. "Development of Wind Power in Andhra Pradesh- New Wind Power Policy", G.O.Ms No. 48 Energy (RES) Department, dated 11 April 2008;

- The RE policy of the State of Karnataka provides for the identification of surplus and unused land in the State that may be used for RE projects, and the provision of such land to the nodal agency for the development of RE in the State. It also proposes suitable amendments to the local land laws to enable RE project developers to purchase suitable private land directly from the owners of the land.⁴⁸

- The Orissa Government's guidelines for RE power generation provide that Government land marked for industry under the land bank scheme, and other Government land wherever applicable, will be provided for units generating power from RE sources.⁴⁹

- The RE policy in the State of Punjab provides for the leasing of government land for RE projects on nominal lease rent. It permits the use of agricultural land for RE projects, without payment of conversion charges for changes in land use.⁵⁰

- The renewable energy policy of the State of Haryana provides that the State Government will acquire land if necessary, at the cost of independent power producers in case a request is made in this regard. In addition, the establishment of RE projects on agricultural land is permitted without payment of conversion charges for changes in land use.⁵¹

B. Single window clearance

- The Karnataka Government's RE policy proposes that the State's nodal agency for RE development will assist RE project developers by pursuing statutory clearances required for RE projects. It also envisages the formation of a State-level empowered committee to provide single window clearance for the development of RE source power plants.⁵²

- The Orissa Government's RE policy also provides that the Orissa Government will extend all possible cooperation for obtaining clearances from various State Government departments.⁵³

- The RE policy for the State of Punjab specifies that the State Government will constitute a

48. Government Order No. EN 354 NCE, 2008 Bangalore dated 19 January 2010

49. Policy Guidelines on Power generation from Non-Conventional Energy Sources in Orissa

50. Punjab New and Renewable Sources of Energy Policy, 2006

51. Policy for Promoting Generation of Electricity through Renewable Energy Sources, Government of Haryana

52. Karnataka Renewable Energy Policy, 2009-14

53. Policy Guidelines on Power generation from Non-Conventional Energy Sources in Orissa, Government of Orissa

“Single Window Clearance Empowered Committee” that will provide clearance from various government agencies/departments in a time bound manner through a single window clearance mechanism within a period of 60 days.⁵⁴

4. ENERGY EFFICIENCY (“EE”)

4.1. Legislation

The Energy Conservation Act, 2001 (ECA) is the principal legislation governing EE in India.⁵⁵ The ECA provides for the establishment of BEE, which functions under the Ministry of Power, GOI, and develops policies and strategies within the overall framework of the ECA for reducing energy intensity.

The ECA lists a series of recommendatory and regulatory functions that the BEE has been tasked with, which *inter alia* include recommending to Central Government the norms for processes and energy consumption standards for equipment using electricity;⁵⁶ strengthening consultancy services in the field of energy conservation;⁵⁷ promoting the use of energy efficient devices and systems;⁵⁸ providing financial assistance to institutions for promoting the efficient use of energy and its conservation;⁵⁹ and specifying qualifications for accredited energy auditors through regulations.⁶⁰

The Central and State Governments have power under the ECA to issue notifications enforcing energy efficiency measures, in consultation with the BEE.⁶¹

The ECA provides for the establishment of energy conservation funds at the central⁶² and State⁶³ levels for meeting the expenses incurred for implementing the ECA by the BEE and State-level agencies, respectively.

4.2. National Mission on Energy Efficiency

As discussed earlier, the National Mission on Enhanced Energy Efficiency (NMEEE), under the

NAPCC, is the leading policy document directing energy efficiency measures in the country. The BEE has been designated as the implementing agency of the NMEEE.

There are four key components of the NMEEE, namely (a) the Perform, Achieve and Trade Scheme, (b) Market Transformation for Energy Efficiency, (c) the Energy Efficiency Financing Platform, and (d) the Framework for Energy Efficient Economic Development. Each of these components is elucidated below.

A. Perform, Achieve and Trade (PAT) Scheme

PAT is a market-based mechanism to enhance the cost effectiveness of improvements in energy efficiency in large energy-intensive industries and facilities, through the certification of energy savings that could be traded. The PAT energy efficiency targets are measured in terms of reductions in their Specific Energy Consumption (SEC). The scheme envisages that Energy Saving Certificates (ESCs) would be issued based on an assessment of the SEC of an industry, which it can sell to another industry having a mandatory target but unable to meet it. ESCs so purchased would be deemed to fulfil the compliance requirement for the underachiever and avoid the penalty for non-compliance under the Act.

The PAT scheme is yet to be implemented. The main elements of the scheme are as follows:

- (a) The PAT mechanism flows out of the Central Government’s power under the ECA to notify energy intensive industries⁶⁴ as “designated consumers” (DCs) and to prescribe energy consumption norms for such DCs.⁶⁵ Industrial units and establishments consuming energy above the threshold in the following nine industrial sectors have been notified as DCs: (i) thermal power plants, (ii) fertiliser, (iii) cement, (iv) pulp and paper, (v) textiles, (vi) chlor-alkali, (vii) iron and steel, (viii) aluminium and (ix) railways.
- (b) The key obligations of the DCs are as follows:
 - An obligation to furnish a report of energy consumption to the designated agency of the State.⁶⁶
 - An obligation to designate or appoint an energy manager who will be in charge of activities for the efficient use of energy and its conservation, and the submission of a report on the status of energy consumption at the

54. Punjab New and Renewable Sources of Energy Policy, 2006

55. It has been in effect since 1 March 2002

56. Section 13(2)(a), ECA

57. Section 13(2)(g), ECA

58. Section 13(2)(k), ECA

59. Section 13(2)(m), ECA

60. Section 13(2)(p), ECA

61. Section 14 and 15, ECA

62. Section 20, ECA

63. Section 16(1) and (3), ECA

64. Section 14(e), ECA

65. Section 14(g), ECA

66. Section 14(k) of the ECA

end of every financial year to the designated agency.⁶⁷

- Monitoring and verification of compliance by Designated Energy Auditors (DENA) which will be prescribed by the government/ BEE under the ECA⁶⁸.
- Compliance with the energy conservation norms and standards prescribed under Section 14 (g) of the ECA.
- (c) ESCerts will be issued to DCs whose energy consumption is less than the prescribed norms, and DCs whose energy consumption is more than the prescribed norms shall be entitled to purchase ESCerts to comply with the prescribed norms and standards.⁶⁹
- (d) The penalty for failure by DCs to comply with the energy consumption norms is Rs. 1,000,000 and in case of a continuing failure, an additional penalty will be levied which shall not be less than the price of every metric ton of oil equivalent of energy, which is in excess of the prescribed norms.⁷⁰

The main steps envisaged for the implementation of the PAT scheme are summarised in Box 3 below.

(e) The PAT scheme is currently being finalised by the Central Government. However, a

consultation document for the PAT scheme floated by BEE in January 2011 provides the following key indications:⁷¹

The PAT scheme will be implemented in phases. The first cycle of the scheme was expected to be operational during April 2011 to March 2014. However, as noted above, the implementation of the PAT scheme has not yet begun.

- Only eight of the nine industrial units specified as DCs in the ECA (all excluding railways) will be included in the first phase of the PAT scheme.
- In the first phase of the PAT scheme, energy saving certificates (ESCs) would be issuable to a DC that achieves the target reduction from the baseline SEC during the stipulated period of three years. The number of ESCs issued will be linked to the quantum of energy saved, and the value of the ESCs will be linked to crude oil prices and controlled by a suitable mechanism.
- The ESCs will be traded bilaterally between any two DCs (within or across designated sectors) or on special trading platforms to be created in the two existing power exchanges.
- The fungibility of ESCs with RECs is also envisaged. It is proposed that the conversion factor for enabling such fungibility will be based on verifiable parameters such as energy consumption in kgOE (kilograms of oil equivalent).
- For fulfilling prescribed annual energy saving targets, the DCs may either undertake energy efficiency initiatives, or engage in trading of RPOs and/or ESCs. DCs would have the responsibility to annually monitor and report their energy efficiency status to the BEE, and ESCs will be awarded to a DC only if energy savings in the particular year exceed the annual savings target.
- The existing power exchanges, IEX and PXIL will provide a neutral electronic platform to all DCs for trading RPOs and ESCs.
- In case of non-compliance, the State Designated Agencies, constituted under the ECA and notified in 31 States/UTs,⁷² will be responsible for adjudicating matters relating to penalising DCs.

Initially, it was envisaged that the PAT Scheme would cover 714 DCs from the eight energy-intensive sectors. However, the number of DCs was reduced to 563 in February 2011, and finally a list of 477 DCs has reportedly been approved by the Ministry of Power and is awaiting approval by the Ministry of Law and Justice.⁷³

67. Section 14(l) of the ECA

68. Section 14A and 13 (p) of the ECA

69. Section 14A of the ECA

70. Section 26(1A) of the ECA

BOX 3

PAT SCHEME: PROPOSED KEY STEPS

Specific Energy Consumption (SEC) targets will be set for Designated Consumers (DC) by the Ministry of Power in consultation with the BEE for the DCs.

Monitoring and verification of SEC for each DC in the baseline year and the target year will be done by an accredited verification agency or energy auditors accredited by the BEE. DCs shall report on the energy consumption and savings.

Units that achieve savings in excess of their target will be provided the excess savings as energy savings certificates (ESCs). DCs who secure ESCs can trade them with other DCs (within or across the designated sectors) who are unable to meet the SEC targets, either bilaterally or on special platforms such as the stock exchange or the power and commodity exchange.

The process of issuance of ESCs shall be the responsibility of Energy Efficiency Services Limited (EESL), which is a public sector company incorporated by four central public sector units for the purpose of helping to implement some aspects of NMEEE.

71. BEE, PAT Consultation Document, 2010-II, as on 10 January 2011

72. Action Plan for Energy Efficiency, 2009 by BEE.

73. PAT Scheme status update, dated 16 November 2011,

B. Market Transformation for Energy Efficiency (MTEE)

This is the second component of the NMEEE, and seeks to accelerate the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable. For this purpose, it envisages several steps, including leveraging international funds for promoting energy efficiency, implementing a national energy efficiency CDM roadmap, and programmes of activity for household lighting, demand side management in agriculture and commercial buildings, etc. The current status of the implementation of MTEE is as follows:

- Under this initiative, the BEE already registered the “Bachat Lamp Yojana Programme of Activities” (“BLY-PoA”) under the UNFCCC Clean Development Mechanism on 29 April 2010. The BLY-PoA is designed as a public-private partnership between the GOI, private sector CFL suppliers and DISCOMs. The CFL suppliers sell high quality CFLs to households (a maximum of four per household) at a price of Rs. 15 (Rupees Fifteen) per CFL within a designated project area in a DISCOM region of operation. It should be noted that the use of CFLs at the household level is not mandatory in India. BLY is at different stages of implementation in different States.
- The Programme of Activities (PoA) to leverage the CDM for agriculture and municipal sectors, and also the CDM roadmap, are reported to be under development.
- Another programme under this initiative is the development of the Super Efficient Equipment Programme (SEEP), which proposes to develop super-efficient appliances with the aim of reducing consumption and enabling demand side management.⁷⁴

C. Energy Efficiency Financing Platform (EEFP)

The third component of the NMEEE seeks to create mechanisms that would help to finance demand side management programmes in all sectors by capturing future energy savings. Various steps have been taken for the implementation of the EEFP:

- A public sector company, Energy Efficiency Services Limited (EESL), has been incorporated to provide leadership in the market for energy service companies (ESCOs), and a memorandum of understanding has been signed with three financial institutions to help finance ESCO-based projects.

<http://www.climate-connect.co.uk/Home/?q=node/1496>

74. Ministry of Power, Government of India

- Over 70 ESCOs have already been rated.
- PTC India Ltd. has commenced financing of ESCO-based projects at Rashtrapati Bhavan, New Delhi; the All India Institute of Medical Science (AIIMS), a leading hospital in New Delhi; employee State insurance corporation hospitals; and various municipalities.
- In addition, the Small Industries Development Bank of India (SIDBI) has initiated an exercise to finance energy efficiency projects in small and medium enterprises (SMEs).⁷⁵

D. Framework for Energy Efficient Economic Development (FEEED)

The fourth component of the NMEEE seeks to provide fiscal incentives that may supplement the Government efforts for the creation of energy efficiency markets, for example: the creation of two funds to promote financing of EE projects (the partial risk guarantee fund, and the venture capital fund), and the introduction of an “Energy Efficiency Performance Index”.

Tax/duty exemptions for the promotion of energy efficiency are also being considered under the FEEED, for example: a graded excise duty for efficiency labelled equipment in favour of higher efficiencies, and income and corporate tax incentives for ESCOs/ venture capital funds, etc. in energy efficiency.

The key features of the funds envisaged under the FEEED are as follows:

- *Partial Risk Guarantee Fund (PRGF)*: The PRGF will be a risk-sharing mechanism that will provide commercial banks with partial coverage of risk exposure against loans made for energy efficiency projects. This will reduce the risk perception of the banks towards lending for new technologies and new business models associated with energy efficiency projects. The PRGF will act as a first loss, subordinated recovery guarantee and will be placed in a guarantee reserve account and paid out to participating banks in the event of a loss or default. The lending banks will also pursue recovery procedures in the event of default, and will pay the PRGF any monies recovered after first satisfying their own receivables.
- *Venture Capital Fund for Energy Efficiency (VCFEE)*: The VCFEE will ease a significant barrier from the viewpoint of risk capital availability to the ESCOs and other companies who invest in the supply of energy efficient goods and services. This fund will be set up with initial seed

75. BEE, <www.bee-india.nic.in>

capital from the Central Government, and can be expanded by contributions from other agencies.

4.3. Other EE Schemes

Most of the schemes relating to EE issued at the central or State level seek voluntary compliance. The efforts are focused on capacity development and the creation of a market for energy efficiency products and services through voluntary schemes, which are briefly described below:

A. Central-level initiatives on EE

(i) Standards and Labelling Scheme⁷⁶

The standards and labelling scheme was launched by the Ministry of Power, GOI on 18 May 2006. It requires the display of energy performance labels on high energy end use equipment and also lays down minimum energy performance standards for certain high energy equipment. The aim is to enable consumers to make informed decisions when purchasing appliances. The labelling scheme has been mandatory for tubular fluorescent lamps, room air conditioners, distribution transformers, and household frost-free refrigerators since 7 January 2010. The scheme is voluntary for eight other electrical items (direct cool refrigerators; induction motors, agricultural pump sets, ceiling fans, liquefied petroleum gas stoves; electric geysers; washing machines and colour televisions).

(ii) Energy Efficiency Codes for Buildings

Energy efficiency norms for buildings have been developed, but are mostly voluntary in nature. At the central level, it is only the Central Public Works Department which mandates energy efficient construction for all its buildings. At the State level, some States (such as Delhi and Haryana) have mandated the use of energy efficiency norms in certain buildings, as detailed below.

(a) MNRE scheme for energy efficient green buildings

The MNRE has adopted a rating tool called “Green Rating for Integrated Habitat Assessment” or “GRIHA”⁷⁷ as the national rating system for green buildings in India. GRIHA contains qualitative and quantitative assessment criteria to assess the performance of a building against certain nationally accepted benchmarks.

The MNRE issued a scheme on energy efficient green buildings in 2009, which provides various

incentives for the adoption of the GRIHA rating system. For instance, the scheme provides for reimbursement of the registration fee payable for the GRIHA system in case of buildings that have a specified minimum area and achieve a specified minimum rating on the GRIHA system. In addition, the scheme provides for one-time payments to municipal corporations and local bodies that take measures to encourage the use of the GRIHA system.⁷⁸

As noted earlier, the Central Public Works Department (CPWD) has issued a notification requiring all buildings constructed by the CPWD to follow the GRIHA green rating system.⁷⁹

(b) Energy Conservation Building Code, 2007

The Central Government, exercising its powers under the ECA, has prescribed the “Energy Conservation Building Code, 2007”, which is a voluntary code that sets minimum energy efficiency standards for the design and construction of new commercial buildings having a connected load of 100 kW or contract demand of 120 kVA.⁸⁰

(c) BEE Star Rating Programme for Buildings

The BEE has also developed a “star rating programme” for office buildings having a connected load of 500 kW and above, based on the actual performance of the building in terms of specific energy usage (in kWh/sq m/year). Initially, it seeks to target warm and humid, composite, and hot and dry climatic zones for air-conditioned and non-air-conditioned office buildings, and to subsequently extend this to other zones and buildings.⁸¹

B. State-level initiatives on EE

As noted previously, the ECA empowers the State Governments to designate any agency in the State as a State Designated Agency (SDA) to coordinate, regulate and enforce the provisions of the ECA within the State. SDAs have been notified in all States. However, energy conservation measures in most of the States are still in a nascent stage, mainly confined to organising workshops and training programmes, and creating awareness.

78. The MNRE Scheme on Energy Efficient Solar/Green Buildings

79. Notification No. DGW/MAN/176 (Subject – Green Building Parameters) dated 16 March mandating that all Civil Public Works Department (CPWD) constructions shall be green

80. Action Plan for Energy Efficiency, 2009 by BEE

81. “Sushilkumar Shinde launches Star Rating programme for office buildings to accelerate Energy Efficiency”, PIB, 25 February 2009, <http://pib.nic.in/release/release.asp?relid=47969&kwd=>

76. Ministry of Power, Government of India

77. GRIHA has been developed by The Energy and Resources Institute (TERI).

Some States, such as Delhi and Haryana, have been more active and came out with notifications making the use of CFLs and Solar Water Heating (SWH) systems mandatory. However, the extent of the implementation of these notifications has not been monitored.

The incentives adopted by the States to spur growth in EE are as follows:

(a) Tax Rebate Incentives

The State Government of Andhra Pradesh provides incentives to owners installing solar heating and lighting systems, harvesting rain water, or recycling waste water as per the Andhra Pradesh revised Building Rules, 2008. Such incentives are in the nature of rebates in property tax to owners or their successors-in-interest who construct buildings by leaving more setbacks than the prescribed minimum. A 10% rebate in property tax is also provided to persons who install and use solar heating and lighting systems.⁸²

(b) Energy Conservation Fund

In accordance with the ECA's requirement that a State-level energy conservation fund be set up in each State, the Karnataka Government's renewable energy policy provides for the establishment of an energy conservation fund which will be used to facilitate the growth of energy efficiency infrastructure.⁸³ A similar fund has also been established in the States of Haryana,⁸⁴ Punjab, Rajasthan, Kerala, Andhra Pradesh, Tamil Nadu, Nagaland, and Chhattisgarh.⁸⁵

(c) Mandatory measures

Mandatory use of solar water heaters: In the State of Delhi, the use of solar water heating systems has been made mandatory in institutions, hospitals, hotels, and buildings with a plot/area of 500 Sq.m and above.⁸⁶ Haryana has also made it mandatory to use solar water heaters in specified categories of buildings (such as hospitals, hotels, all government buildings, etc).⁸⁷

- **Mandatory use of CFL:** The State Government of Haryana has prohibited the use of

new incandescent lamps in all new buildings constructed in the government sector, or with government aid.⁸⁸ In addition, the State of Delhi has made it mandatory to use CFL and electronic chokes in all new buildings of the government or government-aided institutions, and to replace defective incandescent lamps and chokes with CFL and electronic chokes in existing buildings.⁸⁹

- **Mandatory energy efficient design of buildings:** Haryana has mandated that all new buildings to be constructed in the government sector, or with government aid, will be based on energy efficient designs, incorporating energy efficient designs and renewable energy technology devices with effect from 30 June 2006.⁹⁰

5. CONCLUSION

While higher fossil fuel prices, energy security concerns, and environmental considerations all constitute the composite set of factors behind the regulatory impetus for RE and EE in India, the practical impetus for RE and EE initiatives in the recent past can be clearly traced to the overall policy thrust to address climate change.

Two of the eight missions under the National Action Plan on Climate Change (NAPCC) focus on solar energy and energy efficiency. Under these, several initiatives have been taken at the level of the Central Government and State Governments, both of which have jurisdiction on energy as a subject, under India's federal regulatory framework. As mentioned in the Introduction to this paper, it is still early days for making any substantive evaluation of the policy instruments being implemented in India. The level of seriousness and commitment of both the Central and State Governments is evidenced in the steps towards implementation that are already being taken, especially in relation to RE.

RE in India

The principal legislative instruments that have been used by the Government of India for promoting RE, are similar to those being implemented in the EU – preferential tariffs for RE, Renewable Purchase Obligations, Renewable Energy Certificates, and a variety of subsidies and other incentives. Since energy falls under the jurisdiction

82. See official website of the Hyderabad Metropolitan Development Authority, <<http://www.hmda.gov.in>>

83. Karnataka Renewable Energy Policy, 2009-14

84. Haryana Govt. Notification No. 22/7/2010-5 Power dated 19 February 2010

85. Press Information Bureau, Government of India, 3 May 2010

86. Order No. F. No. 11(149)/2004/Power/2387 dated 28 September 2006, Government of NCT of Delhi

87. Government of Haryana vide its gazette (extraordinary) no. 22/52/2005-SP dated 29 July 2005

88. Government of Haryana vide its gazette (extraordinary) no. 22/52/2005-SP dated 29 July 2005

89. Order No. F. No. 11(149)/2004/Power/2387 dated 28 September 2006, Government of NCT of Delhi

90. Government of Haryana vide its gazette (extraordinary) no. 22/52/2005-SP dated 29 July 2005

of both the Centre and State Governments in India, the latter have a significant role in the implementation of these measures. At the level of the State Governments, as noted in this paper, there has been no uniformity or consistency in the approaches being taken by the 28 States of India. One of the reasons for this concerns issues relating to the availability of RE sources that can be effectively tapped, such as wind or solar. Another important reason concerns the different levels of political impetus in different States. Mandatory Renewable Purchase Obligations which require the electricity distribution licensees in each State to purchase a certain specified percentage of electricity from RE sources, therefore range from 2% to 10% among different States. While these may appear to be modest and small targets, they do represent a significant start, and are expected to be ramped up when there are more RE sources available. The effective enforcement of RPOs is hoped to be achieved through a mechanism of fines and penalties. There are also market-based instruments that are being implemented, such as Renewable Energy Certificates, to enable entities which fall short of RPOs to purchase RECs to make up for the shortfall in achieving RPOs. REC trading began in March 2011.

RPOs have existed in one form or another for the past four years. However, they have not been effectively enforced so far. Distribution licensees and SERCs often reason that in the absence of viable RE sources, it would not be practical to enforce RPOs. This reasoning however will no longer hold good with the steadily increasing RE generation capacity in the country, and the availability of RECs. It is interesting to note that there has been a steady increase in the monthly issuance of RECs, beginning with 532 RECs in March 2011 and rising to 107 649 RECs in February 2012. What remains to be seen is how RPO enforcement occurs, since this would be the test of how effectively RE sources play a role in the energy mix of the country.

The other interesting development in India is the rapidly falling costs of RE generation, especially in the solar power sector. Under the Jawaharlal Nehru National Solar Mission (JNNSM), there has been a 28% fall in the average winning bid between the first batch awarded in 2010, and the second batch which was bid out in 2011. Solar tariffs announced by the SERCs in the States of Rajasthan and Gujarat have also shown a significant decline, to reflect the falling costs of generation. If these trends continue, they could enhance the cost-effectiveness and viability of RE sources over a period of time.

The Government's seriousness about enforcement concerns was recently reflected in the encashment of bank guarantees of 14 companies that had defaulted on commissioning dates in relation to projects under the first round of bidding for the JNNSM (Jawaharlal Nehru National Solar Mission). This sends a strong signal of the seriousness with which performance milestones and timelines for RE generation are likely to be implemented by the Government, which could eventually have an overall positive impact for the country.

RE generation in India, however, has not been without controversy. There have also been several criticisms as regards the manner in which some of the initiatives have been implemented. A recent study has alleged violation of the bidding norms by one company to obtain a dominant position in the first round of bidding for the JNNSM at the national level.⁹¹ The study estimates that Lanco Infratech has control over companies that would be responsible for over 235 MW of allocation, which is almost a quarter of the total 1 000 MW to be derived from solar radiation under the first phase. The main issues arising from this are those related to violation of the bidding norms, and the consequent potential for abuse of the dominant position that may result from Lanco's control. These, and other criticisms of the bidding process of the JNNSM (which relies on the 'reverse bidding' method), are yet to be ironed out.

With regard to wind energy, there have been some positive developments in the recent past. Wind energy development in India began in the 1980s. But it is only in the past few years that it has started making a significant contribution to the country's energy mix. During the 10th Plan (2002-2007), India saw the installation of 5 426 MW of wind power generation capacity, as against the target of 2 200 MW. The target fixed by the MNRE for 2007-12 is 10 500 MW. While there are some concerns that the lack of availability of land for wind farms and inadequate transmission mechanisms may limit significant wind capacity growth in this period, there are voices of optimism as well given the current levels of growth in the sector of almost 1 800-2 000 MW new plants per year.

An issue that is sometimes raised is the ideal mix of regulatory incentives for RE projects. India's framework, as discussed, provides for a mix of preferential tariffs, RPOs, RECs and other fiscal and non-fiscal incentives. In this regard, the dilemma for any policy maker is to get the right balance in order to ensure that heavy dependence on subsidies should not lead to long-term sustainability

91. Centre for Science and Environment, Down to Earth, February 2012

issues. Lessons from the EU experience in this regard would likely be valuable. Another important aspect, which lies outside the realm of regulation, is that of access to finance. In this regard, both lenders and developers in India could benefit from lessons and practices in jurisdictions such as the EU with regard to risk allocation in financing renewable projects at the stages of construction, operation and maintenance, as well as at the time of structuring and financing a project, and addressing this effectively through project documentation. In this regard, the use of security structures based on revenue flows from RECs, or from the PAT scheme as discussed below, would also be valuable in framing viable financing structures.

EE and the PAT Scheme

With regard to Energy Efficiency, the Government has estimated the size of the market for energy efficiency in India to be approximately Rs. 740 billion, and that implementation of the National Mission for Enhanced Energy Efficiency (NMEEE) has the potential for reducing carbon dioxide emissions by 98.55 million tonnes annually.

The PAT scheme, devised by the Government as part of the NMEEE will be a first-of-its-kind initiative in the developing world. It is a market-based mechanism aimed at ensuring that improvements in energy efficiency in large energy-intensive industries are attractive. The PAT mechanism intends to enhance the cost-effectiveness of energy efficiency in energy-intensive industries by certifying energy savings and enabling their trading. The scheme builds on the provision of the Energy Conservation Act that empowers Central Government to notify energy-intensive industries and mandate them to report their energy usage, to appoint Energy Managers and to adhere to targets for energy efficiency. The Ministry of Power notified units consuming energy above the benchmark in nine industrial sectors – namely Thermal Power Plants, Fertiliser, Cement, Pulp and Paper, Textiles, Chlor Alkali, Steel, Aluminium and Railways. The theory behind the PAT scheme is laudable; its starting point is that there is diversity of energy efficiency in any industry, and that more efficient units can monetise their energy savings (manifested as Energy Saving Certificates) to less efficient units.

The true impact of the PAT scheme can be analysed only once it starts being implemented, which is expected sometime in 2012. At the outset, there are a few concerns regarding its design elements. There are concerns that the scheme does

not account for adequate differences between different plans while calculating ‘specific energy consumption’ (SEC). For example, under the current definitions and methodology as applied to the cement sector, it is not clear whether the recovery of limestone from an on-site quarry or waste treatment on site is an activity that would be covered under the PAT or not. These ambiguities, it is feared, could lead to complications and different interpretations.

Perfecting methodologies for the assessment of energy consumption and savings is therefore a critical element for which lessons from other countries could be useful. For example, the EU ETS methodology to measure emission reductions could provide valuable lessons. Similarly, the UK Government’s Climate Change Levy and Climate Change Agreements to enhance efficiency, and discounts on levies based on the achievement of targets, is also an interesting model which could be studied in this regard.

In conclusion, it must be emphasised that strong political and economic support are both essential in shaping the RE market in any country. Even in the EU, although a directive in 2001 laid the foundation for RE policies, it was only in 2007 that the EU specified national targets for RE for its Member States, and several Member States specified national targets. The EU experience with the actual enforcement and implementation of these obligations since 2007 is thus also a relatively new experience. In relative terms, therefore, while the regulatory scenario in India is at the stage of infancy, the EU could be said to be approaching adolescence. The experience of the EU in using different mechanisms of support for RE (including quota obligations, tender schemes, green certificates, investment aid, fiscal incentives, tax refunds and direct price support schemes), provides a menu of interesting options. The viability of each of these options needs to be considered and understood.

As India’s regulatory framework evolves and matures, it would need to factor in the practical concerns of the stakeholders involved, especially in relation to the adoption of accurate methodologies for the calculation of emissions and their reduction. India would also benefit immensely from lessons learnt in other jurisdictions. These include those relating to specific instruments such as RE tariffs and RPO, and the adequate enforcement of RPOs in order to achieve the targeted RE consumption in the energy basket of a country. ■

APPENDIX

ANNEX A: RE Tariffs as per CERC Tariff Regulations for FY 2011-12¹

Particulars	Levelised total tariff (FY 2011-12)	Benefit of Accelerated Depreciation (if availed)	Net Levelised Tariff upon adjusting for accelerated Depreciation benefit (if availed)
	(Rs/kWh)	(Rs/kWh)	(Rs/kWh)
Wind Energy Projects			
Wind Zone-1 (CUF- 20%)	5.33	0.80	4.53
Wind Zone-2 (CUF- 23%)	4.63	0.69	3.94
Wind Zone-3 (CUF- 27%)	3.95	0.59	3.36
Wind Zone-4 (CUF- 30%)	3.55	0.53	3.02
Small Hydro Projects			
H.P, Uttarakhand, and NE States (below 5 MW)	3.78	0.47	3.31
H.P, Uttarakhand, and NE States (5 MW – 25 MW)	3.22	0.42	2.80
Other States (below 5 MW)	4.49	0.55	3.94
Other States (5 MW – 25 MW)	3.84	0.50	3.34
Solar Power Projects, when PPA signed on or before 31 March 2011			
Solar PV	17.91	(2.96)	14.95
Solar Thermal	15.31	(2.46)	12.85
Solar Power Projects, when PPA signed after 31 March 2011			
Solar PV	15.39	(2.45)	12.94
Solar Thermal	15.04	(2.34)	12.69
Biomass Power Projects			
The applicable tariff ranges from Rs. 3.78/MWh to Rs. 4.97/MWh depending on the State in which the Project is located. The tariff applicable for most States is Rs. 4.41/MWh.			
Non-Fossil Fuel-based cogeneration			
The applicable tariff ranges from Rs. 3.93/MWh to Rs. 5.21/MWh depending on the State in which the Project is located. The tariff applicable for most States is Rs. 4.68/MWh.			

1. CERC Order dated 9 November 2010.

ANNEX B: Solar tariffs by SERCs

S.NO	STATES	Solar Tariffs (Rs/kWh)
1.	ANDHRA PRADESH	<p>Solar PV</p> <p>Rs. 17.91 for projects commissioned during 2010-2011 & 2011-12.</p> <p>Rs. 14.95 after ADB (if availed)</p> <p>Solar Thermal</p> <p>Rs. 15.31 for projects commissioned during 2010-2011, 2011-12, & 2012-13.¹</p> <p>Rs. 12.85 after ADB (if availed)</p>
2.	ARUNACHAL PRADESH ²	No solar-specific tariff.
3.	ASSAM	<p>Rooftop Solar PV & Small solar power projects:</p> <p>CERC tariffs have been extended only for rooftop solar PV and small solar projects.³</p> <p>Solar PV</p> <p>Capped price of energy for grid connected solar PV plants which are not eligible for the incentive declared by the MNRE, when commissioned up to 2009-10 will be Rs 11/kWh and when commissioned after 2009-10 and before 31 March 2012, will be Rs 10/kWh (to remain valid for 10 years from the date of entry into force of these regulations).⁴</p> <p>No generic solar thermal tariff.</p>
4.	BIHAR	<p>Solar PV, Rooftop PV & Small solar power projects</p> <p>Rs. 17.91, or</p> <p>Rs. 14.95 if ADB availed</p> <p>Solar Thermal</p> <p>Rs. 15.31, or</p> <p>Rs. 12.85 if ADB availed⁵</p> <p>The above tariffs are applicable for projects commissioned up to 31 March 2013.</p>
5.	CHATTISGARH	<p>No new tariffs for projects after 31 December 2010.</p> <p>However, same tariffs applicable to Rooftop PV & Small Solar Power Generation Programme.⁶</p> <p><i>However, Draft Chhattisgarh State Electricity Regulatory Commission (Terms and conditions for determination of generation tariff and related matters for electricity generated by plants based on renewable energy sources) Regulations, 2011, have been formulated. These have not been notified as yet.</i></p>
6.	DELHI	CERC Tariff extended.
7.	GOA AND UNION TERRITORIES	No solar specific tariff as yet.
8.	GUJARAT	<p>For projects commissioned up to 31 December 2011:</p> <p>Solar PV</p> <p>Rs.15 for initial 12 years from date of commercial operation of project and Rs.5 from 13th year to 25th year;</p> <p>Solar Thermal</p> <p>Rs. 11 for initial 12 years from date of commercial operation and Rs. 4 from 13th year to 25th year⁷</p> <p>Solar PV, Rooftop PV & Small solar power projects</p> <p>The same tariffs can also be availed of by solar rooftop power projects and other small power plants connected to LT/11 KV grid. Alternatively, project developers may also opt for levelised tariffs of:</p> <p>Rs. 12.54 for rooftop and other small solar PV projects; and</p> <p>Rs. 9.29 for small Solar Thermal Power Projects⁸</p>
9.	HARYANA	<p>During 2008-09 to 2012-13:</p> <p>Rs. 15.96 for solar power plant commissioned up to 31 December 2009;</p> <p>Rs. 15.16 for solar power plants commissioned after 31 December 2009 but by 31 March 2010;⁹</p> <p>For projects under Rooftop PV and other Small Solar Power Plants Scheme that are commissioned by 31 March 2013, the levelised tariff for 25 years as determined by CERC is applicable, including annual tariff determined from time to time for such projects.¹⁰</p> <p>Tariff specified above is applicable till 2013.</p>
10.	HIMACHAL PRADESH	<p><i>No final notification of solar specific tariffs.</i></p> <p><i>Discussion paper on tariff for grid interactive Solar PV and Solar Thermal power projects eligible under MNRE guidelines dated 1 November 2008 proposes the following rates:</i></p> <p>Rs 14.87 for Solar PV projects of 1 MW to 5 MW commissioned before 31 December 2009.</p> <p>Rs.12.87 for Solar Thermal projects of 1 MW to 5 MW commissioned after 31 December 2009.</p>

S.NO	STATES	Solar Tariffs (Rs/kWh)
11.	JAMMU AND KASHMIR	Tariffs for rooftop PV shall be the levelised tariff as determined by CERC. No other specification for grid-connected solar plants. ¹¹
12.	JHARKHAND	For projects commissioned till 30 June 2013, provided that the power purchase agreements are signed on or before 31 March 2011: Solar PV Rs. 17.96 Rs. 14.98 after ADB (if availed). Solar Thermal Rs. 13.12 Rs. 11.02 after ADB (if availed) ¹²
13.	KARNATAKA	For projects commissioned up to 31 March 2013: Solar PV Rs. 14.50 Solar PV, Rooftop PV & Small solar power projects Rs. 14.50 Solar Thermal Rs. 11.35 ¹³
14.	KERALA	Solar PV Rs. 17.91, Rs. 14.95 after ADB (if availed) For Solar PV plants above 3 MW for which purchase agreements are signed by 31 March 2011 and projects are commissioned by 31 March 2012. Solar Thermal Rs. 15.31, Rs. 12.85 after ADB (if availed) For solar thermal plants for which power purchase agreements are signed by 31 March 2011 and projects are commissioned by 31 March 2012. Rooftop PV Rs. 17.91 Rs. 14.95 after ADB (if availed) For rooftop (PV) and other small solar power plants of capacity from 1 MW up to 3 MW connected to Distribution Network (below 33 kV) for which power purchase agreements are signed by 31 March 2011 and projects are commissioned by 31 March 2012. ¹⁴
15.	MAHARASHTRA	For plants commissioned in 2010-2011 & 2011-2012: Solar PV Rs. 17.91; or Rs. 14.95 after ADB (if availed) Solar Rooftop PV & Small solar power projects Rs. 18.41; or Rs. 15.45 after ADB (if availed) Solar Thermal Rs. 15.31; or Rs. 12.85 after ADB (if availed) ¹⁵ For projects where PPA are signed after 31 March 2011 and projects are commissioned during FY 2011-12: Solar PV Rs. 15.61 Rs. 13.10 after ADB (if availed) Solar Rooftop PV and other small solar power projects Rs. 16.11 Rs. 13.60 after ADB (if availed) Solar Thermal Rs. 15.24 Rs. 12.85 after ADB (if availed) ¹⁶

S.NO	STATES	Solar Tariffs (Rs/kWh)
16.	MADHYA PRADESH	<p>Solar PV Rs. 15.35; or Rs. 13.94 after ADB (if availed) For solar PV project of more than 2 MW capacity, for which PPA signed by 31 March 2011 and project commissioned by 31 March 2012;</p> <p>Solar PV, Rooftop PV & Small solar power projects Rs. 15.49; or Rs. 14.08 after ADB (if availed) For rooftop and other small solar power plants of capacity up to 2 MW connected to distribution network (below 33 kV) for which PPA signed by 31 March 2011 and projects commissioned by 31 March 2013.</p> <p>Solar Thermal Rs. 11.26; or Rs. 10.29 after ADB (if availed) For solar thermal for which PPA signed by 31 March 2011 and project commissioned by 31 March 2013.¹⁷ However, control period of the tariff order is extended to 31 March 2012. For Solar PV, applicability of the tariff order is extended to Power Purchase Agreements signed before 31 March 2012 and where projects are commissioned by 31 March 2013. For Solar Thermal, applicability of the tariff order is extended to Power Purchase Agreements signed before 31 March 2012 and where projects are commissioned by 31 March 2014. For Rooftop and other solar plants of capacity up to 2 MW, applicability of the tariff order is extended to Power Purchase Agreements signed before 31 March 2012 and where projects are commissioned by 31 March 2014.¹⁸</p>
17.	MANIPUR	<p>No Solar tariffs. However, Joint Electricity Regulatory Commission for Manipur & Mizoram (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2010, specify the principles to be considered while determining tariff.¹⁹</p>
8.	MEGHALAYA	No Solar tariffs.
19.	MIZORAM	<p>No Solar tariffs. However, Joint Electricity Regulatory Commission for Manipur & Mizoram (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2010, specify the principles to be considered while determining tariff.²⁰</p>
20.	NAGALAND	“Nagaland Electricity Regulatory Commission (Terms and Conditions for Determination of Generation Tariff for Renewable Energy) Regulations, 2011”, which inter alia specifies principles for tariff determination for solar PV, solar thermal, solar rooftop PV systems and other small solar power projects based on technologies approved by MNRE. ²¹
21.	ORISSA	<p>For projects commissioned in FY 2010-11; 2011-12 and 2012-13:</p> <p>Solar PV Rs. 17.80; or Rs. 14.77 after ADB (if availed) Solar Thermal Rs. 14.73; or Rs. 12.32 after ADB (if availed)²² Rooftop PV and small solar power plants Rs. 18.52, or Rs. 15.39 after ADB (if availed)²³</p>
22.	PUNJAB	<p><i>For power projects whose PPA signed on or before 31 March 2011:</i></p> <p>Solar PV: Rs. 17.91, or Rs. 14.95 after ADB (if availed) Solar Thermal: Rs. 15.31, or Rs. 12.85 after ADB (if availed) <i>For power projects whose PPA signed after 31 March 2011:</i></p> <p>Solar PV: Rs. 15.39, or Rs. 12.94 after ADB (if availed) Solar Thermal: Rs. 15.04, or Rs. 12.69 after ADB (if availed)²⁴</p>

S.NO	STATES	Solar Tariffs (Rs/kWh)
23.	RAJASTHAN	<p>Rs. 15.32, and Rs. 13.19 after ADB (if availed) for solar PV plants commissioned by 31 March 2012; Rs. 12.58, and Rs. 10.99 after ADB (if availed) for solar thermal power plants commissioned by 31 March 2013; Rs. 15.32, and Rs. 13.19 after ADB (if availed) for rooftop solar PV installations and other small solar PV power generation plants covered in GOI's subsidy scheme commissioned by 31 March 2012²⁵</p> <p>Additionally: Small solar thermal Rs. 12.58, or Rs. 10.99 after ADB (if availed)</p> <p>For small solar thermal power generation plants covered in GOI's subsidy scheme commissioned by 31 March 2013.²⁶</p> <p>For the 1 MWp solar power plant under MNRE's 'Demonstration programme' for tail end grid connected solar plants', which receives central financial assistance: Rs. 7.99 and Rs. 6.93 after ADB for 25 years. (Project being implemented by Rajasthan Renewable Energy Corporation, and during the bid process M/s Larsen & Toubro Limited adjudged lowest bidder'.²⁷</p>
24.	SIKKIM ²⁸	No solar tariffs.
25.	TAMIL NADU	<p>Solar PV Rs 18.45 Rs. 14.34 after ADB (if availed)²⁹</p> <p>Solar Thermal Rs. 15.51 Rs. 12.16, after ADB (if availed)³⁰</p>
26.	TRIPURA	No solar tariffs.
27.	UTTAR PRADESH	<p>For projects not covered by MNRE schemes: Rs. 15 for solar PV plant commissioned up to 31 December 2011; Rs. 13 for solar Thermal plant commissioned up to 31 December 2011³¹</p> <p>However, tariff to be re-determined for solar projects (since the current tariff is applicable only to project commissioned till 31 December 2011), keeping in view the declining capital cost of solar power plants.³²</p>
28.	UTTARAKHAND	<p>No specific solar tariff announcement.</p> <p>However, Uttarakhand Electricity Regulatory Commission (Tariff and other Terms for Supply of Electricity from Renewable Energy Sources and non-fossil fuel based Co-generating Stations) Regulations, 2010, specify the tariff structure and principles to be considered while determining tariff.³³</p>
29.	WEST BENGAL	<p>Tariff to be mutually agreed by licensees and suppliers within the prescribed limit, as specified below:</p> <p>Solar PV Rs. 16.13,</p> <p>for solar PV plants commissioned up to 2012-13 (including those availing accelerated depreciation): Solar PV, Rooftop PV & Small solar power projects Principles for determination of tariff for rooftop solar PV provided.</p> <p>Solar Thermal No tariff specified for solar thermal projects.³⁴</p>

1. Andhra Pradesh Electricity Regulatory Commission, I.A. No. 17 of 2010, dated 14 July 2010.
2. SERC notified; but yet to be constituted (See <http://www.powermin.nic.in/acts_notification/status_reforms_in_states.htm>).
3. AERC (Procurement of Electricity from Projects/Schemes covered under Rooftop PV and Small Solar Power Generation Programme-Category 1 Projects under JNNISM), Regulations, 2010.
4. Assam Electricity Regulatory Commission (Co-generation and Generation of Electricity from Renewable Sources of Energy) Regulations, 2009; 3 June 2009.
5. BERC, Suo Motu Proceeding No. 1/2010, Order passed on 6 August 2010.
6. CSERC, Suo Motu Petition No. 16 of 2008(T), Amended Order, dated 9 July 2010.
7. GERC, Order No. 2 of 2010, "Determination of tariff for Procurement of Power by the Distribution Licensees and others from Solar Energy Projects", dated 29 January 2010.
8. GERC, Suo Moto Order No. 8 of 2010, dated 31 August 2010.
9. This tariff is an average tariff that shall remain constant for a period of five years. The tariff is without considering any subsidy/incentive. However, if the project qualifies for generation-based incentives, then the tariff payable by the distribution utility shall be the difference of the mentioned tariff and incentive; Haryana Electricity Regulatory Commission (HERC) order on "Fixation of tariff for generation of power through solar energy for FY 2008-09 to 2012-13", dated 25 April 2008.

10. HERC Order dated 16 April 2010 in the matter of "1. Renewable Energy Department, Haryana & Haryana Renewable Energy Development Agency; 2. M/s R S India Solar Energy Private Limited".
11. J&KERC, Tariff Order No.: J&KSERC/08 of 2010, "Tariff Order for Projects Covered by JNNISM", dated 2 June 2010.
12. JSERC, Order, Case No. 13 of 2010, "Suo-Motu Tariff Order for Procurement of Power from Solar PV Project and Solar Thermal Power Project, 2010", dated 12 July 2010.
13. Karnataka State Electricity Regulatory Commission, Order in the matter of "Determination of tariff for grid connected Solar PV, Solar Thermal power plants (other than demonstration projects) and Rooftop Solar Photovoltaic and other small solar power Plants connected to Distribution network at voltage levels below 33KV", dated 13 July 2010.
14. Kerala State Electricity Regulatory Commission, In the matter of "Jawaharlal Nehru National Solar Mission- Tariff for grid connected solar plants- tariff order for grid connected solar PV power plants (above 3 MW), solar thermal plants and rooftop (PV) and other small power plants of capacity from 1 MW up to 3 MW", 4 August 2010.
15. MERC, Case No. 20 of 2010, "In the matter of Determination of Generic Tariff under Regulation 8 of the Maharashtra Electricity Regulatory Commission (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2010", dated 14 July 2010.

16. MERC, Case No. 39 of 2011, "In the matter of Determination of Generic Tariff for the second year of the first Control Period under Regulation 8 of the Maharashtra Electricity Regulatory Commission (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2010", Suo Motu Order, dated 29 April 2011.
17. MPERC, Tariff Order for Solar Energy Based Power Generation in Madhya Pradesh, July 2010. Please note that the MPERC proposes to extend the control period specified in this order, from 31 March 2011 to 31 March 2012 and accordingly desires to make certain changes to the existing tariff order for solar energy. A public notice has been issued in this regard, and a public hearing is scheduled for 15 March 2011.
18. MPERC, Order SMP 23/11 of 29 March 2011, "Fixation of norms for determination of tariff for procurement of power from Solar based Power Projects" (Order was passed after public hearing on 15 March 2011).
19. Dated 15 April 2010.
20. Dated 15 April 2010.
21. Notified on 30 August 2011.
22. Orissa Electricity Regulatory Commission, "In the matter of Suo Motu proceeding initiated by the Commission for finalization of policy on harnessing of power from Renewable Energy Sources including co-generation", Petition No. 37/2008, dated 14 September 2010.
23. OERC, Petitions under Section 62 and 86(1) (e) of 'The Electricity Act, 2003' for Determination and Declaration of Tariff for Power Procurement by the Distribution licensee/GRIDCO in State of Orissa from Grid Interactive Solar Photovoltaic Power Projects under Rooftop PV and Small Solar Generation Programmes (RPSSGP) announced by MNRE, GOI, on 16 June 2010.
24. Punjab State Electricity Regulatory Commission, Petition No. 59 of 2011, dated 31 October 2011.
25. Rajasthan Electricity Regulatory Commission, Order dated 25 May 2010.
26. Rajasthan Electricity Regulatory Commission, Order dated 29 September 2010.
27. In the matter of determination of generic tariff for 1 MWp Tail end Grid Connected Demonstration Solar Photovoltaic Power Plant under the Central Financial Assistance Scheme of MNRE, Petition No. RERC 242/11 before the Rajasthan Electricity Regulatory Commission; 17 August 2011.
28. Tariff Order issued by Govt. of Sikkim does not have a separate component for solar energy tariff. Most of electricity generation in Sikkim is from hydel power plants.
29. TN Electricity Regulatory Commission, Order No. 1 of 2010, dated 27 May 2010. This tariff is subject to the outcome of tariff is subject to the outcome of the Civil Appeal No.1304 of 2010 filed by Indian Wind Energy Association before the Supreme Court of India.
30. TN Electricity Regulatory Commission, Order No. 2 of 2010, dated 8 July 2010. This tariff is subject to the outcome of tariff is subject to the outcome of the Civil Appeal No.1304 of 2010 filed by Indian Wind Energy Association before the Supreme Court of India.
31. UPERC (Captive and Non-Conventional Energy Generating Plants) Regulations, 2009, Notification no. UPERC / Secy / CNCE Regulation, 2009/ 696, dated 22 March 2010, notified on 8 January 2011.
32. Order passed on 12 August 2011, in the matter of review of tariff for solar power under UPERC (Captive and Non-Conventional Energy Generating Plants) Regulations, 09, M/s Moser Baer Clean Energy Ltd., Petition No. 694 of 2010
33. Dated 6 July 2010.
34. WBERC (Cogeneration and Generation of Electricity from Renewable Sources of Energy) Regulations, 2010, dated 10 August 2010.

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- E. Guérin, X. Wang (2012), "Mitigation targets and actions in China up to 2020". IDDRI, *Working Papers* N°01/2012.
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- E. Bellevrat (2011), "What are the key issues to be addressed by China in its move to establish Emissions Trading Systems?", IDDRI, *Working Papers* N°17/2011.
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