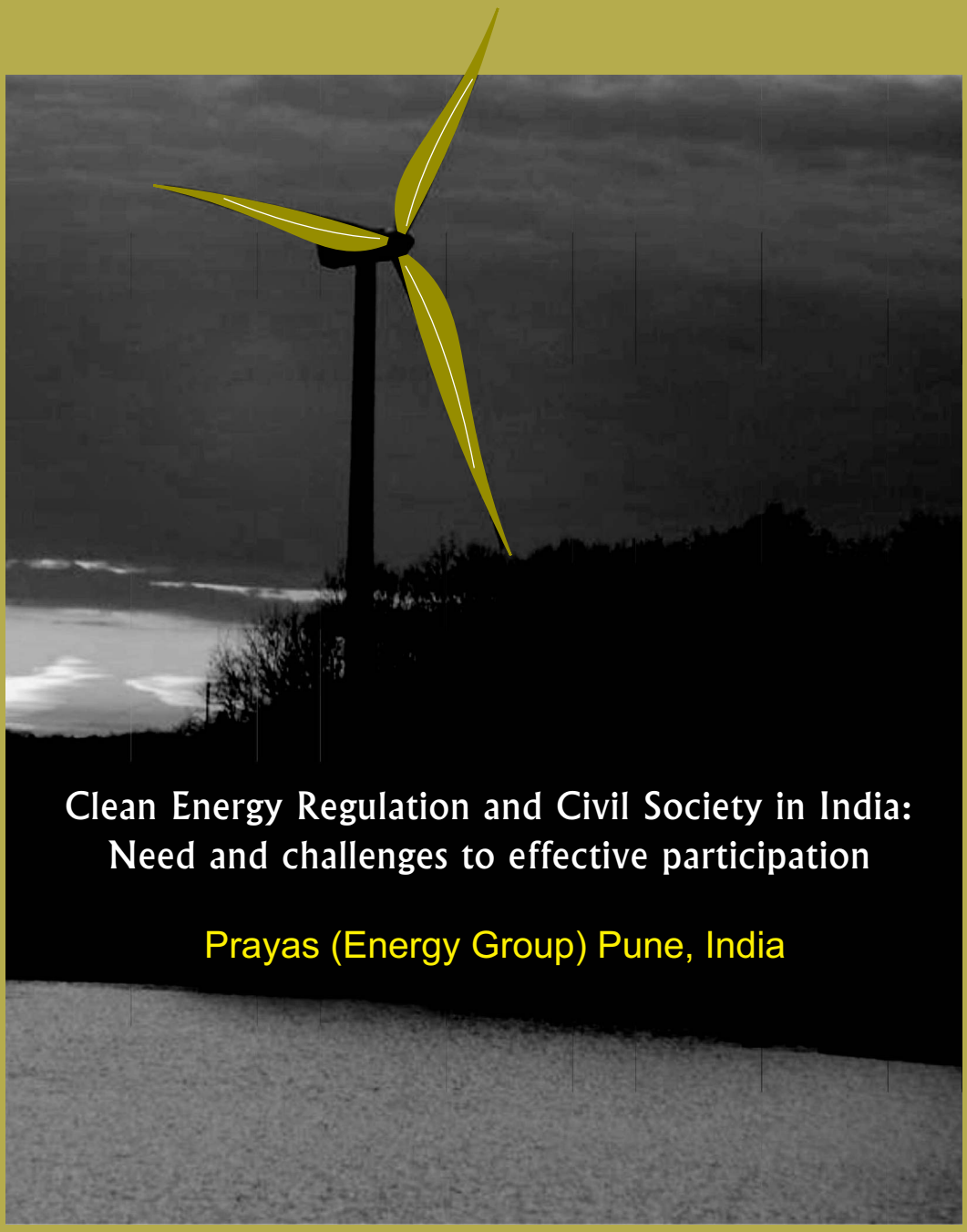
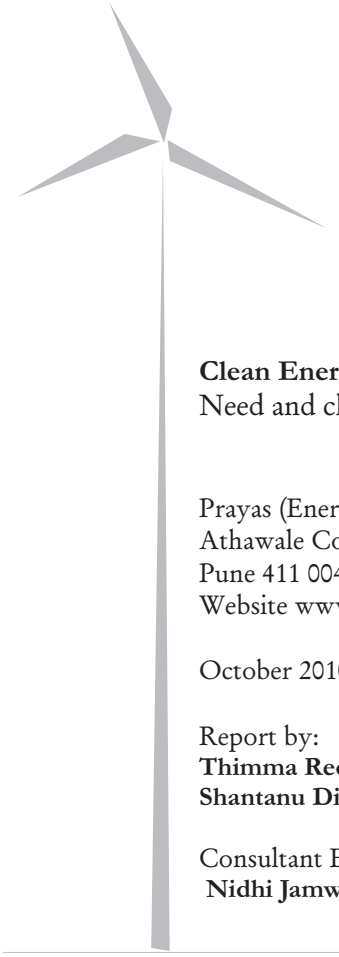


Clean Energy Regulation and Civil Society in India: Need and challenges to effective participation

Prayas (Energy Group) Pune, India

प्रयास

आरोग्य, ऊर्जा, शिक्षण आणि पालकत्व
या विषयांतील विशेष प्रयत्न



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This report has been prepared as part of the Electricity Governance Initiative (EGI). EGI is a collaborative effort of Prayas-Pune and the World Resources Institute (WRI) to promote better governance in the electricity sector. EGI is a unique network of civil society organizations dedicated to promoting transparent, inclusive and accountable decision making in the electricity sector. We facilitate collaboration of civil society, policymakers, regulators, and other electricity sector actors using a common framework to define "good governance". More than 30 organizations around the world are now partners in the Initiative. We are grateful to Renewable Energy and Energy Efficiency Partnership for supporting this work.

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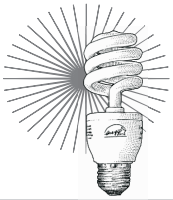
Contents

Abbreviations

APERC	Andhra Pradesh Electricity Regulatory Commission
ASCI	Administrative Staff College of India
BEE	The Bureau of Energy Efficiency
CDM	Clean Development Mechanism
CERC	The Central Electricity Regulatory Commission
CSOs	Civil Society Organisations
CUF	Capacity Utilization Factor
DSM	Demand Side Management
ECA	The Energy Conservation Act, 2001
FOR	Forum of Regulators
GCV	Gross Calorific Value
GERC	Gujarat Electricity Regulatory Commission
GHG	Green House Gas In
WEA	The Indian Wind Energy Association
KWh	Kilowatt-hour
MEDA	Maharashtra Energy Development Agency
MERC	Maharashtra Electricity Regulatory Commission
MNRE	Ministry for New and Renewable Energy
MSEDCL	Maharashtra State Electricity Distribution Co. Ltd
MU	Million Units
MWh	Mega Watt hour
NAPCC	The National Action Plan on Climate Change
NEDCAP	Non-Conventional Energy Development Corporation of Andhra Pradesh Limited
OERC	Orissa Electricity Regulatory Commission
OREDA	Orissa Renewable Energy Development Agency
PAT	Perform, Achieve and Trade
PLF	Plant Load Factor
PPA	Power Purchase Agreement
PV	Photovoltaic
RECS	Renewable Energy Certificates
ROE	Return on Equity
RPO / RPPO	Renewable Power Purchase Obligation
RPS	Renewable Portfolio Standards
SDA	State Designated Agencies
SERCs	State Electricity Regulatory Commissions
SHR	Station Heat Rate
TNERC	Tamil Nadu Electricity Regulatory Commission
WISE	World Institute of Sustainable Energy



1. INTRODUCTION AND OBJECTIVES

Renewable energy and energy efficiency has gained increased importance in electricity sector planning and regulation since the last decade[a]. The debate on climate change brought these issues to the centre stage of global growth challenge. Both renewable energy and energy efficiency have a vast potential for reducing carbon emissions responsible for global warming. Nationally and internationally it has been accepted that renewable energy must play a pivotal role in the global energy supply to meet the increasingly serious environmental and economic threats of climate change as well as to address local social and environmental challenges.

Indian government, too, is not unaware of these threats. In the last few years, the government has formulated policies and enacted legislation to promote renewable energy and energy efficiency. In fact, India was the world's first country to establish a separate ministry (apart from ministries looking after coal, power etc.) for promotion of renewable energy. An independent Ministry of Non-Conventional Energy Sources was set up in 1992. It was rechristened Union Ministry for New and Renewable Energy (MNRE) in 2006[1].

Setting up of a separate ministry was followed by a series of legislation to encourage 'green' power generation in the country. The Energy. Conservation Act was enacted in 2001 with the aim of promoting energy efficiency. The Electricity Act, 2003, along with its various policies, had provisions for promotion of clean energy. Both these legislation also provided a window of opportunities to civil society organisations (CSOs) to participate in the regulatory process of clean energy development[b].

Such legislative, policy and regulatory processes have led to significant increase in renewable energy capacity, but developments at the state level vary widely. Whereas some state-level regulatory commissions have proactively

[a] In this report, renewable energy refers to the grid connected renewable energy sources (excluding large hydro); whereas energy efficiency means utility promoted/supported measures to enhance efficiency of electricity distribution & usage. It does not include efficiency improvements for energy generation. Renewable energy & energy efficiency are collectively also known as clean energy.

[b] In this report civil society organisations (CSOs) refer to consumer groups, environmental groups, people's movements & other such organisations working for protection of public interest in areas related to consumers, environment, energy, farmers, etc.

encouraged renewable energy and energy efficiency, others are still at an infancy stage. In some cases regulators are proactive, but utilities are unresponsive. Legislation such as the Electricity Act, 2003 emphasize on a transparent public participation in the regulatory process. But, as discussed later in the report, the participatory process has not translated into serious action as far as clean energy development is concerned.

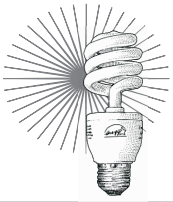
There are instances of public opposition to clean energy because of inappropriate tariff incentives and controversial project development practices. For instance, farmers in Maharashtra have strongly opposed land acquisition for wind farms, forcing the state government to order an investigation last year[2]. Some villagers have even managed to shut down the wind turbines, demanding a better compensation package[3].

Keeping in mind this scenario, CSOs have an important role to play. These organisations can both act as a pressure group forcing regulators to implement ambitious clean energy programmes; and also be a watchdog to ensure transparent and socially beneficial clean energy development in the country. However, at present, the role of CSOs is both limited and undocumented.

It is in this context the Prayas (Energy Group) decided to study the scope of CSO participation in regulatory process at state-level for development of renewable energy and energy efficiency in India. The present report not only reviews the role of CSOs in promotion of clean energy through regulatory process, but it also documents the extent to which these organizations have made use of the existing regulatory processes to overcome hurdles in advancement of clean energy regime. Based on this review, the report identifies key recommendations for improving the role of CSOs in development of renewable energy and energy efficiency.

The report is broadly divided into four sections. The first section provides a brief review of key legal and policy provisions for promotion of clean energy in the country. It also describes the role of regulatory process in development of renewable energy and energy efficiency. The next section presents an overview of clean energy programmes in a few Indian states. It presents case studies of five states -- Andhra Pradesh, Gujarat, Maharashtra, Odisha and Tamil Nadu --- that are in different stages of regulatory process and development of clean energy. Hence, they represent a divergent status of renewable energy and energy efficiency initiatives in the country. This section draws on the companion report by Prayas (Energy Group) titled 'Overview of Renewable Energy and Energy Efficiency in Select States in India, December 2009'.

Based on these case studies and focussed interaction with several stakeholders, the third section highlights key challenges to effective CSO participation in clean energy regulatory process. In the concluding section, the report suggests measures to address these challenges and asserts that CSOs can make a difference by pushing for balanced and rational, but ambitious deployment of clean energy.



2. CLEAN ENERGY POLICIES AND REGULATIONS IN INDIA

As mentioned before, Indian government has given significant importance to renewable energy development. The enactment of Energy Conservation Act, 2001 set the tone for country's energy efficiency agenda. This was followed by the Electricity Act, 2003, which enhanced mandate of regulatory commissions and other agencies in the power sector for promotion of clean energy. Apart from these legislative measures, described in Table 1, Indian government has undertaken a wide range of policy initiatives to give impetus to renewable energy and energy efficiency.

Table 1: Clean energy development in India: Important legal and policy initiatives

Development	Year of enactment
Energy Conservation Act	2001, which came into force from March 1, 2002
Electricity Act	2003
National Electricity Policy	February 12, 2005
National Tariff Policy	January 6, 2006
National Action Plan on Climate Change	June 30, 2008
"Policies on Renewables: Report" by Forum of Regulators	November 2008
National Mission on Enhanced Energy Efficiency	August 24, 2009
Jawaharlal Nehru National Solar Mission	November 23, 2009
CERC Regulations on Renewable Energy tariff	December 3, 2009
CERC Regulations on Renewable Energy Certificates	January 2010

The Energy Conservation Act, 2001 (ECA) that came into force with effect from March 1, 2002 empowered government to notify energy intensive industries, commercial buildings and other establishments as 'designated consumers', and prescribe energy consumption norms for them. These designated consumers were expected to conduct energy audit and follow the audit's

recommendations. The ECA also empowered the central government to prescribe energy conservation building codes and to direct the owners or occupiers of commercial buildings to comply with these provisions. The 2001 Act introduced energy efficiency labelling of electrical equipment and appliances. At the same time, it empowered the government to prohibit manufacture, sale, and import of notified equipment and appliances not conforming to those standards.

The Bureau of Energy Efficiency (BEE) was set up in March 2002 under the provisions of the ECA. This statutory body functions under the aegis of Union Ministry of Power. The primary objective of BEE is to reduce energy intensity of the Indian economy with active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors[4]. During the 11th Five Year Plan (2007-2012), BEE aims at reducing power consumption by five per cent (equivalent to 10,000 mega watt of avoided capacity). To meet this target, the Bureau has taken up various programmes such as commercial building and household lighting; standards and labelling of appliances; demand side management in agriculture, municipalities and industries; and capacity building of the 30 state designated agencies (SDA). BEE claims its efforts have already lead to a demand saving of over 2,000 mega watt (MW) in 2007-08 and 2008-09[5].

It would be no exaggeration to call the Electricity Act, 2003 a watershed in power sector reforms in India. This legislation covers major issues involving generation, distribution, transmission and trading in power. It lays thrust on efficient and environmentally benign policies. The 2003 Act mandates that state electricity regulatory commissions (SERCs) should promote renewable energy, and has made important provisions for the same. Section 61(h) of this Act states that while specifying the terms and conditions for determination of tariff, the Appropriate Commission shall "be guided by the promotion of co-generation and generation of electricity from renewable sources of energy." According to Section 86 (1) (e) of this Act "the State Commission shall promote co-generation and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee". Thus, the 2003 Act enlarged the regulatory mandate and role of regulators in promoting clean energy. It provided significant authority to the SERCs to respond to this mandate.

National Policies

The mandate of Electricity Act, 2003 was taken forward by the National Electricity Policy and the National

Tariff Policy issued on Feb 12, 2005 and January 6, 2006 respectively. The electricity policy recommended private sector participation for full exploitation of potential of non-conventional energy resources in the country. It also laid thrust on procurement of renewable energy through competitive bidding process. The policy suggested differential tariffs to promote non-conventional technologies because such technologies would take time before competing (in terms of cost) with the conventional energy sources. The National Electricity Policy insists on energy conservation measures in industrial, agriculture, commercial and domestic sectors; and also lays stress on adoption of voluntary and self-regulating measures. It aims at reducing the requirement for capacity additions. This is to be achieved by adopting load management techniques and differential tariff structure for peak and off-peak power supply[6].

In continuation of the electricity policy, the National Tariff Policy addressed some important issues like method of calculation of cross-subsidy under open access and the competitive bidding route for the private players. The tariff policy directed the state commissions to take into account availability of renewable energy resources in the region and its impact on retail tariffs while fixing a minimum percentage for purchase of energy from such sources. Annexure 1 provides key clean energy development related provisions in the National Electricity Policy 2005 and the National Tariff Policy 2006.

Climate missions

The National Action Plan on Climate Change (NAPCC) was released by the Prime Minister, Manmohan Singh, in June 2008. It outlines a national strategy to enable the country to adapt to climate change and enhance the ecological sustainability of India's development path. The national plan suggested that starting 2009-2010, renewable energy procurement may be set at five per cent of the total grid purchase, which should be increased by one per cent each year for the next 10 years. Hence, as per the NAPCC, renewable energy sources should contribute 15 per cent of the total power generated in the country by 2020.

NAPCC consists of eight national missions representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. These eight missions are national solar mission, national mission on enhanced energy efficiency, national mission on sustainable habitat, national water mission, national mission for sustaining the Himalayan eco-system, national mission for a green India, national mission for sustainable agriculture, and national mission on strategic knowledge for climate change.

The Jawaharlal Nehru National Solar Mission under the NAPCC aims at deploying 20,000 MW of grid connected

solar power by 2022. As per the mission, the power distribution licensees need to procure 0.25 per cent of their requirement from solar energy sources in the first phase between 2009 and 2012. This needs to be increased to three per cent by 2022. Apart from this, it intends to enhance indigenous manufacturing capacity of solar energy.

NAPCC's aim is to cut down the carbon emissions. The national mission on enhanced energy efficiency will work towards that goal by reducing the energy intensity of India's economic growth. The enhanced energy efficiency mission envisages a saving of five per cent of the country's energy consumption by 2015.

The BEE has introduced 'perform, achieve and trade' (PAT) mechanism under which 714 energy-intensive industrial units across the country will be given targets for reducing their specific energy consumption (i.e. energy consumption per unit of output). Those who do better than their targets will be allowed to sell energy saving credits to those failing to achieve the required cuts. Under the PAT scheme, industrial units would be issued the energy savings certificates (ESCerts) that can be traded on special platforms in the power exchanges. Financial penalty for non-compliance is also being put in place.

Forum of Regulators and Central Electricity Regulatory Commission initiatives

The launch of NAPCC was followed by release of an important report, 'Policies on Renewables: Report', by Forum of Regulators (FoR) in November 2008. Through this report, FoR, a body of central and state electricity regulatory commissions, attempted to bring uniformity in regulatory approach to clean energy development. It said the renewable purchase obligation (RPO) percentage should be applicable to energy input and not in terms of the installed capacity. RPO percentage should be maintained at the minimum level of five per cent by 2010, recommended the report. FoR also suggested that an overall RPO percentage should be specified rather than technology-specific percentage.

The report advocated adopting cost-plus tariff using the site specific capacity utilization factor (CUF) and a higher rate of return on equity. FoR urged use of renewable energy certificates (RECs) to remove roadblocks in flow of renewable energy from surplus states to the deficit states. The forum claimed the issues related to eligibility of fossil fuel based co-generation for the purpose of RPO and imposing RPO on open access or captive consumers needed to be further studied.

• Meanwhile, the Central Electricity Regulatory Commission (CERC) also undertook initiatives to promote clean energy development. Table 2 provides details of various assumptions and tariffs specified by the CERC for different

renewable energy technologies. In May 2008, CERC released a discussion paper on 'Promotion of Co-generation and Generation of Electricity from Renewable Sources of Energy'. This was followed by the issuing of draft regulations on 'terms and conditions for tariff determination from renewable energy sources' in May next year. Latter was in keeping with the paragraph 6.4 of the National Tariff Policy, as per which the commission had to lay down guidelines for pricing of non-firm power, especially from non-conventional sources, to be followed in cases where such procurement was not through competitive bidding. These draft regulations were released for public scrutiny and were adopted as final regulations on December 3, 2009. Some key features of the final regulation are as follows:

• **Pricing of renewable energy power:** CERC followed cost-plus approach in deciding the power purchase tariff from different renewable energy sources. The commission adopted a control period of three years. In the case of solar photovoltaic (PV) and solar thermal power plants, the CERC has to annually review the capital cost. Tariff period has been fixed for 13 years (except for small hydro plants below five mega watt capacity and solar units) even though useful life of the plant extends up to 20-35 years. In case of small hydro projects (less than 5 MW), tariff period is set for 35 years; whereas it is 25 years for solar PV and solar thermal. As per the final regulation, financial norms specified shall be the ceiling norms while determining project specific tariff. Single part, levalised tariff is to be adopted i.e. tariff fixed per kilowatt-hour (kWh) for the entire duration of the power purchase agreement (except fuel cost). Fuel cost has to be specified on year of operation basis. All renewable energy plants, except biomass and cogeneration plants of 10 MW and above capacity, are to be treated as must run plants and should not be subjected to 'merit order dispatch' principle. The debt-equity ration is set at 70:30. Loan with interest rate equivalent to long term prime lending rate of SBI plus 150 basis points, RoE = pre-tax 19 per cent per annum for the first 10 years and 24 per cent from 11th year onwards has been prescribed.

• **Generation Based Incentive:** Incentives to be taken into account while determining tariffs.

• **Sharing clean development mechanism benefits**: In the first year of clean development mechanism (CDM), 100 per cent of the proceedings to be retained by the developer. In the following year, share of beneficiaries will be 10 per cent that will be progressively increased by 10 per cent every year till it reaches 50 per cent. After this, the proceedings shall be shared in equal proportion

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Note: Levalised tariff is for projects availing accelerated depreciation benefit and shows the range of levalised tariff specified by CERC for different states.

Source: CERC Order , December 3, 2009

Renewable Energy Certificates

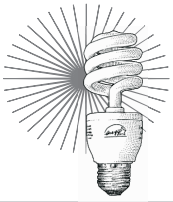
In January this year, CERC issued Renewable Energy Certificates regulations to give further boost to renewable energy development in the country. Renewable energy certificates (RECs) are tradable commodities that represent the green attribute of electricity generated from an eligible renewable source. One REC represents 1 Mega Watt hour (MWh) of renewable electricity. The main purpose of the REC mechanism is to overcome the inequitable distribution of the renewable energy resources across the country and to redistribute the renewable energy burden across the states more equitably. Using this mechanism, states deficient in renewable energy sources can purchase green attribute of renewable energy generation from other states to meet their RPO requirement. Competition is expected to be the main driver to reduce costs, while the cheapest renewable

Table 2: CERC's Renewable Energy Tariff Benchmarks for year 2009 –10

Parameter	Wind	Small hydro	Biomass	Cogene-ration	Solar PV	Solar Thermal
Capital cost (Rs in crore per MW)	5.15	5-7	4.50	4.45	17.00	13.00
Capacity utilisation factor	20-30%	30-45%	60-80%	45-60%	19%	23%
O&M (Rs in lakh per MW)	6.50	12-21	20.25	13.35	9.00	13.00
O&M escalation	5.72% -	5.72%	5.72%	5.72%	5.72%	5.72%
Auxiliary consumption		1%	10%	8.5%	-	10%
Fuel cost	Water	Rs 1,299– royalty as pass through	Rs 809–Rs Rs 2,168 per tonne	1,411 per tonne		
Levalised Tariff (Rs/ kWh)	3.5 – 5.26	3.14 – 4.35	3.83 – 5.42	4.16 – 5.65	17.14	12.54

energy resources are ideally expected to be deployed first.

The REC mechanism, first mooted by the MNRE, has been taken forward by the CERC. Latter has notified rules and the forbearance and floor prices for RECs. Final regulations for introducing a market for RECs were issued on January 14 this year, followed by floor and forbearance prices on June 1. This REC mechanism is expected to become functional soon.



3. CLEAN ENERGY INITIATIVES IN FIVE INDIAN STATES

Based on the legal and policy framework described in the previous section, many state governments and the regulatory commissions have undertaken measures to promote clean energy in the last decade. The present section provides an overview of those initiatives in five Indian states, with a view to understand the status of clean energy development in these states and issues confronting effective clean energy deployment. This report focuses on Maharashtra, Tamil Nadu, Gujarat, Andhra Pradesh and Odisha, as they represent diversity in the Indian energy sector both in terms of evolution of regulatory process, availability and exploitation of renewable energy resources, and the active civil society.

In the case of Odisha and Andhra Pradesh, reforms were initiated under the respective state-level power sector reform acts; whereas Gujarat, Maharashtra and Tamil Nadu embarked upon reforms path with the formation of ERCs under the Centre's Electricity Regulatory Commissions Act, 1998. However, later all these states and their respective ERCs came under the purview of Electricity Act, 2003.

SERCs were established in these states between 1996 and 2000. The initiatives for promoting clean energy by these state commissions can be viewed in two phases. In the first phase, till around 2005-06, most SERCs focused on determining technology specific, promotional tariff for renewable energy and mandating local distribution company to enter into long term power purchase agreement (PPA) with renewable energy developers at such regulated tariff. For instance, between 2002 and 2005, the Maharashtra Electricity Regulatory Commission (MERC) issued tariff orders for wind power, biomass based generation, co-generation, and small hydro generation. Through these orders MERC fixed tariff for this renewable-based electricity generation in the range of Rs 3 per kWh to Rs 3.5 per kWh with certain in-built escalation factors. This tariff was based on 'cost-plus' principles, i.e. tariff (power purchase rate by local distribution utility) assured entire cost recovery and profit for renewable energy developers. These orders also required distribution companies to sign PPAs of 13 to 20 years with the renewable energy developers to provide long term revenue certainty for developers.

The second phase of SERC's initiatives was in response to the enhanced mandate

of the 2003 Act when many state commissions specified Renewable Purchase Obligations (RPO)/Renewable Portfolio Standards (RPS) for distribution companies. Under these orders, SERCs directed the distribution companies to procure a certain percentage of their total power requirement from renewable energy sources at a regulated tariff (often similar to the preferential tariff determined for each renewable technology). Annexure 2 tabulates renewable energy related RPO and tariff orders issued by SERCs in states covered as part of this study.

As a result of these regulatory orders, renewable energy deployment in many states has increased significantly. Table 3 shows the status of renewable energy in the select five states. Tamil Nadu and Maharashtra have an installed generation capacity of over 4,700 MW and 2,300 MW respectively. But renewable energy development is not uniform across all the states. For instance, Odisha has virtually negligible installed capacity, while Andhra Pradesh has managed only 644 MW capacity. The scenario of energy efficiency promotion through regulatory process is worrisome with Maharashtra, being the only state that has taken any significant regulatory initiatives in energy efficiency.

Table 3: Clean energy deployment: Status of renewables in five states in 2009

State	Installed capacity of renewable energy (in MW)	Renewable energy contribution (in million units (MU) & percentage)
Maharashtra	2,370	3,757 MU / 3.95 per cent
Andhra Pradesh	644	1,163 MU / 1.75 per cent
Tamil Nadu	4,703	7,532 MU / 11 per cent
Gujarat	1,574	1,100 MU / 2.23 per cent
Odisha	-	375 MU / 3.2 per cent

Source: Tariff orders of respective state electricity regulatory commissions

Weak CSO participation in regulatory process

An important issue emerging out of the five states' analysis is the lack of participatory approach in clean energy regulatory process. In accordance with the legal and regulatory framework, state regulatory commissions are required to conduct public hearings and consider public comments while issuing tariff orders and fixing RPO/RPS. Table 4 summarises public participation in the regulatory processes in the select five states.

Table 4: The weak link: Feeble CSO participation in regulatory process on renewable energy tariff and RPO/ RPS

Event	Andhra Pradesh	Gujarat	Maharashtra	Odisha	Tamil Nadu
1st RPPO	9	0	1	1	2
2nd RPPO	6				6
1st tariff order	9	Wind – 1	Wind – 6 Biomass – 1	0	2
		Bagasse - 3	Bagasse – 4		
			Small Hydro – 0		
			Municipal solid waste – 1		
			Solar – 0		
2nd tariff order	6	Wind – 1 Solar – 0			6

Note: Numbers indicate total participants/comments received in response to public notice issues by the respective SERCs.
Source: Renewable energy tariff orders of respective SERCs

The above table clearly shows a lack of participation by civil society and environmental groups in regulatory process for promotion of clean energy. Mostly the project developers have participated in response to public notices issued by the state commissions. Based on detailed review of regulatory orders and discussions with various stakeholders, subsequent sections highlights some of the key challenges and issues that are impeding effective CSO participation in the regulatory process.

Potential uncertainty

Even though most states are taking steps for promoting clean energy, there is uncertainty about the overall potential of renewable energy generation that may lead to misplaced targets. Accurate potential assessment is a must for ensuring both ambitious and realistic renewable energy generation targets.

Andhra Pradesh serves a good example for this problem. As per APERC's 2008 discussion paper, the Non-Conventional Energy Development Corporation of Andhra Pradesh Limited (NEDCAP) projected the total potential of renewable energy in the state at 4,412 MW[7]. It also pegged the wind energy potential of the state at 2,110 MW. In sharp contrast, the Indian Wind Energy Association (InWEA) estimated Andhra's wind energy potential to be a whopping 8,675 MW[8]. Such confusion is not limited to

wind energy sector alone. There are discrepancies in the potential of biomass plants as well. For instance, NEDCAP has set a target of 627 MW for biomass plants. But according to a report by Hyderabad-Administrative Staff College of India (ASCI), the state does not even have sufficient fuel for 225 MW. This was confirmed when the APERC refused to sanction more plants under this category[9].

Maharashtra, too, is grappling with contradictory potential estimates. Whereas the Maharashtra Energy Development Agency (MEDA) has arrived at a total renewable energy potential of 10,030 MW, MNRE estimates the same to be 7852 MW[10]. Reason for this difference is the variation in wind energy potential. MEDA has set the wind energy potential at 6,500 MW; but MNRE claims it to be 4,584 MW only. Such discrepancy is also noted in case of municipal and industrial wastes. Whereas MEDA claims the potential of such wastes to be 900 MW, MNRE states it is 637 MW. Both the agencies, however, have arrived at a potential of 781 MW for biomass-based plants. But such plants are already riddled with problems. Even at 12 per cent of the estimated total potential, the state is facing an acute fuel shortage. This has been pointed put in various media reports[11].

In the case of Odisha also, there is a large difference between potential estimate of Orissa Renewable Energy Development Agency (OREDA) and World Institute of Sustainable Energy (WISE). As per OREDA claims the total renewable energy potential is 16,230 MW, but WISE claims it at 7,874 MW. Differing estimates of solar energy potential -- OREDA at 14,000 MW and WISE at 5,000 MW – is the main reason behind this variation[12].

There could be various reasons for these divergent data on renewable energy potential in the country. It is possible that because of technological advances the harnessing of different sources of renewable energy may have increased. A more accurate renewable energy potential is required for planning the future capacity additions. Such estimates should not only be transparent but also accessible to the civil society. Uncertainty about achievable potential limits the civil society participation and others efforts to demand more ambitious renewable energy targets. It runs into a danger of either too limited targets or very high targets that not only have a significant impact on tariff, but also cause local social/environmental problems.

Obliged to purchase 'green' power

The ERCs of Maharashtra, Tamil Nadu, Gujarat, Andhra Pradesh and Odisha have specified a percentage of the total power consumed in the state to be procured from the renewable energy sources. These commissions have come out with their respective Renewable Power Purchase Obligation (RPPO) orders.

Except Odisha, the other four ERCs came out with RPPO orders on suo

moto basis. Orissa's order was in response to a petition filed by the non-profit, Greenpeace India Society. All these orders are based on the estimates of renewable energy potential of their respective state and its impact on tariff burden to be borne by the consumers. However, barring Tamil Nadu, most states have failed to meet their targets.

APERC issued two RPPO orders on September 27, 2005 and on March 31, 2009. Both these orders stipulate five per cent of the power consumed in the state to be procured from the renewable sources. GERC also came out with a series of RPPO orders. In its first regulation on RPPO, issued in October 2005, the commission stipulated one per cent of the total power purchased by the licensees to be procured from renewable sources in the year 2006-07 and 2007-08. For the following year of 2008-09, a target of two per cent was fixed. GERC then came out with another draft regulation on RPPO, applicable from 2009-10 onwards for the second control period. In this regulation, the commission suggested a drastic increase in power procurement from renewable sources. It suggested eight per cent share of renewables for 2009-10. This is set to rise to nine per cent in 2010-11 and 10 per cent in 2011-12. Apart from this, the GERC has also suggested specific proportion of power to be procured through wind and solar energy routes.

MERC issued its order on renewable purchase specification (RPS) framework on August 16, 2006. According to this order, every 'eligible person' will have to procure electricity generated from eligible renewable energy sources at the percentages specified by the commission (six per cent for the year 2009-10). Tamil Nadu, too, set an ambitious target. In its Order No 3 of May 15, 2006, TNERC fixed an RPPO of 10 per cent in a year. In the following order, Order No 1 dated March 20, 2009, the commission specified RPPO at minimum of 13 per cent for 2009-10 and minimum of 14 per cent for 2010-11.

Odisha has adopted much less aggressive approach as far as RPPO is concerned. Till very late, OERC did not have any comprehensive regulation or order on procurement of power from renewable energy sources. Greenpeace, an NGO, filed a petition in 2004 at OERC requesting the commission to pass an order to the distribution companies to explore the possibilities of purchase of power from renewable energy at least to the tune of 10 per cent of the total purchase of power from various existing sources. In wake of this petition, the commission in its April 2005 order decided that for the year 2006-07, 200 million units (MU) of power will be purchased by the utilities from renewable sources.

Greenpeace's petition was followed by another petition by Bhubaneshwar-based Project Development Consultants. In response to the second petition, the commission passed an order dated August 20, 2005 and directed the utilities to procure three per cent of the total

purchase during 2007-08 from the renewable sources. This percentage has to go up at the rate of 0.5 per cent per annum for each subsequent year to reach a level of five per cent by 2011-12.

The orders of APERC, GERC and MERC are applicable to distribution licensees as well as captive consumers and open access consumers. Recent GERC and MERC orders have also suggested the captive and open access consumers can fulfil their RPPO through mechanisms like RECs.

Though most SERCs have set their RPO/RPS targets, many states have failed to meet those targets. Except Tamil Nadu, the other four states studied have been unable to achieve the RPPO stipulated by their respective commissions. The situation in Andhra Pradesh is starkly different from Tamil Nadu. The state is expected to reach four per cent in 2009-10 as against the target of five per cent. Similar is the condition in Gujarat. During 2009-10 the state will manage to procure only 2.17 per cent from renewable energy sources when the target is eight per cent. In Maharashtra, renewables contributed about 3.95 per cent of the total power consumed in 2008-09, while the target was five per cent. For the year 2008-09, Orissa has to procure 669 MU from renewable sources, but its utilities could manage only 375 MU. Similarly, as against a target of 780 MU in 2009-10, the state could secure only 530 MU. And even within those 530 MU, 280 MU came from co-generation units based on fossil fuels.

There is a reason behind this failure. SERCs have been unsuccessful in ensuring compliance with RPO/RPS due to legal challenges to their authority to levy penalty and questions regarding availability of adequate renewable energy generation[13]. Large, open access consumers have also attempted to avoid renewable energy purchase obligation by challenging SERCs jurisdiction to mandate such purchases[14]. CSOs did not intervene in any of these proceedings before the SERCs or the High Courts in support of adherence to RPO/ RPS regime. This underscores the need for proper potential estimation and an urgent intervention by the civil society in the regulatory process to strengthen regulatory mechanism for making utilities and large consumers accountable for RPO/RPS compliance.

Tariff troubles

One of the most controversial issues in renewable energy sector is the setting of tariff. Before the establishment of regulatory commissions, state governments used to follow the Centre's guidelines on fixing the renewable energy tariff. These guidelines were prepared on the basis of the then prevailing thermal power generation cost. But after establishment of SERC's, the commissions adopted different mechanisms for determination of renewable energy tariffs. Whereas APERC has covered all the renewable energy sources in a single tariff order, GERC and

MERC have fixed separate tariffs for each source. TNERC, on the other hand, conducted public consultation for all the sources together, but issued separate tariff orders for each renewable energy source. Except OERC, the other four commissions have followed cost-plus approach in arriving at preferential tariffs.

Various parameters were taken into consideration while deciding these tariffs. These parameters include capital costs, plant load factor (PLF), debt-equity ratio, return on equity (RoE), interest on term loan, interest on working capital, depreciation, O&M expenditure, O&M expenditure escalation, station heat rate (SHR) and gross calorific value (GCV) adopted for different renewable energy fuels, cost of fuels, auxiliary consumption, etc. Annexure 3 tabulates assumptions of various regulatory commissions for these parameters. A review of the cost-plus approach and the assumptions raises some disturbing questions.

The commissions have not used uniform values for these parameters and there is considerable variation in the values adopted for different parameters. For instance, both APERC and TNERC adopted 55 per cent as the PLF for bagasse-based cogeneration plants, but MERC set it at 90 per cent. Whereas APERC has used 15.5 per cent pre tax as ROE, TNERC adopted 19.85 per cent pre tax. Gujarat and Maharashtra have used different interest on term loans for wind energy -- 10.75 per cent and 14 per cent respectively. In case of depreciation for biomass plants, while APERC adopted 7.84 per cent, TNERC adopted 4.5 per cent.

The useful life of plant and PPA period are also crucial in determining the renewable energy tariff. In the case of wind energy, project's life extends up to 20 to 25 years. But in Maharashtra, MERC limited PPA to eight to 13 years during which the developers recover all their fixed capital. After the PPA period, developers are free to sell power at market rates, thereby depriving the consumer benefit of low tariff after payment of all costs related to the turbine. This increases burden on the consumers, as utility will have to contract new capacity to fulfil its obligations under RPO.

Since the tariff determined is on cost-plus basis, the variation in these cost driving parameters leads to significant variation in final tariff also. For example, in Andhra Pradesh the cost of biomass power is Rs 3.95 kilo Watt hour (kWh). Compared to this, in Tamil Nadu, the biomass energy plants commissioned on or after September 19, 2008 have a high tariff of Rs 4.5 kWh, Rs 4.65 kWh and Rs 4.75 kWh for the first three years. In case of wind power, GERC in 2006 fixed tariff of Rs 3.37 / kWh for 20 years[15]. But MERC decided to continue earlier tariff of Rs 3.50 per kWh for the first year and the same to be escalated by 15 paise per unit per year for 13 years term of PPA. MERC issued this tariff the same month, August 2006, as GERC[16]. MERC further

allowed the wind developers to sell power at market determined prices at the end of PPA term, thereby depriving consumers the benefit of low tariff in later years (as loan is repaid during PPA term).

Divergent capital costs: A look at the per MW capital cost considered by various SERCs (all within a couple of years period) further explains the anomalies in determining key parameters while deciding tariff. While APERC adopted Rs 3.25 crore per MW for bagasse-based plants, its neighbouring state's TNERC has adopted Rs 4.67 crore per MW for similar plant. Further, the GERC adopted Rs 3.5 crore per MW for biomass power plants, but TNERC adopted Rs 4.87 crore per MW for similar plant. This is a difference of about 40 per cent.

Capital cost of wind energy plants too varies significantly from state to state. Whereas APERC has adopted Rs 4.7 crore per MW, Tamil Nadu has considered Rs 5.35 crore/MW. The example of capital cost of wind turbines from Andhra Pradesh is quite revealing. APERC issued an order on May 1, 2009 and increased the power purchase price of new wind energy projects from Rs 3.37 per unit to Rs 3.50 per unit. This increase was based on various factors, including the per MW capital cost of wind energy unit. A capital cost figure of Rs 4.70 crore per MW was used by the commission to arrive at the increased tariff.

The following table 5 shows per MW cost of wind power plants quoted by wind turbine manufacturers in different Indian states within a gap of few months. The per MW cost was varied by more than Rs two crore (i.e. over 40 per cent) within a span of three months.

Table 5: Wide range of wind turbine capital cost estimates

Client	Submission date	Cost per MW (Rs in crore)
Gujarat Alkalies and Chemicals Ltd	17.3.2007	5.14
Chennai Port Trust	4.4.2007	5.36
Rajasthan State Mines and Minerals Ltd	23.4.2007	5.16
ONGC – Gujarat	15.6.2007	6.08
Bharat Electronics Ltd, Karnataka	16.6.2007	7.45

Source: InWEA submission before the APERC dated 21-10-2008

Weak data, but huge increase in fuel costs: Fuel or variable cost is a major component of tariff for renewable energy technologies such as biomass and bagasse-based cogeneration. Determining cost of these fuels has been a big challenge. The case of Maharashtra explains the nature of this challenge. In December 2009, MERC issued an order increasing the variable cost component of biomass power from Rs 1.34 per unit to Rs 3.28 per unit, and total cost of biomass power from Rs 3.11 per unit to Rs 4.98 per unit. This was in response to a petition filed by the Maharashtra Biomass Energy Developers Association. Before hiking the tariff, the commission had directed biomass energy developers to furnish detailed information in prescribed format. However, the same was not furnished to the commission. In spite of acknowledging that the fuel cost information was inadequate and contradictory, rather than compiling the required data through independent sources or mandating renewable energy developers to provide consistent data, the commission went ahead and raised the tariff.

This order of MERC was based on information from only four biomass power projects, as against the eight projects commissioned in the state (paragraphs 9 and 15 of the order). Documents provided by the four biomass power projects show the fuel mix used by these projects is different from the fuel mix proposed by the developers in DPRs (paragraph 38). There are discrepancies between the certified data submitted by the developers and information provided under sworn affidavits. MERC, too, acknowledged the unreliability of data (Paragraph 41). It agreed there were differences in fuel cost based on data submitted in the Cost Accounting Records and data submitted in the Data Template on fuel usage and fuel procurement (paragraph 42). However, the commission ignored these data discrepancies and admitted developers' submission about exceptional circumstances and scarcity of fuel availability. It then approved the hike in variable charges taking into account information provided under certified Data Templates. The local utility, MSEDCL, too did not object to the proposed revision. The only caveat in the order was the hike was applicable only up to March 31, 2010. But as described in next para, once such an order is issued, it becomes a precedent for others to follow.

The situation is similar in case of bagasse-based cogeneration. MERC issued an order on January 11, 2010 increasing the power purchase price of cogeneration units from Rs 3.50 per unit to Rs 4.79 per unit. This hike was justified on the basis of increase in price of bagasse, used as fuel in cogeneration units. The entire revision was once again based on unreliable data. This, too, was acknowledged by the commission in paragraph 49 of its order, where it noted: "the petitioner has neither provided any statistics, computations of cost of generation nor any supporting documents for

the operational cogeneration projects in order to substantiate the cost of generation. Even the proposed options for formulation for bagasse price have not been substantiated through illustration based on historical and/or current price data for sugar cane price or coal price as proposed by the Petitioner. Further ... as per submission of Commissioner of Sugar, it has furnished bagasse price data only in case of 6 cogeneration projects (during FY 2008-09, bagasse price is reported only for 4 cogeneration projects) out of 21 cogeneration projects already commissioned and operational within the State. Further, the range of bagasse price as reported for 4 cogeneration projects during FY 2008-09 varies significantly from Rs 854.92/ tonne (Shri Shanker, Solapur) to Rs 1,454/tonne – Rs 2,177/tonne (Shri Pandurang, Solapur), to Rs 1,924/tonne (Shri Someshwar, Pune), to Rs 2,200/tonne (Shri Vikas, Latur). Thus, relying on un-audited information based on limited number of projects with wide variation may not be prudent". Shockingly, in spite of acknowledging the information gap, the commission went ahead and responded favourably to the petitioner's request for an increase in bagasse price and raised it to Rs 1832/MT.

CERC's efforts to rationalise renewable energy tariff : Taking note of challenges in determining the renewable energy tariff, CERC came out with tariff guidelines for renewable energy tariff in 2009[c]. These guidelines provide basis for determining renewable energy tariff in different states based on state specific scenario (e.g. fuel price and availability, wind utilisation factor in different states). States were expected to adopt the new tariff guidelines to bring uniformity in the approach. Rather than easing the tension, this has lead to a different kind of challenge in terms of reasonableness of tariff determined by the commission. For example, the tariff arrived at by the CERC for wind power projects comes to more than Rs 4.90 for plants in Maharashtra (December 3, 2009 order). This translates into a 20 per cent increase in tariff over the tariff determined by the MERC in its earlier orders. These orders were the basis of wind energy capacity addition of over 1,000 MW in the state. This shows the earlier tariff determined by the MERC was sufficient to attract large capacity in wind project.

The calculation of solar power tariff is equally convoluted. CERC, through its order dated Dec 3, 2009, has fixed a tariff of Rs 17.14 per unit and Rs 12.54 per unit for solar PV and solar thermal respectively (for projects with accelerated depreciation benefit). This tariff is fixed for 25 years. However, a month later, GERC decided on a much lower tariff for similar solar power generation projects. GERC's tariff for solar PV is set

[c] As per these guidelines, CERC considered return on equity of 19 per cent for renewable energy developers and used a discount rate in the range of 16.45 per cent to 16.8 per cent for calculating levalised tariff.

at Rs 15 per kWh for initial 12 years and Rs 5 per kWh for the next 13 years. The tariff for solar thermal power projects is fixed at Rs 11 per kWh and Rs 4 per kWh for the first 12 years and the following 13 years respectively. Even though Gujarat offers a much lower tariff than CERC, within six months of the GERC's tariff order, PPAs for nearly 500 MW solar capacity have been signed[17]. This confirms the tariff determined by CERC was on the higher side and solar power projects are viable even at a much lower tariff[d].

This review of tariff determination of renewable energy projects highlights the mammoth challenge of lack of transparency in capital cost as well as fuel costs of such plants. Neither project developers, nor state level energy development agencies, entrusted with the task of clean energy promotion, have played a constructive role in overcoming this information asymmetry and the resultant suspicion about reasonability of renewable energy tariff determined by regulatory commissions. Such varying assumptions and parameters for cost-plus tariff create confusion and raise doubts in the mind of CSOs regarding 'reasonable' tariff for renewable energy. These non-transparent processes also have a direct bearing on the customers. The SERCs need to insist that project developers share adequate information about project's costs and should also undertake independent analysis to assess reasonable project costs. The role of CSOs in pushing SERC's to undertake such detailed analysis and providing better information about project costs would be very helpful in determining rational renewable energy tariff.

Non-participatory tariff determination process

Confidence about transparent and independent nature of tariff determination process is a pre-requisite for sustained and effective CSO participation in the regulatory process. However, the review of regulatory process in select five states has exposed some critical lacunas. This problem is best illustrated by Andhra Pradesh. APERC did not undertake any public process before issuing its first and second renewable energy tariff orders in 2000 and 2001. CSOs and local people demanded a say in the regulatory process and requested for a hearing. The commission mended its way slightly during the third renewable energy tariff order by holding a public hearing on March 19, 2004. But, the very next day the commission issued its 65 page order. The order showed how in the past commission had held several rounds of discussions with the private developers without giving consumers equal opportunity. The 'participation' process adopted by the APERC made it clear the commission had already decided on the renewable energy tariffs.

[d] Subsequent tariff order by CERC for financial year 2010-11 reduced the tariff to Rs 14.95 / kWh and Rs. 12.85 / kWh for solar PV and solar thermal respectively. This is still higher than the GERC tariff.

State governments, too, influence the tariff determination. For instance, the Government of Andhra Pradesh has issued various orders under the section 108 of Electricity Act, 2003. These orders have had a direct impact on APERC's orders on biomass and wind energy. The state government issued a government order on April 11, 2008 permitting DISCOMs to offer Rs 3.10 per unit to wind energy units. Indian Wind Turbine Manufacturers Association approached the government requesting for a revision of the tariff. Latter obliged by issuing another order in September 2008 revising and raising the tariff to Rs 3.50 per unit, which was subsequently adopted by the APERC.

However, the matter did not end here. Through another letter dated November 12, 2008, the state department of energy authorised an increase in the purchase price of power from biomass units to Rs 3.79 per unit. This was justified in the garb of increased fuel costs. Strangely, the rate finally adopted by the commission is even higher than Rs 3.79 per unit. For example, allowing an increase in fuel cost by the commission means a tariff of Rs 3.95 per unit for a plant set up in 2004.

Energy efficiency : Ignored and forgotten

Clean energy includes both renewable energy and energy efficiency. Whereas Indian government has taken some bold steps to increase the country's renewable energy capacity; regulatory process has treated energy efficiency like a stepchild. This contradiction is quite serious. On one hand, even under highly resource strained situations, SERCs are mandating significant renewable energy purchase at a huge premium; on the other hand, energy efficiency, costing much less, is completely ignored. Both energy efficiency and renewable energy are comparable in terms of environmental benefits, energy efficiency and demand side management (DSM).

Andhra Pradesh government took cognisance of energy efficiency measures and issued several notifications to undertake specific energy efficiency measures in state government offices and agricultural sector. But these efforts are proving insufficient due to lack of sustained monitoring and commitment. For example, the government stipulated that farmers who opt for adoption of DSM practices, such as installing capacitors, frictionless foot valves, ISI standard pumpsets, are eligible for free power supply. However, there is no effective monitoring of this freebie. Eastern DISCOM and central DISCOM have recently started a pilot project on the supply of CFL bulbs at subsidized rates to the consumers. But there is no review of impact or outcome of these efforts. Unfortunately, the state regulatory commission has shown no interest in mandating utilities to undertake energy efficiency.

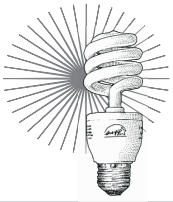
In Maharashtra there have been some energy efficiency and conservation initiatives, but these are sporadic. In response to consumer groups and regula-

tors pressure, state distribution utility undertook a pilot project in Nashik district on CFL distribution in 2009. These lamps were supplied to about 300,000 consumers over a period of six months on instalments. This lead to a saving of seven to nine MW of power. However, a high failure rate of these lamps (over 50 per cent) lead to consumer complaints and the project could not be sustained[18].

Maharashtra's another initiative, Akshay Prakash Yojana implemented in 4,611 villages in 2006, too died prematurely. Under this scheme, the villagers were asked to regulate their electricity usage during the peak hours by using it only for residential lighting purpose. People were asked to give up appliances consuming high levels of electricity. Power theft was also checked. These measures ensured a drop in the electricity demand, sometimes up to 50-70 per cent. According to MSEDCL submissions to the MERC, this scheme was successful in bringing down the peak electricity demand by 960 MW. In return, these villages were provided 22 hours of assured power supply everyday. But the programme was discontinued because the utility found it difficult to daily supply 22 hours of promised electricity. Also, over a period, local level social regulation started diluting leading to an increase in demand.

In yet another regulatory initiative, through orders in May 2005 and October 2006, MERC prescribed higher load management charge for consumers consuming beyond certain limit (compared to earlier years consumption) and simultaneously offered rebate for consumption below this limit. In May 2007, the commission also attempted to set a much higher tariff for certain consumer categories such as shopping malls and multiplexes to encourage them to undertake energy efficiency activities. This was done in the context of large power shortages in the state. The commission's approach was to provide tariff signals to consumers for enhancing energy efficiency and thereby contributing to mitigating load shedding. But both these initiatives were short-lived and had to be withdrawn as consumers, especially large ones, opposed these initiatives and filed petitions both before the regulator and the appellate forum.

Overall this review indicates that even though energy efficiency has huge potential and is economically very attractive, most regulatory commissions have shown no interest in effectively utilising this important measure to address energy shortages as well as to reduce environmental impacts of power sector.



4. Need and challenges to civil society participation

Clean energy development is not a technology issue alone. Promotion and adoption of renewables has a direct bearing on the electricity tariffs that ultimately affect the consumers. Also consumers have a right to know reasons for promotion of a particular technology and the method for tariff calculation. At statute and policy level this has been accepted by the Indian government. Both the Electricity Act, 2003 and the National Electricity Policy direct ERCs to take into account interest of all stakeholders, including CSOs, while preparing plans and issuing guidelines for the development of renewable energy.

The Preamble to 2003 Act clearly mentions 'protecting interests of consumers'. Section 86 (3) of the Act reads the state commissions should ensure transparency while exercising their powers and discharging their functions. The state-level ERC is expected to give a hearing to all the affected people. The statute has enabled public to appear before the commission to put forth its views. These public hearings have provided a platform to CSOs and common people to participate in the country's clean energy development process.

In some states civil society has participated vigorously in the regulatory process determining consumers' electricity tariff. For example, in Maharashtra over 200 consumers/groups filed their comments during the annual tariff revision process in 2009 on affidavit. Similarly in Andhra Pradesh, hundreds of consumers and civil society groups participated in tariff related public hearings. But as depicted in table 4, CSO participation in regulatory process related to clean energy has been abysmal, with hardly any public interest CSOs participating in these proceedings. Mostly project developers and their associations have participated in public hearings related to clean energy, i.e. mainly renewable energy.

CSO participation is crucial. These independent organisations can create demand pull for renewable energy and energy efficiency programmes in the country. CSOs efforts in Odisha to demand RPO order from regulatory commission, or in Maharashtra where they put pressure on regulatory commission and utility to undertake CFL

demand side management program, are some of the examples of crucial CSO role in the regulatory process. Their participation can also lead to innovative solutions and help manage trade offs in promoting clean energy. CSOs can push for balanced and rational, but ambitious deployment of renewables. For example, in states where SERCs are not giving enough attention, CSOs can approach the commission to mandate energy efficiency/DSM programs for utilities. CSOs can also strengthen SERCs initiatives by filing / joining petitions before regulatory commission or courts, when either large consumers or utilities do not respond to the regulatory initiatives. This would also bring in a sense of accountability among the regulators, utilities, project developers and large consumers.

Based on the review of regulatory documentation related to clean energy in select states (discussed in previous section) and discussions with various stakeholders, Prayas team has arrived at a number of concerns and challenges for effective civil society participation in the regulatory process. Following are some key concerns of civil society groups that are preventing them from actively participating in the regulatory process to demand more ambitions and effective clean energy regime by SERCs.

a. Tariff: is the premium reasonable and justified?

As discussed in the section on 'Tariff Troubles', lack of transparency is a major problem afflicting renewable energy projects in India. Both the capital cost and the variable/fuel costs of these projects is based on inadequate data and ambiguous claims of project developers. This has often led to high renewable energy tariff that translates into an unjustifiable burden on the consumers. It also limits the growth of renewable energy generation as utilities are already under financial stress. This lack of transparency in renewable energy tariff, coupled with near complete neglect of energy efficiency (which also has significant potential and is 'environment' friendly way to meet energy services), has led to an overwhelming feeling that renewable energy development is being undertaken more from developers' perspective than long-term environmental benefits. Doubts about whether the premium paid to renewable energy generation is reasonable and justifiable hampers CSO demand for more ambitious renewable energy development.

b. Weak monitoring mechanisms: CSOs are finding it hard to support the regulatory process because of a lack of reliable and credible monitoring mechanism for renewable energy projects. For example, concerns about actual fuel source for biomass-based projects cannot be addressed sufficiently in the absence of reliable and transparent monitoring mechanism. The state level EDAs are notified as nodal agencies for promotion of clean energy projects. These agencies

are also expected to monitor the performance of such projects. However, as seen in case of Maharashtra and Andhra Pradesh, these agencies are unable to provide reliable and comprehensive data about actual fuel consumption as well as prices for renewable projects.

c. Social and environmental impacts: Renewable energy plants are expected to serve twin purpose. One, mitigate environmental impact of the conventional power plants. And two, provide livelihood options to local people. However, it is being increasingly felt that some of these plants are leading to adverse impact both on the environment and local population. Questions are being raised about the social impacts of renewable energy projects, even though they are exempt from environmental impact assessments. Some projects have lead to local strife. For instance, biomass-based power plants used to provide an additional source of income to some farmers as they could sell their agricultural waste. Because these plants were connected to the nearest substation, they also helped improve local voltage levels. However, it badly affected the rural poor for whom agriculture waste meant fuelwood[19].

Land allotment for renewable energy projects has also pitched local farmers against the private developers. Maharashtra is a classic example where farmer protests have been on an all time high. In districts like Dhule, farmers are refusing to part with their land for setting up of wind farms[20]. Those in Satara and Sangli districts are demanding higher land compensation. In some cases revenue forests and reserve forests have been allotted for wind farms. Forests and common property resources are crucial for rural people who use such land for grazing, fuel wood collection and non-timber forest produce. Such concerns about extent of social and local environmental impacts of renewable energy projects also dissuade CSOs from demanding more ambitious capacity targets through regulatory process.

Overall, these concerns about reasonability and justification of renewable energy tariff premium, weak monitoring mechanisms and local social and environmental impacts of renewable energy projects make CSOs circumspect about demanding more effective SERC actions on clean energy. These governance weaknesses are resulting in developing constituency of people against renewable energy projects, rather than building constituency in support of such projects. These are also the main reasons behind CSOs lack of initiatives to effectively participate in the regulatory process.

However, there are some other barriers that too need to be addressed to ensure effective CSO participation. These are discussed below.

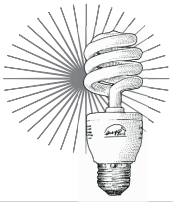
a. Lacking awareness: One of the key barriers to CSO involvement in clean

energy process is their lack of awareness. Before CSOs participate in the regulatory process, they need to be aware of the need, potential and opportunities in the clean energy sector. At present, these organizations are unaware of the opportunities available under the newly created regulatory processes to accelerate shift towards more sustainable energy mix. Lack of awareness amongst CSOs about the role and process of regulatory decision making, about opportunities available for CSO intervention in regulatory decision making and about the potential and feasibility of renewable energy options are some of the obstacles. Regulatory process, being a quasi judicial process, follows and responds to certain procedural requirements. For example, merely sending letters and demand manifestos would not elicit any response from regulatory commissions, and one would have to file formal petition to demand response from commissions. Similarly, while challenging utility or large consumer claims against clean energy initiatives, CSOs have to base their argument on sound technical, economic and legal analysis to successfully convince regulatory commissions and to uphold the order in judicial/higher forum scrutiny. Providing information and tools to CSOs about such procedural requirements and 'spaces' for CSO intervention would empower them to effectively create a 'demand pull' on sector institutions for clean energy deployment.

b. Resource crunch: Once the CSOs are made aware of the potential and the legalities, the next step is to help them engage in the regulatory process. But that is not easy to come by. CSOs need to have access to analytical resources related to technical, financial and legal issues in the clean energy sector. Discussions held with the NGOs showed how these organisations were constrained by a lack of financial and legal resources. CSOs agree they can be opinion makers and create an enabling environment for clean energy. But they lack both physical and financial capacities when it comes to regulatory process. Hence, in order to improve public and CSO participation in the regulatory process, it is important to make available financial and other resources to these organisations. Building capacity of CSOs to intervene in policy formulation and regulatory process is also important.

c. Recognition of CSOs' role by ERCs, EDAs and utilities: CSOs play key role in many sectors of economy. Typically sectors such as health, education and rural development have witnessed large number of CSOs participation in processes ranging from policy formulation to implementation arena. But in the energy sector, there are a limited number of active CSOs. And within these CSOs, a large chunk focuses either on awareness generation or public opinion building campaigns, field level experiments or renewable energy technology research. As a result, many actors in the energy

sector and those associated with clean energy development lack appreciation of potential contribution of CSOs in the regulatory process for promotion of clean energy. These actors often perceive CSOs role as limited to opinion building and field level implementation, especially in remote areas or localities difficult to handle for utilities. In order to exploit full potential of transparent and participative decision making process (provided by the Electricity Act and regulatory processes), efforts are needed to improve understanding of various actors (SERCs, utilities, project developers and energy development agencies) about CSOs role and contribution in the regulatory process. This would provide crucial support, especially in the initial years, when CSOs attempt to participate and make interventions in the regulatory process.



5. CONCLUSIONS AND WAY FORWARD

In the last decade, India has created strong legal, policy and regulatory framework for promotion of clean energy. This has achieved significant growth in renewable energy generation with grid connected renewable energy installed capacity reaching over 17,000 MW in 2010 and renewable energy contributing to almost four per cent of India's electricity generation. In coming years this process is likely to accelerate, and renewable energy capacity need to increase to 65000 MW if the NAPCC target is to be met. . But this transition towards clean energy is marred by some disturbing trends. Though several studies have established that energy efficiency has large potential and is clearly the least expensive option for meeting environmental and social concerns of electricity sector development, not enough attention is being paid towards the promotion of energy efficiency. Meanwhile renewable energy, a costly option requiring significant tariff premium, is being promoted on a large scale.

Tariff determination of renewable energy generation is also beset with lack of transparency about capital as well as variable/fuel costs, and weak regulatory process to ensure efficient, rational tariff. Another important trend highlighted by our review of clean energy development in select states is non-responsiveness of utilities and large consumers towards regulatory initiatives for clean energy, especially regarding energy efficiency. At times, utilities as well as large consumers have resorted to legal challenge to prevent regulatory initiatives in clean energy sector.

Under present circumstances, civil society and 'green' advocates can play an important role. These groups can support rational initiatives of regulatory commissions by providing informational support as well as by building pressure on utilities and large consumers to respond positively to such regulatory initiatives. These groups can also contribute towards making regulatory process more accountable by demanding more rational but ambitious approach towards clean energy. Unfortunately, the present review reveals that in spite of legal and regulatory framework for public participation, civil society groups have seldom participated in the regulatory process.

This report identifies several reasons

for the lack of effective civil society participation and consequent failure of civil society to demand more rational and ambitions clean energy deployment. Firstly, the lack of transparency in capital costs and variable costs of renewable energy generation, and the failure of project developers to help regulators overcome this information asymmetry have raised questions about the reasonability and justifiability of tariff premium for renewable energy generation. Secondly, there are inadequate mechanisms to monitor actual performance of renewable energy projects. Agencies responsible for monitoring, such as state-level EDAs, either do not have the requisite capacity or are not functioning with enough independence to ensure stringent performance monitoring. Thirdly, not enough attention is being to given to social and environmental impact of renewable energy generation, especially in terms of impact of land use pattern change, livelihood of poor communities near project sites, etc. For ensuring more aggressive and sustainable transition towards clean energy paradigm, these governance linked lacunas needs to be addressed by the project developers, regulators and government agencies.

These efforts to fix the governance aspects of clean energy development need to be supplemented by structured capacity building of CSOs and other players. This would involve creating awareness amongst civil society groups about the role they can play in regulatory process, functioning of regulatory commissions and spaces available to civil society for intervention in the same. Regulatory process is complex and requires significant technical, legal and economic skills for effective intervention. The efforts of civil society to participate in the regulatory process need to be supported by provision of adequate financial as well as analytical resources. Simultaneously, efforts are needed to educate other stakeholders, namely project developers, regulators, government and energy development agencies, about the important role civil society can and should play in the regulatory processes.

Though India has made impressive strides in clean energy deployment, the real challenge lies in maintaining this momentum in the years to come. Civil society can play a vital role in this transition towards sustainable energy future. And in this context, the present report by Prayas has highlighted some key hurdles in the path of civil society participation, along with the corresponding remedial measures.

Annexure 1: Important provisions related to clean energy development in National Electricity Policy, 2005 and National Tariff Policy, 2006

National Electricity Policy, 2005

Renewable Energy

Section 5.2.20: Feasible potential of non-conventional energy resources, mainly small hydro, wind and bio-mass would also need to be exploited fully to create additional power generation capacity. With a view to increase the overall share of non-conventional energy sources in the electricity mix, efforts will be made to encourage private sector participation through suitable promotional measures.

Section 5.12.1: Non-conventional sources of energy being the most environment friendly there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on non-conventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources.

Section 5.12.2: The Electricity Act 2003 provides that co-generation and generation of electricity from nonconventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non-conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commi-ssions. Such purchase by distribution companies shall be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies.

Energy Conservation

5.9.1 There is a significant potential of energy savings through energy efficiency and demand side management measures. In order to minimize the overall requirement, energy conservation and demand side management (DSM) is being accorded high priority. The Energy Conservation Act has been enacted and the Bureau of Energy Efficiency has been

setup.

5.9.2 The potential number of installations where demand side management and energy conservation measures are to be carried out is very large. Bureau of Energy Efficiency (BEE) shall initiate action in this regard. BEE would also make available the estimated conservation and DSM potential, its staged implementation along with cost estimates for consideration in the planning process for National Electricity Plan.

5.9.3 Periodic energy audits have been made compulsory for power intensive industries under the Energy Conser-vation Act. Other industries may also be encouraged to adopt energy audits and energy conservation measures. Energy conservation measures shall be adopted in all Government buildings for which saving potential has been estimated to be about 30% energy. Solar water heating systems and solar passive architecture can contribute significantly to this effort.

5.9.4 In the field of energy conservation initial approach would be voluntary and self-regulating with emphasis on labeling of appliances. Gradually as awareness increases, a more regulatory approach of setting standards would be followed.

5.9.5 In the agriculture sector, the pump sets and the water delivery system engineered for high efficiency would be promoted. In the industrial sector, energy efficient technologies should be used and energy audits carried out to indicate scope for energy conservation measures. Motors and drive system are the major source of high consumption in Agricultural and Industrial Sector. These need to be addressed. Energy efficient lighting technologies should also be adopted in industries, commercial and domestic establishments.

5.9.6 In order to reduce the requirements for capacity additions, the difference between electrical power demand during peak periods and off-peak periods would have to be reduced. Suitable load management techniques should be adopted for this purpose. Differential tariff structure for peak and off peak supply and metering arrangements (Time of Day metering) should be conducive to load management objectives. Regulatory Commissions should ensure adherence to energy efficiency standards by utilities.

5.9.7 For effective implementation of energy conservation measures, role of Energy Service Companies would be enlarged. Steps would be taken to encourage and incentivise emergence of such companies.

5.9.8 A national campaign for bringing about awareness about energy conservation would be essential to achieve efficient consumption of electricity.

5.9.9. A National Action Plan has been developed. Progress on all the proposed measures will be monitored with reference to the specific plans of action.

National Tariff Policy, 2006

Section 5(3) (i): Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant base line should take into account the benefits obtained from the Clean Development Mechanism (CDM) into consideration, in a manner so as to provide adequate incentive to the project developers.

Section 6.0: Accelerated growth of the generation capacity sector is essential to meet the estimated growth in demand. Adequacy of generation is also essential for efficient functioning of power markets. At the same time, it is to be ensured that new capacity addition should deliver electricity at most efficient rates to protect the interests of consumers. This policy stipulates the following for meeting these objectives.

Section 6.4(1): Pursuant to provisions of section 86(1)(e) of the Act, the appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006. It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the appropriate Commission.

Section 6.4(2): Such procurement by distribution licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.

Section 6.4(3): The Central Commission should lay down guidelines within three months for pricing non-firm power, especially from non–conventional sources, to be followed in cases where such procurement is not through competitive bidding."

Annexure 2 : Electricity Regulatory Commissions' Regulations/Orders on Renewable Power Procurement and Tariffs

	Andhra Pradesh	Gujarat	Maharashtra	Orissa	Tamil Nadu
1st RPPO Order	27-9-2005	29-10-2005	16-8-2006	23-4-2005 20.08.2005	15-05-2006
2nd RPPO Order	31-3-2009	Under consideration	Under consideration	Under consideration	20-3-2009
Wind Energy	6-3-2000 20-6-2001 20-03-2004 1-5-2009	11-8-2006 30-1-2010	24-11-2003 20-11-2007 10-12-2008	23-4-2005* 20-8-2005**	15-5-2006 20-3-2009
Biomass Energy Tariff Order	6-3-2000 20-6-2001 20-03-2004 31-3-2009	17-8-2007	8-8-2005 25-3-2009		15-5-2006 27-4-2009
Bagasse Co-generation	6-3-2000 20-6-2001 20-03-2004 31-3-2009	3-1-2007	16-8-2002 25-5-2005		15-5-2006 6-5-2009
Small Hydel	6-3-2000 20-6-2001 20-03-2004 31-3-2009		9-11-2005		26.06.2009 06-09-2008
Municipal Solid Waste	6-3-2000 20-6-2001 20-03-2004 31-3-2009		6-4-2004		
Industrial Waste	6-3-2000 20-6-2001 20-03-2004 31-3-2009				
Solar	31-12-2008	22-1-2009 29-1-2010	8-5- 2009		11-7-2008

* For all sources, unit cost of the renewable energy should not exceed the highest generation cost of thermal stations of the eastern region.

** For all sources, project cost fixed by the State Technical Committee will be taken as the ceiling cost for determination of tariff.

Annexure 3: Parameters used by SERCs to determine renewable energy tariff

Parameter	Andhra Pradesh	Gujarat	Maharashtra	Orissa	Tamil Nadu
Project cost Rs In Cr/MW	Bagasse: 3.25 Biomass: 4 Mini-hydel: 4.5 Wind: 4.7	Bagasse: 4 Biomass: 3.5 Solar: PV-16.50, ST-13 Wind: 4.62	Bagasse: -- Biomass: 4 Wind: 5 for plants commissioned before 31-3-2003 and 4 for plants commissioned after 1-4-2003	Capital costs approved by the State Technical Committee of Governme nt of Orissa	Bagasse: 4.67 Biomass: 4.87 Wind: 5.35
PLF	Bagasse:55 Biomass: 80 Mini-hydel:35 Wind: 24.5	Bagasse: 80 Biomass: 80 Solar: 20% for PV 25% for ST Wind: 23%	Bagasse: 90 Biomass: 80 Wind: 18 for old plants and 20 for new plants		Bagasse: 55 Biomass: 80 Wind: 27.15
Heat rate of the plant (K.cal/Kwh)	Bagasse, Biomass: 3,700	Bagasse: 3700 Biomass: 4290	Bagasse: Biomass:3650 Solar: Wind:		Bagasse, Biomass: 3840
Calorific value of fuel (K.cal/Kg.)	Bagasse: 2300 Biomass: 3200	Bagasse: 2250 Biomass: 3300	Bagasse: 2250 Biomass: 3250		Bagasse: 2300 Biomass: 3200
Cost of fuel Rs./MT	Bagasse:9 50 Biomass:	Bagasse: 775 Biomass: 1000	Bagasse: 1832 Biomass: 2605		Bagasse: 1000 Biomass:
Fuel cost escalation - per annum	Bagasse, Biomass: 5%	Bagasse: 5% Biomass: 5%	Biomass: 5%		Bagasse, Biomass: 5%

continued

Parameter	Andhra Pradesh	Gujarat	Maharashtra	Orissa	Tamil Nadu
Auxiliary consumption	Bagasse, Biomass:9 % Mini-hydel: 1%	Bagasse: 8% Biomass: 10% Solar: 10% for ST	Biomass: 10%		Bagasse, Biomass: 10%
O&M Expenditure	Bagasse: 3% Biomass: 4% Mini-hydel: 1.5% Wind: 1.25% of the project cost	Bagasse: 2.5% Biomass: 7% Solar: PV-0.85%, ST-1.35% Wind: Rs. 6.5 lakh per MW	Bagasse: 2.5% Biomass: 4% Wind: 2%		Bagasse, Biomass:4.5 % Wind: 1.1%
O&M Escalation	Bagasse, Biomass, Mini-hydel: 4% Wind: 5%	Bagasse, Biomass, Solar, Wind: 5%	Bagasse, Biomass, Wind: 5%		Bagasse, Biomass, Wind: 5%
Debt:Equity	Bagasse, Biomass, Mini-hydel: Wind: 70:30	Bagasse, Biomass, Solar, Wind: 70:30	Bagasse, Biomass, Wind: 70:30		Bagasse, Biomass, Wind: 70:30
Return on Equity (ROE)	Bagasse, Biomass, Mini-hydel: 16% Wind: 15.5% pre tax	Bagasse, Biomass, Solar, Wind: 14% post tax	Bagasse: 20% Biomass,		Bagasse, Biomass, Wind: 19.85% pre-tax

continued

Parameter	Andhra Pradesh	Gujarat	Maharashtra	Orissa	Tamil Nadu
Interest on term loan	Bagasse:10	Bagasse: 10.25% Biomass: 12% Solar, Wind: 10.75%	Bagasse:13% Biomass: 12% Wind: 14% for old plants and 12.5% for new plants		Bagasse, Biomass, Wind: 12%
Interest on working capital	Bagasse, Biomass, Mini-hydel: 12%	Bagasse, Biomass: 10.75% Solar, Wind: 11.75%	Bagasse: 15% Biomass: 13%		Bagasse, Biomass: 12%
Depreciation	Bagasse, Biomass: 7.84% Mini-hydel: 6.7% Wind: 4.5%	Bagasse, Biomass: SLM Solar, Wind: 6% in the first 10 years and 2% from 11th to 25th year	Bagasse: 5.28% Biomass: 5.28%		Bagasse, Biomass, Wind: 4.5%
Life of the plant & machinery		Bagasse: 20 Biomass: Solar: Wind:	Bagasse: Biomass: Solar: Wind:		Bagasse, Biomass, Wind: 20 years

References

1. http://www.mnre.gov.in/
2. Nidhi Jamwal and Shikha Lakhanpal 2008, Fanning an alternative, in Down To Earth, Society for Environmental Communications, New Delhi, Aug 1-15.
3. Sanjay Jog 2008, Local ire jams Suzlon windmills, in The Financial Express, May 9.
4. http://www.bee-india.nic.in/index.php?module=Company&id=1
5. Verified Energy Savings related with the activities of Bureau of energy efficiency for the year 2008-09, by National Productivity Council, www.bee-india.nic.in
6. http://www.powermin.nic.in/indian_electricity_scenario/national_electricity_policy.htm
7. APERC Discussion Paper 2008
8. InWEA submission before the APERC dated 21-10-2008
9. APERC Order dated March 20, 2004 in O.P. No.1075 of 2000 (Paragraph 48) and APERC Order dated September 27, 2005 in O.P. No.9 of 2005 (paragraphs 3 and 20)
10. MERC - Discussion Paper on Renewable Energy Framework for New Control Period (FY 11 to FY 16), Prepared by ABPS Infra, March 2010
11. Ruhi Khandari and Aparna Pallavi 2010, Biomass market in a flux, in Down To Earth, Society for Environmental Communications, New Delhi, March 31.
12. Orissa Power Sector at A Glance, 2009, Paper by Ashok Kumar Jagadev, Dy. Director, OERC, in souvenir released by OERC on the occasion of workshop on 'Tariff Setting vis-a-vis Sustainable Development of Power Sector in Orissa'
13. MERC Order dr. 7 Aug. 2009 in case no.104, 122 and 125 of 2008
14. Gujarat Electricity Regulatory Commission, Proceedings of the 5th Meeting of the Co-ordination Forum held on 15th December, 2009, www.gercin.org
15. GERC Tariff order dt. 11.8. 2006
16. MERC order on RPS, 16 August 2006
17. Presentation by GERC Chairman at Forum on Clean Energy, Good Governance and Electricity Regulation, 20-21 May 2010, Cape Town, South Africa
18. Review of Nashik CFL DSM Program of MSEDCL, Prayas Energy Group, December 2007
19. Ruhi Kandhari et al 2010, Biomass market in a flux, in Down To Earth, New Delhi, April 1.
20. Nidhi Jamwal et al 2008, Fanning an alternative, in Down To Earth, New Delhi, August 15.

Clean Energy Regulation and Civil Society in India: Need and challenges to effective participation

In the last decade, India has created strong legal, policy and regulatory framework for promotion of clean energy. This has achieved significant growth in renewable energy generation with grid connected renewable energy installed capacity reaching over 17,000 MW in 2010 and renewable energy contributing to almost four per cent of India's electricity generation. In coming years this process is likely to accelerate, and renewable energy capacity need to increase to 65000 MW if the NAPCC target is to be met. Thus though India has made impressive strides in clean energy deployment, one of the real challenge lies in maintaining this momentum in the years to come. Civil society can play a vital role in this transition towards sustainable energy future. And in this context, this Prayas report highlights some key hurdles in the path of civil society participation, along with the corresponding remedial measures.

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या विषयांतील विशेष प्रयत्न