

Politics and Governance of Clean Energy

An Indo-German Comparative Study for Large Scale Diffusion of Renewable Energy in India



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Table of contents

Introduction	9
Renewable Energy in India.....	13
Perspective of Non-Governmental Organizations on Conventional and Non-Conventional Energy.....	31
Renewable Energy Project Developers Perspective	35
Renewable Energy in Germany	41
India & Germany: Comparison and Conclusion.....	55
Bibliography	59
Annexure.....	63

List of Tables

Table 1 Tracking Evolving Laws, Policies and Regulations for Renewable Energy Development.....	17
Table 2 Tariff and frequency of tariff revision in states.....	21
Table 3 CAG Observation on Wind Power Promotion by States.....	22
Table 4 RPO target and compliance levels for wind producing states.....	24
Table 5 RPO and compliance level of states with limited/negligible wind potential.....	24
Table 6 Targets for the state and union territories for Non-solar and Solar.....	26
Table 7 State Wise Solar Capacity Addition Targets Proposed by MoP/MNRE.....	27
Table 8 State Wise Wind Capacity Addition Targets Proposed by MoP/MNRE.....	28
Table 9 Renewable energy targets set by different states in Germany.....	47
Table 10 Political Parties in Germany	48

List of Figures

Figure 1 Trend in Yearly wind capacity	20
Figure 2 Solar cumulative capacity and installation	23
Figure 3 Retail power price and its components in Germany	43

Introduction

Renewable Energy and India

While renewable energy (RE) has been on India's development priority as an alternate source of energy to meet its energy access and energy security needs, the recent climate change concerns have further added to the impetus. India's National Action Plan for Climate Change (NAPCC) while taking cognizance of the several impacts of climate change, seeks to manage the objectives of growth and poverty reduction along with those of environment through 'a directional shift in the development pathway' (Government of India 2008). This 'directional shift' includes amongst other priorities, an agenda to push for renewable energy and energy efficiency in a big way. The NAPCC set a target of achieving 15% energy from renewable sources by 2020. Special focus has been made on solar energy in the NAPCC and under the Solar Mission India expects to achieve 20GW of solar capacity by 2022. The NDA government has announced an even more aggressive approach towards renewable energy. India now aims to have an installed renewable energy capacity of 175 GW by 2022. Of this, 100 GW of this would come from solar power, 60 GW from wind energy, 10 GW from small hydro power, and 5 GW from biomass-based power projects.

There have been several state and central government incentives to promote renewable energy such as accelerated depreciation for wind projects. Various state governments have given additional incentives, such as introducing market mechanisms to facilitate the sale of renewable energy over the electric grid, or raising funds to support renewables. State independent electricity regulatory commissions (SERCs) set renewable purchase obligations (RPOs) for distribution utilities, determine feed in tariffs (FIT) for various renewable energy technologies and facilitate the transfer of energy through regulation of evacuation and facilitating the buying and selling of renewable energy certificates. As an outcome, however states have performed differently in adding renewable energy. This difference in performance can be attributed to the influence of several actors such as the interest of political parties, private developers, developers, and citizens.

The strong push for renewables is primarily driven by the central government. Like Germany, India is looking at a major transformation in the way electricity is produced and consumed in the country. Institutions in India are however still evolving and this transformation will require huge investments in technology and manpower and will have a bearing on the economy and society. In addition the country faces its own set of challenges such as financially weak distribution companies, consumers with limited ability to pay, mismatch between supply and demand and overall quality of electricity supply.

Renewable Energy and Germany

Germany has been a pioneer in the development of renewable energy since the 1970's. As a leading member of the European Union, Germany is focussing on meeting targets set by the EU - first the non-binding target of 2001, followed by binding commitments of 2009 (20% reduction in greenhouse gases, 20% increase in energy efficiency and 20% share in

renewable energy) and recently the Energy roadmap of 2050 (with a target of achieving 85-90% reduction in greenhouse emissions).

Germany's programme – 'Energiewende' is a massive programme for a 'fundamental transformation' of its energy systems. As per the plan, all nuclear plants will be shut-down by 2022 and green-house gas emissions will be reduced by 80% by 2050. One of the major focuses of the programme is on renewable energy with a target to achieve a share of 35% of renewable energy in the energy mix by 2020 and 80% by 2050.

Within the country, the renewable energy drive has found significant backing of political parties. Jacobsson & Lauber, 2004 explored the reasons for rapid spread of wind and solar cell technologies in Germany and concluded that in a 'battle of institutions', the Parliament with support from advocacy coalitions was able to back policies for renewable despite a reluctant government and amidst opposition of nuclear and coal interests .

Kemfert & Horne, 2013 elaborates that the Green Party supported renewables way back in the 1970's, then the Christian Social Union (Conservative Party) brought in the feed-in-law in cooperation with the Green Party in 1991. Later the Socialist-green government (SPD and Greens) created the Renewable Energy Act (EEG) in 2000 that guaranteed feed-in for renewable energy and guaranteed prices for 20 years. Post the Fukushima incident, most parties have converged on the need for total abolition of nuclear and subsequent promotion of renewable. The diffusion of renewable energy has found substantive support at the local level, with civil society supporting renewable. This is an outcome of a continuous strategy to inform and educating the public through large events, public statements, studies and campaigns (ibid).

Germany's rapid shift to clean energy has been largely determined by federal policy but the actual deployment of renewable energy depends on the efforts and policies of the country's federal states. A 2014 study¹ in Germany noted that there is significant difference in the performance of the 16 federal states in achieving renewable energy goals.

India and Germany have significant plans for adding renewable energy in the energy mix. Germany has been a pioneer in the drive for renewable energy and could therefore present a very useful case for India to learn from. In fact several Indian initiatives for promoting renewable energy, such as feed-in tariffs draw already from the German experience. Studying Germany's renewable energy programme is relevant for India, as they both are large federal systems, where states enjoy significant levels of autonomy. In both countries energy is a concurrent subject, where policies are made both at federal and state level, and where cooperation is needed to meet overall federal targets. The states have autonomy in terms of state support schemes, regulations for construction, renewable energy heating and land use planning. In both countries there are also considerable differences in the performance of states in achieving renewable energy targets.

Objective and Key Research Questions

The proposed study will undertake a comparative review of renewable energy programmes

¹ The study was commissioned by the Renewable Energies Agency (AEE) and was jointly prepared by the German Institute for Economic Research (DIW) and the Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW).

in Germany and examine what conditions and institutional arrangements have helped in the rapid diffusion of renewable energy. The Indian experience so far in the development of solar energy and wind energy will be examined to understand how effective conditions and institutions have been in promoting solar energy in India. The ultimate objective would be to draw policy learnings for India from Germany's experience with its renewable energy programme.

Key Research Questions: The key research questions are listed below. For each issue, lessons will be drawn from the **German experience** with '**Energiwende**', where possible.

1. What are the factors driving solar/wind energy (both climate change and energy access imperatives) at the national level?
2. How does the federal structure impact deployment and uptake of renewable energy in India?
3. Does support or initiative from some political parties play a role in promotion of renewable energy in India?
4. Has civil society played an important role in promoting or impeding renewable energy in India?
5. What has been the impact of the entry of large multinational solar companies in the Indian market?
6. What role has the state electricity regulators played in the promotion of renewable energy in India?

Methodology

The German experience with 'energiwende' will be examined in detail with focus on the role of political parties, conventional electricity generators, civil society and research institute. For the Indian Context, the study will first focus on the renewable energy programme at the national level. Thereafter it will examine two states in India as case-studies. The role of different actors and institutions in the Indian context will be examined through literature review and focussed group discussions. The key conclusions from the comparative study will be drawn in order to suggest learnings for India.

Renewable Energy in India

Legislative Framework for Renewable Energy

The key legislation which guides the development of renewable energy in India is the Electricity Act, 2003. The Electricity Act 2003 mandates the State Electricity Regulatory Commissions (SERCs) to promote generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person. The Act also requires respective SERCs to fix RPO obligations for states.

Since electricity is a concurrent subject, both the Central Government and the State Governments have jurisdiction over the sector. In practice, the centre has mainly been responsible for planning inter-state and international matters related to electricity and the state governments have taken responsibility of matters within the state. As per this arrangement, the centre formulates broad regulations in the electricity sector and the state governments make state-specific rules within the regulatory framework defined by the centre. Moreover, in order to incentivise RE the central government designs guidelines, policies and various fiscal incentives, which the states may or may not adopt.

Institutional Framework

There are multiple agencies involved in the renewable energy sector in India. At the central level, the Ministry of New and Renewable Energy (MNRE) is the nodal ministry which is mandated to develop and deploy new and renewable energy for supplementing the energy requirements of the country. MNRE also conducts resource assessments for renewable energy and supports R&D in renewable energy technologies. Financial assistance to renewable energy projects is provided through the Indian Renewable Energy Development Agency (IREDA) which provides loans and also channels funds to promote renewable energy.

In addition, there are a number of government institutions whose mandate encompasses the renewable energy sector. For example, the Ministry of Power (MoP) is responsible for the National Electricity Policy and National Tariff Policy, both of which play a key role in promoting procurement of renewable energy-based power. Ministry of Finance is in-charge of taking decisions on fiscal transfers and tax breaks. It also decides on allocations from the cess collected from the Clean Energy Fund.

At the state level, there are nodal agencies (state renewable development agencies) and departments which operate under the purview of the respective state governments for implementation of all renewable energy and co-generation schemes. These agencies promote renewable energy deployment at the local level by channelizing central-level subsidies, implementing demonstration projects, and providing information assistance to RE developers.

Centre Policies

The Government of India (GoI) has enacted several policies which support the expansion of renewable energy. The National Electricity Policy 2005 allows the SERCs to establish a preferential tariff for electricity generated from renewable sources to enable them to be cost-competitive. The Tariff Policy 2006 requires fixation by SERCs of a minimum percentage of RPO from such sources. The Tariff Policy also states that procurement of renewable power for future requirements will be done through a competitive bidding process and in the long-term, renewable energy technologies would have to compete with other sources in terms of full costs.

The government of India announced a 'National Action Plan for Climate Change (NAPCC)' in 2008, as a follow up on India's commitment to reduce carbon emissions wherein it was envisaged that RE would constitute 15 per cent of the energy mix of India by 2020. It has been a guiding framework for the state regulators to set their respective state RPO target in line with the target under NAPCC.

The Jawaharlal Nehru National Solar Mission (JNSSM) was launched in 2010 as one of the eight Missions under the NAPCC. It was divided into three phases and aimed at deploying 20,000 MW of grid connected power and 2,000 MW of off-grid power by 2022. Gujarat and Rajasthan were identified as the leading states for solar capacity addition -over 850 MW for Gujarat and 500 MW for Rajasthan. With the change of government at Centre in 2014, the targeted capacity addition for solar was revised to 100 GW, wind 60 GW, Biomass 10 GW and small hydro 5 GW taking the total to 175 GW.

The Tariff Policy of 2006 has been subsequently amended in 2011 and 2016 in order to incorporate greater emphasis on solar. The Amendment of 2011 introduced solar specific REC mechanism and solar RPO in states to reach at 3% by 2022. This was further amended in 2016 when the solar target was revised to 8%. A new concept of Renewable Generation Obligations (RGO) was introduced, as per which thermal generating stations are required to establish a certain renewable energy generating capacity or procure and supply renewable energy from time to time as prescribed by the Central Government. The revised policy also waives inter-state transmission charges and losses for solar and wind sources of energy.

Draft National Renewable Energy Act

MNRE circulated a draft of proposed *National Renewable Energy Act, 2015* in July 2015. Emphasizing on the need for a separate Act for renewable energy, the MNRE stated that RE is not on a level playing field with conventional power systems and needed legislative support to claim its due'. MNRE also recognised that in order to increase the RE share in total energy mix, changes were required not only in policies related to RE deployment but also in policies related to the planning of the complete energy system. This Act clearly laid out the roles of centre and state governments, obviously with much greater power at the Centre. Provisions included timely and equitable payment for renewable energy as well as payment security mechanism for RE. This Act provided for the formulation of a National RE Policy, which would create a national, uniform and mandatory renewable electricity purchase obligation trajectory for all obligated entities. The SERCs were required to ensure RPO compliance while the State Load Dispatch Centres (SLDC) and Renewable Energy Development Agencies (REDAs) were required to provide data to SERCs for monitoring

compliance. The Draft has however not moved forward. As the Act discusses the need for changing in system planning, it has been argued that amendments should rather be made in the Electricity Act, 2003 rather than having a separate Act for renewable. The draft Renewable Act also gives greater powers to the central government and therefore it would be difficult to bring the states on board.

Judiciary

Appellate Tribunal for Electricity (APTEL)

Electricity Act of 2003 provided for establishment of the Appellate Tribunal for Electricity (APTEL) to hear appeals against the orders of any adjudicating officer or The Central Regulatory Commission or State Regulatory Commission or Joint Commission. All the proceedings of the Appellate Tribunal have the same standing as that of a judicial proceeding. An appeal against the order or judgment delivered by the Appellate Tribunal can be filed at the Supreme Court.

APTEL was established in 2004. Over the past few years, it has passed some very important orders and judgments with respect to renewable energy, and renewable purchase obligations in particular. Time and again, it has talked about the importance of RPO obligation and REC mechanism. The Tribunal has delivered judgments in matters pertaining to functioning of State Regulatory Commissions.

Recently in April 2016, in Green Energy Association vs. MPERC and MPPMCO, APTEL checked the practice of imposing meagre penalties on non-compliance of RPOs. It opined that a small penalty will defeat the object behind RPO obligation and REC mechanism, and may become a precedent, which is not in the interest of the objective of promotion of renewable energy uptake.

Beside appeals, the APTEL has original jurisdiction to hear petitions and issue directions to any Regulatory Commission for the performance of its statutory functions. The Tribunal has made use of this provision of the Electricity Act and issued directions to the Commissions.

In a judgment dated 20th April 2015, APTEL held that if a State Commission fails to perform its functions as enshrined in the Electricity Act, the Tribunal could issue directions to the State Commission. The Tribunal clarified that it would not give any direction that defeats the Regulations, but would not restrain from issuing directions to Commissions to ensure compliance with regulations. APTEL had earlier issued directions in principle to Gujarat State Electricity Regulatory Commission. In its 2015 order, the Tribunal gave detailed directions to State Commissions. These can be summarised as follows:

- The State Commission shall decide the RPO targets in time to give adequate time to the distribution licensees to plan and arrange for RE and enter into PPAs
- The State Commissions shall obtain proposal for renewable energy procurement as per the RPO Regulations. The State Commission shall invite comments from public and give directions after taking into account such comments.
- The State Commissions should carry out monitoring of compliance of the RPO periodically, and review the performance of the distribution licensees in respect of

RPOs.

- The State Commission shall give directions regarding, carry forward/review in RPO as per the RPO Regulations, keeping in view availability of REC, where applicable.
- Penal provisions may be imposed in case of default in fulfilling of RPO by obligated entity
- Power to make relaxations should be used judiciously by the State Commissions.

Thus, APTEL has not restricted its scope to settling disputes, but expanded it to hear original appeals and issue directions to further the objectives of Electricity Act, Electricity Policy and Tariff Policy. This has made APTEL an important stakeholder with significant contribution in promotion of renewable energy in India.

Supreme Court

While High Courts of different states have passed judgments on matters relating to promotion of renewable energy, Supreme Court has played an instrumental role in providing a clear thrust to RPOs.

Supreme Court, in 2015, delivered a landmark judgment on applicability of Renewable Purchase Obligations in deciding the case between Hindustan Zinc vs Rajasthan Electricity Regulatory Commission. In 2012, Hindustan Zinc and 15 other companies challenged the validity and scope of RPO regulations promulgated by Rajasthan Electricity Regulatory Commission. Rajasthan High Court rejected the petition and consequently, petitioners moved the Supreme Court.

The Apex Court ruled that the Rajasthan Regulations were within the ambit of Electricity Act and Electricity Policy, and the objective of renewable obligations is protection of environment and prevention of pollution by utilising renewable energy sources.

The Court went on to locate renewable energy within the framework of Constitutional rights and duties for a better environment. The Bench opined that the impugned regulation of RERC on RPOs was important to discharge the constitutional obligations mandated under Article 21, Article 48 A, and Article 51 A (g) of the Constitution of India. Article 21 guarantees right to life. The courts have recognized the right to a wholesome environment as being implicit in the fundamental right to life, guaranteed in Article 21 of the Indian Constitution. Article 48A contains the Directive Principle of State Policy for protection and improvement of environment and safeguarding of forests and wild life. Article 51 A (g) lays the fundamental duty of every citizen to protect and improve the natural environment.

Supreme Court held that considering the mandate of Articles 21 and 51A(g) of the Constitution, provisions for the Electricity Act, National Electricity Policy, Tariff Policy, and Regulations imposing obligation upon captive power plants and open access consumers to purchase electricity from renewable sources is in the larger public interest. It held,

“The purchase of nominal quantum of energy from renewable resources cannot adversely affect the cost effectiveness of the Captive Power Plant. Moreover, the object being reduction of pollution by promoting renewable source of energy, larger public interest must prevail over the interest of the industry herein which will in any case pass on the extra burden, if any, will be as part of the cost of its products and therefore, the same does not burden the

appellants.”

The Court also discussed the statutory back-up for penalty for non-compliance of RPO regulations and found it to be not a tax but ‘an alternative mode of enforcement of Regulation’ to ensure compliance and attainment of the Act’s objectives.

Another issue, where the Supreme Court has been playing an important role is with respect to the powers of Tribunals, and jurisdiction of High Courts in relation to orders passed by Tribunals. Appeal against the order or judgment delivered by the Appellate Tribunal is to be filed at the Supreme Court. In the recent case of Gujarat Urja Vikas Nigam Ltd. vs Essar Power Limited, observed that Tribunals have been dealing with substantial questions of law and direct appeal to SC results in denial of access to High Courts. This effectively results in Tribunals substituting High Courts. The Court, inter alia, asked the Law Commission to examine ‘whether direct statutory appeals to the Supreme Court bypassing the High Courts from the orders of Tribunal affects access to justice to litigants in remote areas of the country’.

Overall the Appellate Tribunal through its judgment has reinforced the powers and functions of SERCs. The Supreme Court through its judgment has recognized ‘right to clean air’ as a fundamental right and fundamental duty. It therefore is the duty of all consumers of electricity to provide for setting off the emissions they generate through conventional electricity.

Table 1 given below tracks important policy and regulatory developments for renewable energy in India.

Table 1 Tracking Evolving Laws, Policies and Regulations for Renewable Energy Development

Name of the Act/Policy	Provisions promoting RE
National Electricity Policy, 2005	<ul style="list-style-type: none"> ▪ Renewable Purchase Obligation (RPO) ▪ RE purchase by discoms through competitive bidding process ▪ Differential tariffs by CERC for RE ▪ Progressive increase in share of electricity from non-conventional sources ▪ Progressive reduction in cost of RE energy through development of technologies and by promoting competition
National Tariff Policy, 2006	<ul style="list-style-type: none"> ▪ SERCs to determine minimum state-specific RPOs ▪ Discoms to procure RE at preferential tariffs determined by SERCs ▪ RE procurement by DISCOM for future requirements to be done, as much as possible, through competitive bidding ▪ CERC should determine tariff from RE power being procured other than through competitive bidding.
National Action Plan on Climate Change (NAPCC), 2008	<ul style="list-style-type: none"> ▪ Sets target of 5% RE purchase by 2009-10 with 1% increment each year to reach 15% by 2019-20
National Tariff Policy, 2011 (Amendment)	<ul style="list-style-type: none"> ▪ Solar RPOs in states to start with 0.25% and increase to 3% by 2022 ▪ Solar specific REC mechanism

Name of the Act/Policy	Provisions promoting RE
National Tariff Policy, 2016 (Amendment)	<ul style="list-style-type: none"> ▪ Long term RPO to be announced by Ministry of Power ▪ Competitive bidding to be the norm for RE procurement ▪ Renewable Generation Obligations (RGO) for coal based generation ▪ Waive inter-state transmission charges for solar and wind ▪ 8% Solar RPO by 2022 ▪ Regulator to frame norms for ancillary services to support power systems/grid operations with expanding RE ▪ RE tariff determined by CERC to act as ceiling price.
National Solar Mission, 2015	<ul style="list-style-type: none"> ▪ RE target of 175GW by 2022 – Solar- 100GW (40GW rooftop); Wind- 60GW; Biomass- 10GW, Small Hydro- 5GW ▪ 15% Government subsidy for rooftop solar using domestic solar panels ▪ 25 Solar Parks (Ultra Mega Solar Power Projects), each with the capacity of 500 MW and above to be set in next 5 years ▪ 10 GW of Solar project based on Decentralized Distributed Generation to be setup
The Electricity (Amendment) Bill, 2014	<ul style="list-style-type: none"> ▪ Design a separate National Renewable Energy Policy ▪ RGO on coal and lignite based thermal power plants ▪ Specific exemptions to RE sources from open access surcharge ▪ Separate penal provisions for non-compliance of RPO
Draft Renewable Energy Act, 2015	<ul style="list-style-type: none"> ▪ Stricter enforcement of RPOs ▪ Supportive ecosystem including RE policy and plan, resource assessment, monitoring mechanisms etc. ▪ Dedicated renewable electricity investment zones ▪ Provision for National renewable Energy Fund and Green Funds by states ▪ Entrepreneurship development and incubation of start-ups to be emphasized to existing or new ventures based on RE technologies
Wind Repowering Policy, 2016	<ul style="list-style-type: none"> ▪ IREDA to provide an additional interest rate rebate of 0.25% for repowering projects ▪ All financial benefits available for new wind projects are also applicable for repowering projects
National Offshore Wind Energy Policy, 2015	<ul style="list-style-type: none"> ▪ Off-shore wind power to be bundled with other sources to make it cost effective. ▪ National Institute of Wind Energy (NIWE) to facilitate project development ▪ All financial benefits available for On-shore wind projects to be applicable for off-shore projects

Source: Author's compilation

State Policies

State policies on non-conventional energy have evolved over time based on the growing thrust on renewable energy sources at the centre, which in turn has been influenced by growing climate change discourse world-wide. Policies and regulations were issued by

states for the first time around 2005-2006. To begin with, renewable energy figured as a part of the overall energy policy of states, followed by separate policies on renewable energy that covered the entire gamut of renewable energy sources. Post the national mission on solar, several states introduced specific policies for solar followed by further focused ones for rooftop solar. With the recent thrust of the central government on solar, several states are once again reviewing their solar policies to bring their targets in line with central targets. Some states have introduced separate policies for wind, biomass and small hydro depending on the potential of these resources in the state. Broadly most policies focus on the role of state government as a facilitator of renewable energy projects in the state. This role is often played by the 'nodal agency' which in almost all states is the Renewable Development Agency. The state government specifies the fiscal incentives and tax breaks that will be made available to the renewable energy project developers. Some of the policies are more specific and besides setting the renewable energy targets, clearly specify the role of all institutions involved in the development of renewable energy, including the role of the SERCs

Role of the State Electricity Regulators

The regulatory oversight in the sector is provided by the CERC and SERCs. However, at present, only grid-connected renewable energy based systems come under the regulatory purview. The off- grid decentralized renewable energy based systems are not regulated in the present set-up. For the grid-interactive systems, the CERC sets guidelines for feed-in tariffs for different renewable energy technologies and issues regulations for interstate open access. The SERCs determine feed-in tariffs for different renewable energy technologies, set RPOs for states, issue regulations on open access, third party sales.

Progress of Renewable Energy in India:

While the Centre provides the overarching policy framework and incentives, a lot depends on the state's overall interest in developing renewable energy and the facilities it can offer, i.e. evacuation infrastructure, attractive tariff, enforcement of RPO/REC, and so on. Tariff setting and RPO compliance are the mandate for the state regulators. While independent of the government, regulators work within the broad policy determined by the state governments. The Central regulator guides the state regulators by setting generic renewable energy tariffs and model regulations on aspects of renewable energy. Generally, the tariffs set by the central regulator are expected to act as a ceiling and state regulators have the flexibility to adapt regulations to meet their specific circumstances,

In the initial years in India, the focus was on harnessing wind potential to meet demand of industrial consumers, who were not fully satisfied with utility power. In Tamil Nadu for instance, the initial interest in wind was primarily driven by the textile industries for captive purposes when the grid supply fell short of their requirements (Krishna et al 2015). Maharashtra, the pioneer in wind power development, was again a heavily industrialised state facing power shortages in the early 2000's. Of the high wind potential states. Tamil Nadu had harnessed 51% of its potential till 2014. Other states like Karnataka had harnessed only 17%, Gujarat 10% and Andhra Pradesh only 5% of their potential in the same period

(CAG.2015). Of the Medium potential states, Maharashtra has exploited 68% of the installed capacity, Rajasthan 46% capacity and Madhya Pradesh 14% capacity (CAG.2015). Odisha, Uttar Pradesh and Jammu & Kashmir had not installed any capacity till 2014

Challenges for the Wind Sector

While there has been significant growth in the sector, a host of issues have also been noted. These include delays in statutory clearances for land, insufficient capacity of the state nodal agencies, tariff issues and in some cases a lack of clear vision of the state in development of wind power. Some of the issues are discussed below:

Lack of Consistency in Fiscal Benefits

The inconsistency in the availability of accelerated depreciation and GBI benefits is seen as a major impediment in the growth of wind. GBI was discontinued in April 2012 but later reintroduced in September 2013 retrospectively from April 2012. AD provision was not continued in 2012-13 and 2013-14. In the course of interviews conducted by TERI with developers during November 2016, concerns on withdrawal of AD and GBI were raised on several occasions. The MNRE, in fact, had to revise its 11th Plan targets downwards from 10,400 MW to 9,000 MW as capacity addition declined (CAG.2015). As can be seen from the following graph, capacity addition dipped significantly during FY 13 and FY 14 and picked up in FY 15 and FY 16 once the accelerated depreciation provision was reinstated. Figure 1 shows the trend in yearly wind capacity addition.

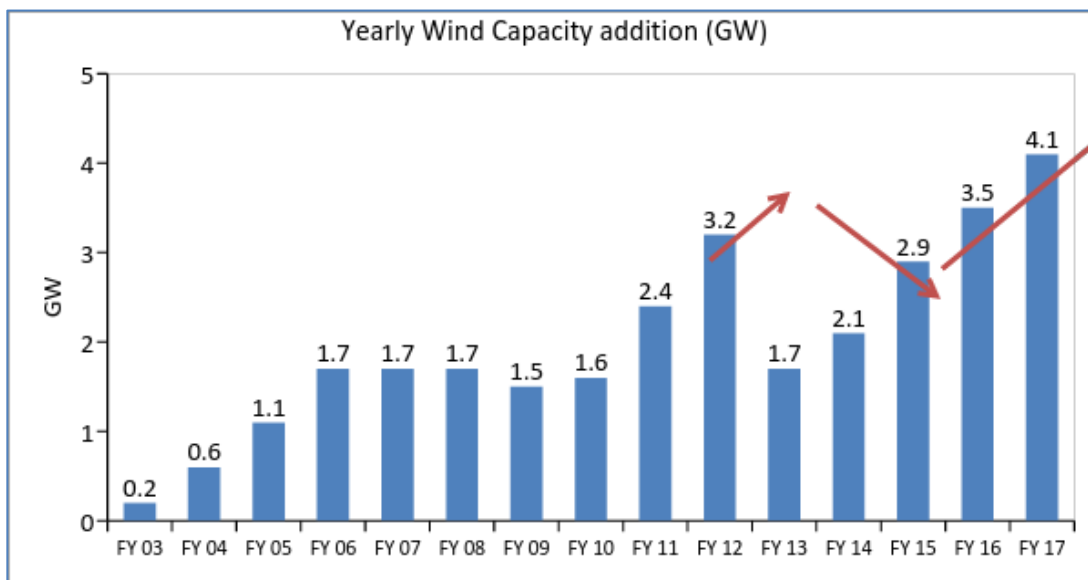


Figure 1 Trend in Yearly wind capacity

Source: National Institute of Wind Energy, CRISIL

Tariffs

The Centre Electricity Regulatory Commission (CERC) prescribes generic tariffs for various sources of renewable energy technologies based on their estimation of capital cost and other parameters. These tariffs are only indicative for states, which can set their own tariffs higher or lower based on their specific conditions. In the past Maharashtra, Madhya Pradesh and Rajasthan have fixed tariffs in line with CERC while most other states generally prescribe

lower tariffs. In case of wind, tariffs are generally prescribed for the first 14 years. The generic tariffs are required to be revised time to time for new projects to ensure that any decline in costs of technology or other parameters are taken into consideration. Such tariff revisions are however not very frequent. Maharashtra and Madhya Pradesh have revised their tariffs regularly every year. (CAG. 2015). Some developers opine that at times regulators bring down tariffs in order to discourage investment as there are issues in off take and evacuation of wind power Table 2 lists the tariffs and frequency of tariff revision as in 2014 in the wind producing states.

Table 2 Tariff and frequency of tariff revision in states

S.No	State	Tariff (Rs./KwH in 2014)	Revision of Tariff (2007-14)
1	Andhra Pradesh	4.70	Tariff revised in 2008-09 and 2011-12
2	Gujarat	4.15	Tariff revised in 2008-09 and 2011-12
3	Jammu & Kashmir	Not fixed	Not fixed.
4	Karnataka	4.20	Not revised since 2008-09
5	Maharashtra	Zonal31 ranging from 5.81 to 3.88	Regularly revised zone wise every year
6	Madhya Pradesh	5.92	Regularly revised every year
7	Odisha	5.31	Not revised since 2010-11
8	Rajasthan	5.7232 & 5.44	Regularly revised since 2008-09
9	Tamil Nadu	3.51	Regularly revised since 2009-10
10	Uttar Pradesh	4.02	Regularly revised since 2008-09

Source: CAG.2015

Issues of Power Purchase Agreement and Sanctity of Contract

Developers have raised concerns that Discoms often delay signing PPAs and at times delay payment once the plant is up and running. MSEDCL had delayed signing PPAs during the period July 2013-May 2014 (CAG.2015). Some of the projects had already been commissioned and had started supplying to MSEDCL and MSEDCL had delayed making payments to developers (ibid). Since the state has recently added significant coal based capacity, it has become surplus in power. This could be the reason for backing down RE power though it could also be because of transmission capacity constraints.

Transmission Constraints

Transmission constraints are becoming a major bottleneck as wind capacity is mainly located in the southern and western states. Tamil Nadu, which has managed to harness maximum capacity has faced major issues in evacuation. As of 31 March 2014, the state had 7271 MW of installed capacity but had transmission infrastructure for only 6086 MW. States face financial constraints in funding evacuation facilities. In Andhra Pradesh 63 projects with a capacity of 3075 MW were pending due to insufficient transmission evacuation facility (CAG.2015). In Tamil Nadu 6018 MU of wind power had to be backed down from 2007-2014. In Maharashtra, 74 applications for grid connectivity involving 4304 MW were

pending with MSEDCL from March 2012 onwards till March 2014. The union government has recognised the need for increased transmission capacity and a 'Green Energy Corridor' is being established to take care of the power evacuation needs.

Table 3 shows the specific observations of CAG on the performance of various wind potential states during the period 2007-14.

Table 3 CAG Observation on Wind Power Promotion by States

States	CAG Observation on Wind Power Promotion by States
Andhra Pradesh	Wind Policy 2008 favourable to developers, SDA not adequately equipped to handle the requirements of the developers including lack of staff, and reliable information particularly for fixing tariffs.
Gujarat	State did not set any targets for creation of capacity between 2007-14, which reflected the low priority given by the state to wind
Karnataka	Only around 50% of targeted capacity could be added from 2007-14 (1497 MW against 2969 MW) due to difficulties in getting statutory clearances for land (revenue and forest land)
Madhya Pradesh	State could develop only around 10% of the targeted capacity addition (367 MW against target of 3259MW) during 2007-14.
Maharashtra	CAG satisfied with Maharashtra's performance
Rajasthan	An earlier policy to fix tariffs through competitive bidding stayed by state high Court. Government of Rajasthan amended (March 2014) the policy and allowed preferential tariff determined by SERC for the years 2013-14 to 2015-16 but during the year 2013-14 only 98.80 MW could be added
Tamil Nadu	Repowering policy required as around 60 per cent of small wind turbines were operating with PLF ranging from 10 to 15 per cent.
Odisha and Uttar Pradesh	States set little priority in developing wind energy potential

Source: Renewable Energy Sector in India for the period 2007-14, CAG Audit 2015

Challenges in the Solar Segment

While the Solar Mission was launched during the XI plan, only around 940 MW of solar capacity was added during this period. For the 12th Plan, 1900 MW capacity was planned for the first two years of which 1716 MW was achieved up to 31 March 2014. Most of this capacity has come up in Gujarat and Rajasthan as envisaged under JNNSM.

There were delays in the commissioning of solar projects. This delay, according to CAG helped developers benefit from a reduction in capital cost as the tariff was fixed and PPA signed ahead of commissioning. States and project developers in turn have to see the bankability of projects, which improves if the PPA is in place before commissioning.

In order to promote solar, some states like Rajasthan allotted Government land at rates lower than the Collector rate to developers. They also made changes in the land use status. However significant amount of the land released had not been utilised for solar generation

and has become a land bank for the developer (CAG.2015). Figure 2 shows yearly solar installation and cumulative capacity from FY 2010 to FY 2016

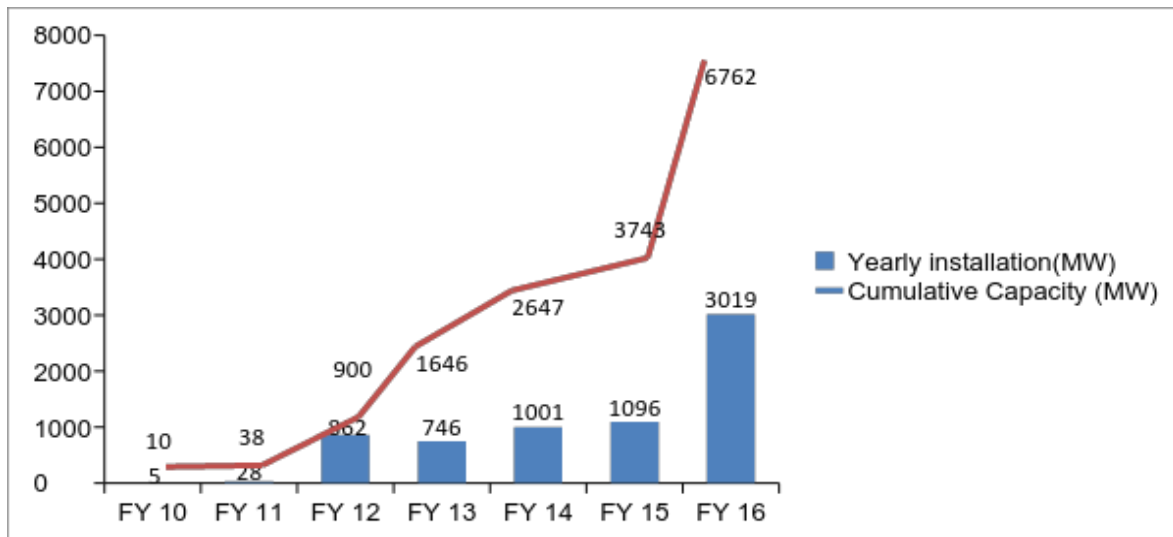


Figure 2 Solar cumulative capacity and installation
Source: MNRE, 2016

Progress on Renewable Purchase Obligations: Managing the Demand Side

The compliance with RPO targets has been weak in states. So far, states, which have significant wind potential and a vision to harness this potential, have set some sizeable RPO requirement as a means to attract investors. This RPO is being complied with states own generation. There has been very little compliance by way of purchase of REC. Only 4.77 per cent of RPO compliance was through REC mode, whereas 95.23 per cent was through direct purchase of electricity from RE sources (CAG.2015).

Overall against the NAPCC targets of eight and nine per cent for the years 2012-13 and 2013-14, national achievement were only 4.28 and 4.51 per cent, respectively (CAG). More importantly, only six of twenty four states complied with the targets fixed by the respective regulatory commissions. Table 4 gives the RPO target and compliance levels for wind producing states. Table 5 gives the RPO and compliance level of states which either have limited renewable potential or where renewable is not yet a development priority. As can be seen both targets are lower and compliance even lower in these states. Many of these states are large states with high energy requirement. Many of them, however have significant coal reserves and see coal mining and coal production as a major contributor to their economy.

Table 4 RPO target and compliance levels for wind producing states

	Target (2013-14)	Compliance (2013-14)
Gujarat	7	6.72
Karnataka	7.25	10.97
Andhra Pradesh	NA	1.75
Maharashtra	9	7.66
Tamil Nadu	9	20.04
Rajasthan	8.2	7.25
Madhya Pradesh	5.5	NA

Source: CAG.2015

Table 5 RPO and compliance level of states with limited/negligible wind potential

	Target 2013-14	Compliance 2013-14
Uttar Pradesh	6	4.45
Odisha	6	NA
Jharkhand	4	0.42
Bihar	4.5	1.89
Punjab	3.5	3.08
Haryana	3.1	0.94
West Bengal	4	2.54

Source: CAG.2015

Governance Issues in Monitoring and Compliance

Monitoring Agency

The SERCs are required to set RPO targets and ensure compliance. They in turn need data and information on compliance levels. Most state RPO Regulations specifies a 'nodal state agency' which is mandated to monitor the compliance of RPO target by the discom on a quarterly basis. Though in most cases, the nodal agency is the state renewable energy development agency; this has not been clearly stated in all regulations. The actual practice differs from state to state. In Maharashtra, the regulator gets quarterly information from the MEDA but it also verifies the targets independently with the SLDC. In Karnataka, KERC gets compliance monitoring report from the State Load Dispatch Centre (SLDC) only.

In Uttar Pradesh, till recently the Uttar Pradesh Power Corporation Limited (UPPCL) was monitoring compliance with RPO and only recently this function has been assigned to the UP New and Renewable Development Agency (UPNEDA). The UPERC in 2016 issued two sou-motto orders for monitoring the RPO compliance but most of the state discoms have not even appeared before the Commission. Interesting only the private Discom Noida Power Company made an appearance before the Discom.

Renewable Energy Certificate (REC) Costs

Most state regulations direct utilities to purchase REC in case of shortfall in meeting RPO target through actual RE purchase. In practice however regulators have not made any separate provision for purchase of RE through REC in the Annual Revenue Requirement (ARR). The CAG report on the renewable sector has also noted that for the years between 2010 and 2014, only around 4.77% of RPO compliance was made through the REC route. The West Bengal RPO regulations, in fact, restricts the amount of RE and the price at which RE power can be bought. The West Bengal (Cogeneration and Generation of Electricity from Renewable Sources of Energy Regulations), 2013, stipulates that no distribution licensee should purchase more than 5% of the projected consumption in the distribution area from RE. It also states that “due to such procurement of renewable and/or cogeneration energy the average cost of supply to the consumer as determined under Tariff Regulations shall not be increased by more than 2 paise/kWh”. The West Bengal regulations have also listed out five conditions under which the Discom will not be held liable for purchase of RPO. These include non-availability of RE, non-availability of REC within the price capping, failure of contracted plant to generate, discontinuity of supply by RE developer and other reasons for termination of contract. Clearly West Bengal SERC’s priority, in line with the political set up, is clearly to ensure affordable rather than green energy.

Provisions for Penalty for Non-Compliance

Some of the states have a provision for creating a ‘regulatory fund’ in which discom will be required to deposit a charge as determined by the Commission to the extent of non-compliance with RPO. This fund set aside will be used as per the direction of the Commission. Applicability of penalty and the penalty mechanism for non-compliance differs from state. Some regulations (as in West Bengal) fix penalty limited to the amount fixed under Section 142 of the Electricity Act, 2003. Some regulations (as in Maharashtra) leave it to the discretion of the regulator to decide whether and what part of the cost of the regulatory fund will be passed on to the consumer. Recently the WB regulator in its tariff order for West Bengal State Electricity Distribution Company Limited (WBSEDCL) for 2015-16 has warned the utility that from 2016-17, the discom will incur a reduction of 5% from Return on Equity (RoE) for non-compliance of RPO. Till date, the regulator in none of the study states has imposed a penalty. In Karnataka, recently the regulator has withdrawn the arrangement for regulatory fund (for reasons of administrative difficulty) and simply asked the obligated entities to buy REC. Many state SERCs have not even made a provision for penalty and some allow deferment of RPO targets. Till, 2014, while 17 of 24 states reported short fall in meeting RPO obligation, a token penalty was only levied in Uttarakhand.

Moving Forward

In March 2016, the Ministry of Power laid out uniform targets for all states as given in Table 6. Though the MoP was asked to spell out long term targets, it has so far restricted itself to only three years, though the solar target is defined till 2022. Uniform targets are prescribed for states and union territories, non-solar going for 8.75% in 2016-17 to 10.25% in 2018-019, and solar going from 2.75% to 6.75%.

Table 6 Targets for the state and union territories for Non-solar and Solar

	2016-17	2017-18	2018-19
Non-Solar	8.75%	9.5%	10.25%
Solar	2.75%	4.75%	6.75%
Total	11.5%	14.25%	17%

Source: MoP 2016

The RPO obligations have to set on the total consumption of the obligated entity excluding power consumption from hydro sources. This suggests that the government is considering getting states to offset their fossil fuel based generation emissions by utilizing renewable energy. This however adds a new confusion for states as this would mean that the states would need to redefine their energy requirement from renewable energy. While states with significant hydro potential would benefit, states with greater coal based capacity will have to purchase more renewable. There is however lack of clarity on whether states would need to adhere to this new way of estimating RPO requirement. In case they agree, suitable amendments will need to be made in their RPO/REC regulation to incorporate this change. Madhya Pradesh has done so in a recent amendment (2016) of its RPO regulations.

The MoP Order has been sensitive to possible federal issues while prescribing these uniform targets. The order states that 'states may consider to notifying their respective RPO in line with the aforesaid uniform RPO trajectory'. This clearly shows that the central government agrees that it can only 'urge' the states to follow these uniform targets but cannot 'compel' the states to enforce these targets. Centre can incentivise states to meet their renewable obligations through centrally supported schemes. For instance, under the Ujwal Discom Assurance Yojna (UDAY) scheme, beneficiary states are required to comply with the 'Renewable Purchase Obligation (RPO) outstanding since 1st April, 2012, within a period to be decided in consultation with Ministry of Power'. Under the UDAY scheme, the central government has assured benefits such as coal linkages and priority/additional lending under central schemes such as the Deen Dyal Upadhyay Scheme on rural electrification. The MoP notification on the UDAY scheme, however clarifies that it is the state's discretion whether they wish to opt. It is also notable that in several of the MoUs signed between the Centre and state government, there is no mention of the requirement of meeting renewable goals. This seems to suggest that the Centre has already dropped its demand for compelling states to push renewables under the UDAY scheme. Table 7 and Table 8 lists the state-wise solar and wind capacity addition targets respectively as proposed by the Centre.

There is however no clarity on whether the states have been consulting in setting up such high targets. In the past it has been noted that the MNRE decides the state wise targets based on the overall national objective and not necessarily in discussion with states. The CAG noted that while MNRE provided list of targets and achievements from 2007-14 state-wise, 17 state themselves had not fixed any targets for this period. The CAG further remarked that the targets appeared to have been fixed by MNRE without proper planning, analysis, involvement of and communication with the States.

As can be seen from Table 7 significant solar capacity addition is expected in Maharashtra, followed by Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Gujarat. While the capacity addition targets for each of the state is steep, it will be particularly challenging in Uttar Pradesh given that the state has clearly stated its intention that it will meet its RPO

obligations even for the years 2012-15 only by 2019-20 as per its agreement under the UDAY scheme with the Central Government.

Maharashtra has finalised its new RPO regulations on 30th March 2016 in which it has revised its solar RPO targets only in line with the earlier NAPCC targets. So far it is looking at solar obligation of 1 to 3.5% from 2016-17 to 2019-20. It has however come out with a solar off-grid policy through which it aims to add around 500 MW capacities in the next five years.

The Andhra Pradesh SERC has in September 2016 issued a Draft Renewable Purchase Obligation specifying it's the RPO obligations in the state from 2017-18 to 2021-22. The solar targets are particularly aggressive with a target of 4.75 in 2017-18 rising to 12.75 by 2021-22. Andhra Pradesh could possibly be looking at meeting its growing energy needs from solar. Andhra Pradesh's report on 24x7 document itself accepts that "the likely installed capacity from all sources (existing & upcoming) by FY 2018-19 is 13,264 MW thus leaving a shortfall of 3,300 MW during peak hours in FY 2018-19". The capacity addition target includes 5030 MW of Solar and 4150 MW of wind.

Table 7 State Wise Solar Capacity Addition Targets Proposed by MoP/MNRE

	Solar				
	Current capacity (MW)	GoI target till 2022 (MW)	Additional Capacity required for 22 target (MW)	% capacity addition required	States target as % of total targeted by 2022
Rajasthan	1301.16	5762	4460.84	77.42%	5.79%
Uttar Pradesh	143.5	10697	10553.5	98.66%	10.75%
Gujarat	1138.19	8020	6881.81	85.81%	8.06%
Madhya Pradesh	811.38	5675	4863.62	85.70%	5.70%
Maharashtra	386.06	11926	11539.94	96.76%	11.98%
Andhra Pradesh	968.05	9834	8865.95	90.16%	9.88%
Karnataka	340.08	5697	5356.92	94.03%	5.72%
Tamil Nadu	1555.41	8884	7328.59	82.49%	8.93%
West Bengal	11.77	5336	5324.23	99.78%	5.36%
Punjab	571.2	4772	4200.8	88.03%	4.79%
Haryana	17.39	4142	4124.61	99.58%	4.16%
Total of Selected states		80745			81.12%
Grand Total		99533			

Source: MNRE.2016

In case of wind, Andhra Pradesh has been assigned the highest target of adding 6668 MW by 2022. The states non-solar RPO has been fixed at 9.5 -12.5% from 2017-18 to 2021-22 (AP Draft Regulation, 2016). Maharashtra's non-solar has been fixed at 10% in 2016-17 to 11.5% in 2019-20. This suggests that the state itself is not considering significant addition in wind capacity. As per the state's own renewable policy 2015, it has considered adding 5000 MW of wind capacity.

Karnataka, Tamil Nadu and Andhra Pradesh are likely to develop the said capacity as they are power deficit. Tamil Nadu has seen a lot of wind capacity addition but has faced transmission constraints. As a result, wind developers were asked to back down. Curtailment by discoms may also be because states may have signed PPAs with project developers earlier at a higher tariff of Rs 12-15 per unit for 25 years. Now that prices of solar power has declined, state discos may want to renegotiate PPAs.

Some states like Gujarat, Rajasthan and Madhya Pradesh may announce targets on the lines suggested by the central government. These are states ruled by the BJP lead NDA Alliance and therefore would comply with their party.

There are some states for instance Bihar, West Bengal, Odisha which clearly do not have RE on their development agenda. Of these, Odisha and West Bengal have significant coal reserves. Odisha has power surplus and has a number of coal based power projects coming up. West Bengal's RPO regulation of 2013 fixed RPO target in 2013-14 at 4% going upto 6% in 2017-18. Odisha RPO Regulations 2015 specify that the solar obligation will increase from 0.5% in 2015-16 to 5.5% in 2019-20. The non-solar RPO would increase from 2.5% to 5.5% in the same period.

States like Himachal Pradesh have voiced concerns that they are already meeting significant RE requirement through hydro and that solar RPO should be set based on potential and capacity to absorb the power. The Ministry of Power is reportedly considering recommending different RPO targets for different states.

Table 8 State Wise Wind Capacity Addition Targets Proposed by MoP/MNRE

Wind					
	Current capacity (MW)	GoI target till 2022 (MW)	Additional Capacity required for 22 target (MW)	Capacity addition required as % of total targeted	States target as % of total targeted till 2022
Rajasthan	3993.95	8600	4606.05	53.56%	14.33%
Gujarat	3948.61	8800	4851.39	55.13%	14.67%
Madhya Pradesh	2141.1	6200	4058.9	65.47%	10.33%
Maharashtra	4653.83	7600	2946.17	38.77%	12.67%

Wind					
	Current capacity (MW)	GoI target till 2022 (MW)	Additional Capacity required for 22 target (MW)	Capacity addition required as % of total targeted	States target as % of total targeted till 2022
Andhra Pradesh	1431.45	8100	6668.55	82.33%	13.50%
Karnataka	2869.15	6200	3330.85	53.72%	10.33%
Tamil Nadu	7613.86	11900	4286.14	36.02%	19.83%
Total of States	26652	57400	30748		
Grand total		60000	60000		

Source: MNRE.2016

Perspective of Non-Governmental Organizations on Conventional and Non-Conventional Energy

This section examines the views of some of the leading energy think-tanks with strong focus on advocacy. The selected NGO/think-tanks have a prominent national presence and have been working on energy issues for a considerable period of time. Recent published reports, articles and websites of these organisations were studied in order to understand their position on both conventional and non-conventional energy generation. Interviews were sought² with the organisations to confirm their views as emerging from secondary research.

Position of these think-tanks³ on some of the issues is discussed below:

Prayas

Prayas has listed its vision of energy as ‘becoming a tool for sustainable and equitable development for all’. It has listed its goals as follows: universal access and better quality of service, security of sustainable energy supply to meet effective demand in a socially and environmentally responsible manner; and democratization of governance of the energy sector through increased transparency, public participation, accountability of institutions and enhanced capacity of institutions as well as civil society.

Prayas has supported policy making through research in the area of energy. It has a balanced view on various sources of energy and agrees that even the most optimistic projections in the growth of renewable energy sources suggest that fossil fuels will play a significant part in the country’s energy basket for the near to medium term. At the same time through its studies it has brought to focus the impact on coal based stations not only on environment but also on natural resources like land, air and water. Through a study in 2011, it specifically brought attention to the concentration of power plants in one specific region and what its impact would be on natural resources in the region. It has also looked at governance issues in the coal sector particularly on the allocation of coal blocks and the gaps in the new allocation policy.

Prayas is of the view that renewable energy is essential for India from an energy access and energy security perspective and not necessarily a climate change perspective. For a developing country like India with little historical climate change responsibility and extensive energy poverty, it delves on the importance of a balanced policy that considers reasonable financial impact on consumers and tax payers. For instance in 2012 Prayas came up with a report on rooftop solar. It suggested that given the financial and operational condition of utilities it is more appropriate that India opts for net metering instead of gross metering for grid connected rooftop solar given the burden gross metering would pose on utilities. It also said that instead of subsidizing RTPV, tariffs of commercial and high-end

² Of these, Prayas, WRI and CSE responded and discussed their views

³ Since the author is affiliated to TERI, the position of TERI has not been included to ensure against any biases

residential consumers should be aligned with those of RTPV costs, thereby incentivising them to shift to solar or pay higher tariff.

Prayas has engaged extensively with the central government. It has been appointed to important committees on renewable for the Niti Ayog and Ministry of Power. It engages regularly with the Maharashtra Electricity Regulatory Commission (MERC) on renewable and tariff issues. It recently assisted MERC in drafting their net metering regulations. Prayas does not consider 'environmental impacts' of RE projects a major concern, though it finds it difficult to comment given that EIA and SIA are not undertaken for renewable projects. Prayas also engages with consumers and have recently made presentations to educate consumers on various aspects of net metering.

In the past Prayas has advocated on the need for greater participation of consumers in renewable energy decision making. With the advent of independent regulators, public participation was introduced as part of the decision making process in the electricity sector. A study by Prayas in 2010 noted very limited participation of consumers in regulatory hearings on renewable energy. Mostly project developers participate in public hearings. The study emphasised that citizen participation is particularly important around issues of tariff determination as the study noted that there were wide diversions in the capital costs amongst states. The study also noted that both the capital cost and the variable/fuel costs of these RE projects is based on inadequate data and ambiguous claims of project developers (Prayas 2010).

World Resources Institute (WRI), India

WRI follows the broad perspective of sustainable development in the Energy Programme, in India which was set up in 2012. WRI again has a balanced view on conventional and non-conventional energy, that both are required. For instance in case of rural electrification, it believes that in the first instance access is more important than whether it's grid-connected conventional energy or distributed renewable energy.

WRI aims to strengthen policy making by demonstrating how things can be done. For instance its Green Market Development Programme launched in collaboration with Confederation of Indian Industries (CII) aim to aggregate demand for renewable energy from corporates. It started with connecting potential industrial and commercial renewable energy purchasers with suppliers. Companies involved in the programme include Infosys, ACC, Cognizant, IBM, WIPRO, and others. WRI made representations before the Karnataka Electricity Regulatory Commission to waiver charges on supply of solar energy including open access surcharge, wheeling charge, etc. It also called for easing of approval processes.

In rural access, it has undertaken mapping of electricity demand in villages. Often decentralised generators in villages are apprehensive as to what would be the impact on their business grid connected power reaches the village. WRI is exploring options on how the private entrepreneurs business can be connected to the state utility in such a way that the entrepreneur does not get adversely impacted.

On the electricity governance initiative, it has worked with grass root NGOs in Karnataka and Tamil Nadu on building capacities to engage in electricity related decision making. It has also organized workshops for educating the media on clean energy and energy

efficiency.

So far WRI has had a larger presence in the states, where it has undertaken implementation work. It hopes to move the work to the central level gradually. It does interact with MNRE and Niti Aayog.

Centre for Science and Environment

The Centre for Science and Environment (CSE) describes itself as a public interest research and advocacy organisation CSE that 'researches into, lobbies for and communicates the urgency of development that is both sustainable and equitable'. Broadly CSE concurs with a balanced approach where it sees advantages of renewable, particularly for remote energy access, but agrees that coal will remain the mainstay. CSE's specific observation on conventional and non-conventional energy, as evident from its publications is discussed below.

CSE has questioned the need for more coal based power plants as it finds that the existing power plants are working below capacity. It has argued for stricter emission norms for coal based power plants. Enforcement of these norms is seen as a major concern. In a recent report "Heat on Power", CSE has argued that despite having lenient pollution norms, nearly 55 per cent of the power generating units are highly polluting on ground while reporting compliance on paper. In this report CSE has referred to CEA's annual performance review which recognizes that 30 per cent of the power generating units report their non-compliance to the norms but still operate.

CSE broadly sees renewable energy as a means to democratize energy consumption and production which has so far been a monopoly of large generation and distribution companies. It sees renewable energy as a means to meet energy access needs of the poor and prescribes distributed energy generation.

In the initial years of wind power generation, it raised concerns against the misuse of the accelerated depreciation provision by developers. Through its own investigation of a number of wind installations in Maharashtra, it found that at several locations the capacity utilisation factor of the turbines was as low as 11 per cent. It also noted that in certain areas, the wind farms had not even been developed but that the land was being held for tax benefit purposes.

More recently the organization has been arguing for mandatory EIA and SIA for wind projects. It has raised concerns that a number of wind projects are coming up in forest and ecologically sensitive areas. In its report it has argued that that in at least two states – Maharashtra and Karnataka, a lot of forest land has been diverted for wind farms.

Green Peace

Greenpeace India was founded in 2001. It has conducted campaigns around a host of issues in the energy sector including promotion of clean energy generation, promotion of CFL bulbs, solar rooftop campaign in Delhi and for the north-east and advocacy for solar lanterns in Bihar. Greenpeace has also campaigned on issues of nuclear radiation and nuclear

liability. It has also campaigned on issues of mining and has had an adverse stand on coal given its environmental impacts. An analysis by Greenpeace India finds that the country is heading towards an excess of coal power plants, more than needed to match the power demand projected for 2022, and will result in about Rs 3,00,000 Crore of wasted investment into coal power plants⁴. The NGO has also commented on the enormous usage of resources such as water and land by coal based stations.

Observations

Think-tanks influence policy making in different ways. They are often invited by Ministries as part of committees set up on policy matters. They are also part of Parliamentary Committee Reports set up from time to time. Some of the think -thanks engage with independent electricity regulators, which implement policy decisions through appropriate regulations. NGO's tend to broadly advocate on issues of public interest. It is however difficult to identify specific areas or matters on which NGO's have impacted decisions around energy transition.

⁴ <http://www.greenpeace.org/india/en/publications/Power-Scenario-Briefing/>

Renewable Energy Project Developers Perspective

TERI conducted stakeholder discussions with developers in two states, Gujarat and Andhra Pradesh. Gujarat was selected as it is a state that has pioneered solar development in the country. Andhra Pradesh was selected as it is now emerging as a leader in solar development and has set very high RPO targets for solar.

The key research questions were

1. What were the main issues faced by developers in implementing projects in states?
2. What are the different ways through which developers raise their concerns with policy makers?
3. What are some of the key issues that could be resolved by engaging with policy makers?

Major concerns of developers

The proposed withdrawal of GBI and reduction in AD are a major concern, particularly for small developers. (AD to be reduced from 80% to 40% after September 2016 and is set to reduce to 20% after April 2017).

Land acquisition is a major concern particularly in Maharashtra and Karnataka. State governments intervene only in case of revenue land and for private land developers have to directly engage with the landowners. Land comes under the state's jurisdiction and centre has very limited role other than in case of forest land. Some developers felt that there was insufficient transparency in this process and generally developers on good terms with the government get clearances much earlier than others.

While Andhra Pradesh has good wind potential, developers are not forthcoming as they find prevailing tariff of Rs 4.84 unattractive. In case of Tamil Nadu, developers were concerned about the frequent back-down and delays in payment.

In case of rooftop solar, some project developers were of the view that utilities consciously delay matters as the state utilities do not want to let go of their high paying industrial and commercial consumers. Comparing the efficiencies of a private and public utility in Gujarat, a developer stated that while Torrent Power Distribution Company started replacing old meters with bi-directional meters since 2015, the state utilities began this exercise only in November 2016. The developer also noted that the private utility saw a business proposition in rooftop solar and were quick to respond to queries and grievances.

Various Associations and Federations have been established in the renewable energy sector with the purpose of collective bargaining and influencing policy making. Prominent organisations include Indian Solar Manufacturers Association (ISMA), Federation of Indian Chambers of Commerce and Industry's Solar Energy Task Force (FICCI), Solar Power Developers Association (SPDA), National Solar Energy Federation of India (NSEFI) among a

few which are active in the promotion and represent all stakeholders in the solar sector. The Indian Wind Turbine Manufacturers Association (IWTMA), Indian Wind Power Association (IWPA), Indian Wind Energy Alliance (IWEA), Independent Power Producers Association of India (IPPAI), Confederation of Indian Industry (CII), amongst others are active in promoting wind.

Developers, both as individuals and associations, engage significantly with centre and state regulators on issues of tariff, grid access, RPO compliance, issues of scheduling and banking and other regulatory matters. Regulators have an established process of public hearings through which interacts with different stakeholders.

Associations regularly meet with State Energy Departments, state utilities and where possible with the Chief Minister in states and the Union Power Minister.

Associations also use the media to highlight their issues. The media has so far taken a favourable view on RE as a 'clean' fuel against the 'dark and dirty' coal.

Some major Issues that have been addressed by developers

1. Land issues have been resolved to a large extent by the government by setting up solar parks. Government has agreed for Case II bidding for 25000 MW of RE.
2. By making NTPC sole off-taker of solar power under the JNNSM scheme, government has reduced the payment risk of developers. This has in turn reduced credit lending risks for developers and made their projects more bankable.
3. The Union Government has also provided greater clarity and commitment towards renewable energy by charting out a long term vision for RE. The Centre Government is also persuading states to increase their commitments to clean energy too

The following Section examines some of the major associations that have been set up in case of wind and solar in India and the issues that they have taken up with centre and state governments.

The Indian Wind Turbine Manufacturers Association (IWTMA) is an industrial body representing wind turbine manufacturers. IWTMA represents the wind industry in various committees and advisory groups constituted by the Ministry of New and Renewable Energy, National Institute of Wind Energy (formerly C-WET) and IREDA. IWTMA also engages with regulators through tariff hearings. In 2014, IWTMA presented before the MNRE on issues regarding evacuation and transmission of wind power, land availability and clearances in Maharashtra, Karnataka and Gujarat as well as the hike in NPV for forest lands (IWTMA, 2014).

IWTMA in association with CII Godrej GBC organised a series of workshops in Madhya Pradesh, Andhra Pradesh and Karnataka to discuss the outlook for wind and define a roadmap for the RE sector. In MP, IWTMA has requested the state government to give visibility of tariff beyond March 2016, ease the process of allotment of revenue, rationalise state transmission charges and facilitate interstate transmission charges by persuading the Central Government to waive central transmission utility (CTU) charges. Through the media, IWTMA had raised concerns over the tariff and tax structure in Karnataka and MP. The association requested the Karnataka government to allocate identified forest land

towards wind energy projects (Deccan Herald, 2016). Earlier this year, the IWTMA had urged the Telangana government to offer higher tariff for wind energy to facilitate more wind projects in the state to tap the 4GW capacity of the newly established state (The HANS INDIA, 2016).

In order to address the issue of curtailment of wind power in Rajasthan, IWTMA suggested that the issue could be resolved with improved wind generation forecasting. The IWTMA is installing devices across 20 substations in Rajasthan which will reveal how much wind power is available every 15 minutes (The Economic Times, 2016).

The Indian Wind Power Association (IWPA) was set up in 1996. IWPA have recently petitioned Delhi Electricity Regulatory Commission (DERC) to seek action against DISCOMs for non-compliance of RPO (DERC, 2016). IWPA has issued a press release urging Government of India to restore the benefits of Accelerated Depreciation (AD) to wind power producers, which was withdrawn in April 2012 (IWPA, 2013). The IWPA had indicated in its press release, a study by CRISIL which states that the increase in the annual wind mills in India have come down by 50 % (IWPA, 2013).

Tamil Nadu has also in the last few years, curtailed wind generation by 20-30% and failed to make payments due to the generators (Business Standard, 2016).

Indian Wind Energy Alliance (IWEA): The IWEA was formed with coming together of the IWTMA and Wind Independent Power Producers Association (WIPPA) in Dec 2014. WIPPA in the past have opposed price discovery of wind power tariff through competitive bidding and were urging the judiciary to enforce RPO. Both IWTMA and WIPPA represent around 70-80 per cent of the Indian wind power industry (energynext, 2014a).

Issues raised by solar associations in India

National Solar Energy Federation of India (NSEFI) is an umbrella organization founded in 2013 representing solar energy companies -project developers, manufacturers, engineering companies and financing institutions. NSEFI have in the past campaigned for a separate auction for locally manufactured modules. MNRE in July 2016 announced a 500 MW tender for solar projects using only locally produced modules (The Economic Times, 2016). Solar Energy Corporation of India (SECI) floated tenders and specified that only domestically made solar cells and modules could be used. To encourage domestic manufacturing, only such modules will be entitled to subsidy as well as a higher reserve tariff.

Indian Solar Manufacturers Association (ISMA) The ISMA has been demanding that the government impose anti-dumping duty on cheap solar PV module imports to create a level playing field for Indian manufacturers. The association came out with a white paper in association with KPMG in 2014 which highlighted the need for a holistic policy to encourage domestic solar manufacturing. The Indian solar manufacturers wanted India to take US to WTO for discriminatory domestic content requirements (DCR) in India's solar sector in 2014. ISMA sent a formal petition to MNRE in Sep 2015 to revive its demand for safeguard duties and anti-dumping duties on imported solar cells and modules. However in February 2016, the WTO ruled against India and indicated that India's DCR under the Jawaharlal Nehru National Solar Mission (JNNSM) violates its commitments under the global trading rules,

specifically the General Agreement on Tariffs and Trade (GATT) and the Agreement on Trade Related Investment Measures (TRIMs). India has however appealed to the WTO against the ruling and the response is pending (The Wire, 2016). Meanwhile, ISMA has asked for alternative schemes to help promote locally-made modules.

Solar Power Developers Association (SPDA) is a national level association representing India's upcoming solar power generators and developers. Some of the issues which they have highlighted in the past include the review of accelerated depreciation (AD) benefits to developers which has enabled AD dependent bidding organizations in winning projects despite lower equity commitment to the projects and at the cost of revenue to exchequer. SPDA suggested that AD may be withdrawn in favour of an overall cut in the corporate tax rate. SPDA has also campaigned for creating a level playing field for AD and non-AD players by lobbying for exemption of payment of minimum alternate tax (MAT) over a span of 10 years.

SPDA has also been seeking clarity on the operationalization of the renewable generation obligation (RGO) scheme and are campaigning that RGO be exclusive of RPO so that it adds depth to the market. They have also presented their views with regard to ensuring a level playing field between various players in the market and campaigned that no preferential treatment to be given to PSUs by MNRE and there should be open competition with private sector at tariffs decided via competitive bidding (Source-SPDA website). For instance, Phase II of JNNSM (Batch V) is an exclusive scheme for the CPSUs and Government of India organizations for setting up of 1000 MW of grid-connected Solar PV power projects⁵ (MNRE, 2015).

FICCI Solar Energy Task Force constituted a Solar Energy Task Force in 2010 to represent the views of the Indian solar industry before the government. The Task Force comprised 32 members from the entire value chain of the solar industry including manufacturers, project developers, system integrators, EPC companies, raw material suppliers as well as the certification agencies. As part of its advocacy work, FICCI has come out with reports on 'Financing Solar Energy' and 'Securing the Supply Chain for Solar in India'. A white paper by FICCI on 'Financing Solar Energy' urged the central government to provide renewable developers easier access to finance under the National Clean Energy Fund (NCEF). FICCI has recommended to the government that the interest subsidy from NCEF should be made available and routed through the lenders to such eligible project developers so that they could get lower interest rates for the loans. Recently in 2016, FICCI had suggested reviving the 2% export incentive that was given for solar components until last year and exempting such products from VAT across the country (it is currently exempted only in some states) (The Economic Times, 2016).

All India Solar Industries Association (AISIA) has been lobbying the government to impose anti-dumping duties on imported modules from China. In 2016, AISIA had submitted a memorandum to Finance and Commerce Ministry on their concern regarding the levy of Goods and Service Tax on power projects which would escalate end user tariffs. (The Indian Express, 2016).

⁵ Renewable Generation Obligation (RGO) is where new coal/lignite based thermal plants are obligated to establish/procure/purchase renewable capacity after a specific due date as per amendments in the National tariff Policy 2016

Independent Power Producers Association of India (IPPAI) was set up as a not-for-profit association in 1994 to provide a platform for the discussion and examination of regulatory, policy, strategic and financial issues in the development of the energy and infrastructure sectors within India.

IPPAI has sought government's intervention with regard to the curtailment of supply from RE developer by state utilities (Business Standard, 2016). They annually organise Regulators and Policymakers Retreat in which policy makers and developers are invited. According to industry sources, this Retreat has been an effective forum for developers to influence policy decisions. IPPAI has also put forward the need to bring in new debt instruments to reduce the cost of raising capital for setting up solar projects. It has also raised concerns regarding delays and reluctance on behalf of state in signing PPAs.

Renewable Energy in Germany

Germany has a long history of support for renewable energy. It began with the energy crisis of the 1970's when the country decided to explore alternates to oil for which it was heavily dependent on imports. Initially nuclear was considered as an alternative to oil but the Chernobyl disaster resulted in citizen protests and a rethink on nuclear. Simultaneously, there was a growing awareness amongst citizens on environmental issues and there emerged political parties across Europe with a clear agenda on environment. By 1990's climate change concerns began another key driver and this is when the renewable agenda really picked up in Europe. Under the Kyoto Protocol, EU committed to greenhouse gas emission reductions of 15% from 1990 levels in the reporting period 2008-2012. This target was disparately divided amongst EU member states, with Germany accepting a 21% reduction goal (much higher than other states). The Feed-in-Tariff of 1991 and the Renewable Energy Law of 2000 were the watershed events in the promotion of renewable energy. The Fukushima incident in 2011 turned citizens further against nuclear and the government decided to phase out nuclear even earlier than planned. Renewable energy, thereafter, became the only alternate. While the term 'energiewende' had been used since 1970's, it came into common parlance in 2011 when the Merkel led government introduced a legislative package under this name. This was followed by a massive public relations campaign around energiewende. Box 1 chronicles the key events that led to the huge thrust on renewable energy.

Box 1: Tracing developments leading to the Energiewende:

- 1973-75 : Anti-nuclear movement begins in Germany
- 1973/1979 : OPEC driven oil crisis impacts all industrialised countries including Germany
- 1979/80 : Green Party formed
- 1991 : Feed-in-law introduced for renewable energy
- 1998 : EU liberalises European market. Germany introduces competition in generation and supply
- 1998 : Germany's Social Democrats and Greens come to power at the Federal level. New administration decides to phase out nuclear power, cut carbon emissions, and substantially increase renewable energy
- 1997 : Kyoto Protocol adopted in 1997 and entered into force in 2005. Germany signs the protocol in 1998 and ratifies it in 2002.
- 2000 : Germany decides to exit nuclear energy over a 30-year period. Renewable Energy Sources Act enacted.
- 2011 : Meltdown of Nuclear Reactor in Fukushima, Japan. Germany formulates a new plan for an accelerated phase-out of nuclear power. "Energiewende" enters common parlance

Source : Authors own

Energiewende

“Energiewende” is now understood as Germany’s ambitious energy transformation plan where it intends to change its overall energy system with substantive dependence on renewable energy not only for electricity requirement but also for transport and heating. As part of the programme, it plans to reduce greenhouse gas emissions by 80% by 2050. It plans to shut down all nuclear power plants by 2022 and increase contribution of renewables to the total power production: 35% by 2020 and 80% by 2050. It also plans to bring down energy consumption and has set an ambitious target such as a 40% reduction of energy demand in transport and an 80% reduction of primary energy consumption in heating by 2050.

This study however focuses only on the renewable capacity addition programme and strategy, in order to draw lessons for India’s 175 GW renewable energy target.

Renewable Energy Law and Regulation

The following section discusses how the renewable energy law was revised from time to time in order to deal with challenges that emerged with the large diffusion of renewable energy. This section also traces which parties were in power when the various changes in the Law took place so as to reflect on the position of the political parties on various renewable energy issues.

Energy Feed in Law-1991: The law provided for compulsory connection of all renewable power plants to the grid, priority feed-in for renewable electricity to the grid; and guaranteed remuneration for renewable electricity (feed-in tariff) over 20 years. This law obligated public utilities to purchase renewable energy from wind, solar, hydro, biomass and landfill gas sources, on a yearly fixed rate basis, based on utilities average revenue per unit. Remuneration to wind producers was set at 90% of the average retail electricity rate and hydro 80% of the retail price. Since a large part of German retail prices comprise of consumption taxes, this amount was considered generous. (Refer Figure 3 on Break up of electricity prices in Germany) Conventional power producers received considerably less than 80-90% of net retail price of electricity. The Feed in law made provision for coastal wind to begin with and this was later given to inland wind and solar power as well (Buchan 2012). Though the Law gave some impetus to wind, solar still remained unviable.

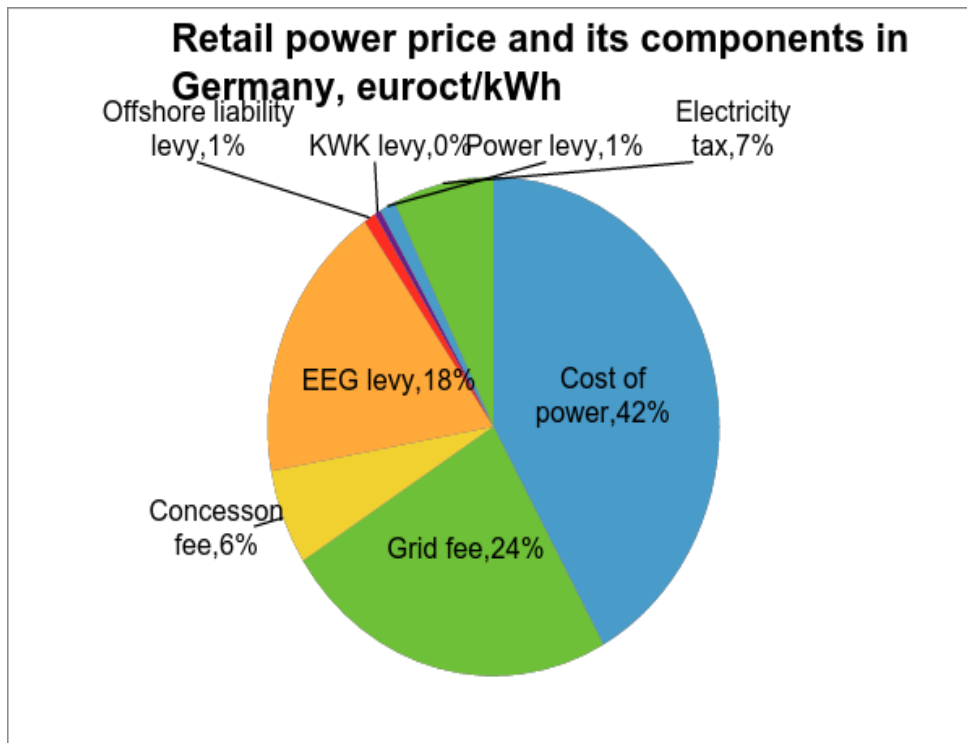


Figure 3 Retail power price and its components in Germany
Source: Energy Wire

The retail price, however had the disadvantage of fluctuating as it was linked to the market price. As a result of this fluctuation, the subsidy levels accordingly fluctuated. This made feed-in-tariff unattractive for bankers and investors. Further, the distribution of burdens was uneven, with grid operators in high-wind regions having to pay out more than the rest. The Act was amended in 1998 to introduce, a double 5% cap on feed-in purchases. This ceiling slowed uptake in some regions. The Electricity Feed-in Act was enacted by a CDU/CSU/FDP coalition government.

An SPD/Greens coalition government, elected in 1998, paved the way for the reform of the Electricity Feed-in Act to give the EEG (2000)

Renewable Energy Act (EEG), April 2000 was the successor of the feed in law and was introduced by the SPD/Greens Coalition. EEG unlike the feed in tariff is based on a regressive feed in tariff. Owners of new plants receive a fix rate, the FIT, for every unit of renewable energy they generate. The FIT is based on estimation of cost of generation over 20 years along with a reasonable profit. The FIT is plant size and technology specific. The FIT decreases for new plants by a fixed percentage every year. This depression is intended to give renewable owners an incentive to lower their costs. The contracts between the power developers and the utilities are enforceable by law. If the government were to alter tariffs on existing projects, companies could take it to Court. Government can only scale down subsidies by reducing tariffs for new projects. The Act also introduced the 100,000 roofs program wherein it offered low-interest loans for photovoltaic installations below 300 MWp.

The FIT is not funded by the government but paid by consumers. The renewable energy generated is sold in the wholesale electricity market at the market price. The difference

between the market price and the predetermined FIT is paid for by the consumers as a surcharge, called the EEG levy.

The Law guaranteed interconnection to the grid for renewable energy sources and preference over conventional sources by the network operator. The law also provides guaranteed purchase of all the power produced. Hence EEG law led to a spurt in RE with generation increasing three folds, from 30 billion kWh in 1999 to over 100 billion kWh in 2010.

The first EEG amendment, effective from 16 July 2003, introduced the 'special equalisation scheme', designed to unburden electricity-intensive industries from the rising EEG surcharge.

Initially, the EEG was scheduled for revisions every four years to adjust to market and technological developments, however, over time and given the dynamics of the sector and the economy, changes have been made more frequently. The following section discusses some of the major revisions made to the Act.

Renewable Energy Sources Act (2004)

Renewable energy targets were defined in the Act for the first time: 12.5% for the share of renewable energy in gross final electricity consumption by 2010 and at least 20% by 2020. The amended Act introduced a substantially modified and differentiated tariff structure. Tariffs for biomass, photovoltaics, and geothermal energy were increased. Environmental concerns were now to be taken up while setting projects in ecologically sensitive zones. Exemptions for industry from the EEG surcharge under the special equalization scheme were extended considerably. The 2004 legislation was overseen by an SPD/Greens coalition government.

Renewable Energy Sources Act (2009)

The renewable targets in the new law were increased to at least 35% (previously 20%) of total electricity production by 2020, 50% by 2030, 65% by 2040, and 80% by 2050. Tariffs for photovoltaic were reduced. The degression for PV was tightened from 5% to 8–10%, depending on the size of installation. A new 'self-consumption incentive' granted a fixed tariff of 25.01 ¢/kWh for electricity consumed by a PV operator within their own house. The support for onshore wind improved. Repowering of turbines was increased, and an additional system service bonus was granted for specified technical contributions including the ability to maintain voltage if the transmission grid failed. The tariff for offshore wind was raised substantially. A 'green power privilege' was introduced, which exempted electricity suppliers with a minimum quota of renewables from the EEG surcharge under certain circumstances. Provision was made for grid operators to temporarily limit wind turbine output in times of network congestion, with compensation payable to the plant owner for lost remuneration.

The 2009 legislation was overseen by a Christian Democratic Union (CDU)/Christian Social Union (CSU)/Social Democratic Party (SPD) grand coalition government.

Renewable Energy Sources Act (2012)

The rising shares of variable renewable generation had led to concerns about the ability of the electricity system to cope with these variations. The new Act included measures for the grid integration of photovoltaic systems. Grid operators could now limit the feed-in of photovoltaics in times of grid overload, with the plant operators receiving compensation for their loss of revenue. The tariff structure for onshore wind was basically maintained, but the degression was tightened from 1% to 1.5% to incentivize efficiency improvements. Industry privileges under the special equalisation scheme were extended to include more companies and the tariff reductions further improved. The green power privilege was also modified. Energy suppliers whose portfolio comprised more than 50% EEG-funded renewables had their surcharge reduced by 2 ¢/kWh, previously they had been fully exempt. In addition, a minimum share of 20% of fluctuating sources, namely wind and PV, was required. The renewables targets remained unchanged. The 2012 legislation was overseen by a CDU/CSU/FDP coalition government.

Renewable Energy Sources Act (2014)

The EEG (2014) is sometimes known as the EEG 2.0 due to its marked departure from earlier legislation. This revision took effect from 1 August 2014. The act requires operators of new plant to market their electricity themselves. In turn they receive a market premium from the grid operator to compensate for the difference between the fixed EEG payment and the average spot price for electricity. The act also paved the way for a switch from specified feed-in tariffs to a system of tendering

The EEG (2014) contained statutory targets for the share of renewable energy in gross final electricity consumption (the targets are additional to those set out in the government's 2010 Energy Concept statement. The targets are 40-45% by 2025, 55-60% by 2035 and 80% by 2050. The EEG (2014) specifies binding trajectories for individual technologies. Installations less than 100 kW were exempt from these provisions and existing installations were to continue operating under the rules under which they were established. It was decided that from 2014–2017 onwards, defined remuneration rates will be replaced by competitive bidding, also known as auctions or tenders. Investors offering the lowest prices were to receive support. The flexible cap mechanism for expansion corridors was replaced with set annual targets for the addition of wind, photovoltaic, and biogas capacity. The 2014 legislation was overseen by a CDU/CSU/SPD grand coalition government.

Renewable Energy Sources Act (2017)

EEG Reform passed in July 2016 (to be implemented from January 2017) will replace feed-in tariffs in favour of an auction system for most renewable technologies. To keep a steady hand on the rise in renewable power over the next decade and achieve renewables target in 2050, the government will largely stick to the 2014 “deployment corridor”. The tenders will provide the mechanism for adhering to this corridor by auctioning a specific amount of capacity volume each year. As set in the 2014 EEG before, the share of renewables is targeted to rise to 40-45 percent by 2025, to 55-60 percent by 2035 and to a minimum of 80 percent by 2050.

A “deployment corridor” has been established, specifying how much renewables capacity may be built per year. Payments to renewables installations would henceforth be determined in a competitive process (auctions), instead of being fixed by the government (feed-in tariffs). Only those renewables installations that have won a tender will receive payments for the power they supply. Hence only a desired amount of renewable energy will be added every year. Small renewables installations of under 750 kilowatt (kW) capacity (in the case of biomass under 150 kW) would however be kept out of the tender system and continue to receive feed-in tariffs (with small changes). This measure has been undertaken to ‘ensure that citizen cooperatives and small project developers remain active in operating small renewables plants’. This round of legislation is being overseen by a CDU/CSU/SPD grand coalition government.

Institutional Set up for Electricity

Centre

At the Federal level the most important actors are the Federal Ministry of Economics & Technologies (BMW_i) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The BMW_i is responsible for the reliable supply of energy, energy efficiency and the energy grid. The Federal Ministry for Environment and Nuclear Safety (BMU) is responsible for renewable energies (apart from bioenergy), environmental protection and nuclear safety.

States

The Federal Republic of Germany comprises 16 federal states. While all states broadly agree on issues of climate change and the need for energy transition, their individual contribution varies widely. The key laws relating to the energy transition are made at the Federal level including the Renewable Energy Act, transmission grid planning, and power market design and efficiency rules. States can influence the extent of greening, based on their jurisdiction over land use planning, regulation of construction, permitting procedures and state support schemes. Since the states are responsible for execution of Federal laws, to that extent they can influence energy transition. The states also decide their own renewable obligations and sites for renewable projects.

Since all the state governments are also represented in the Bundesrat (the second or upper parliamentary chamber), they also have a say on the federal bills passed. Many states have their own energy transition targets and even their own climate protection laws. The renewable energy targets vary widely. Some states have fixed targets as a proportion of final energy consumption, some as proportion of power consumption, some as proportion of primary energy consumption. Some others have targets specifically for power and heat supply. Bavaria, one of the leading states has 50% renewables in power consumption by 2021; 21% renewables in final energy consumption by 2021. Another state Baden-Württemberg is aiming at 78% renewables in final energy consumption by 2050. At the other end of the spectrum Berlin has not fixed any renewable energy target.

Table 9 gives the renewable energy targets set by different states in Germany

Table 9 Renewable energy targets set by different states in Germany

	Renewables target
Baden-Württemberg	78% renewables in final energy consumption by 2050
Bavaria	50% renewables in power consumption by 2021; 21% renewables in final energy consumption by 2021
Berlin	None
Brandenburg	32% renewables in primary energy consumption by 2030
Bremen	100% renewables in power and heat supply by 2050
Hamburg	Wind power: 225-340 GWh per year by 2020
Hesse	100% renewables in final energy consumption (without transport) by 2050
Mecklenburg-Vorpommern	Increase use of renewables in power usage 5.6 times and in heating by 4.8 times (2011) updated concept 2015
Lower Saxony	25% renewables in final energy consumption by 2020 – in the long term 100% renewables
North-Rhine Westphalia	30% renewables in power consumption by 2025
Rhineland-Palatinate	100% renewables in power consumption by 2030
Saarland	20% renewables in power consumption by 2020
Saxony	28% renewables in power consumption by 2022/23
Saxony-Anhalt	26% renewables in primary energy consumption by 2030
Schleswig-Holstein	300% renewables in gross power consumption by 2025; fossil fuel free heating sector by 2050; 22% renewables in heating supply by 2025
Thuringia	45% renewables in net power consumption by 2020; 30% renewables in final energy consumption by 2020. New energy strategy pending

Source: EnergyWire

Most of the northern states are in favour of fast renewable development, particularly of onshore and offshore wind. Since the state in the north are less populated and less industrialised, they see the energy transition as a means to establish wind industry and sell power to the more industrialised southern states. Southern states, on the other hand, are keener on solar and biogas and not keen on absorbing power from the north. They are also

critical of new power line connections. Overall states see renewable as a ‘boom’ that has benefited both individual households as well as Municipal budgets through taxes collected from wind farms and cooperatives.

There are differences between the states on the treatment of fossil fuel based power generation. States with significant coal mining have resisted renewable to protect their local economy while others have pushed for renewables.

Local Level

Municipalities constitute an important level as besides land use planning, building codes, heating and warm water supply, some Municipalities also own public utilities companies. Many of these Municipalities have targets to reach 100% renewable energy consumption in the near future. In Munich, for instance, the Stadt-werke, now a private company owned by the city of Munich, charges a premium of 1.5 cent/kWh for electricity from renewable sources, which is transferred to a special fund and used for setting up PV installations. In Heidelberg, a fund for renewable energy has also been created. Here, the surcharge is 4.6 cent/kWh and the funds are invested in the expansion and distribution of renewable energy.

Governing the Energy Transition

“Good governance is sometimes referred to as “an effective, efficient, and reliable set of legitimate institutions and actors engaged in a process of dealing with a matter of public concern” (Anheier 2013: 13)”. The Energiewende in Germany comprises diverse political levels and jurisdictions as well as various interest groups, cooperatives and alliances (Hertie School). Actors are involved at the level of the European Union, Federal, state and local Government.

There are varied stakeholders in the renewable arena including political parties, renewable generators, existing conventional power generators, transmission and distribution companies, NGOs and civil society. All these different players try to ‘set agenda for energy policy, lobby at legislative veto points and constrain the implementation of policies’. Stakeholders use large scale media campaigns, studies, critical expert statements, and others to highlight their own concerns.

In the subsequent section, based on review of literature, the study examines the role played by different stakeholders in influencing the German Energy Transition.

Political Parties

Table 10 Political Parties in Germany

Party family affiliation	Abbreviation	Party name	Ideological orientation	Energy policy tradition
Conservative	CDU	Christian Democratic Union (Christlich Demokratische Union)	Inter-denominational, Christian center-right party	pro-nuclear, moderate climate protection

Party family affiliation	Abbreviation	Party name	Ideological orientation	Energy policy tradition
--	CSU	Christian Social Union in Bavaria (Christlich-Soziale Union in Bayern)	Bavarian conservative, social party	pro-nuclear, prohydropower, moderate climate protection
Center-Left / Social democratic	SPD	Social Democratic Party (Sozialdemokratische Partei Deutschlands)	Center-left	anti-nuclear, pro coal, moderate climate protection
Greens	Grüne	Alliance 90/ The Greens (Bundnis 90/ Die Grünen)	Ecological, peace oriented, champion of women's rights and New Social Movements	anti-nuclear, pro renewables, ambitious climate protection
Liberal	FDP	Free Democratic Party (Freie Demokratische Partei)	Liberal; free markets and civil rights	pro nuclear, pro coal, low climate protection
Left	Linke(former PDS)	Left Party (Die Linke) (former Partei des Demokratischen Sozialismus)	Socialist party; defender of the welfare status quo and representative of East German interests	anti-nuclear, divided on coal, ambitious climate protection

Source: Schulze & Jochem, 2006, pp. 663-664

The German party system consists of two major political parties - the centre right conservative Christian Democratic Union (CDU), with its sister party, the Christian Social Union (CSU) also known as CDU/CSU or the Union and the centre left Social Democratic Party of Germany (SPD). The other smaller parties which often become coalition partners for the bigger parties are the liberal Free Democratic Party (FDP) and the Greens. There is also the Left Party (formerly: PDS) which emerged after 1990 with the German reunification, with its main constituency in the new East-German states. Table 10 lists the main political parties in Germany along with their ideological stand and views on energy transition.

With regard to energy and climate policy, all parties have committed to climate protection and renewable energies, yet with different levels of priority and favouring different instruments. CDU/CSU and FDP traditionally prioritize economic goals over environmental protection, whereas SPD and Left Party take a medium position, and the Greens committed the strongest to environmental goals (Schmidt, 2007).

The Social Democratic - Liberal (before 1982) and the Conservative -Liberal governments (1982-1998) have traditionally supported coal and nuclear. During the oil crisis, the government incentivised utilities to use domestic hard coal. This incentive was paid out of a government fund financed by a surcharge on electricity supplied to consumers. This

surcharge varied between 3.24% of the price in 1975-76 and 8.5% in 1989.

Local environment groups joined together to form the National Green Party in the mid 1980's. They picked up environmental issues such as the acid rains/chemical spills in the Rhine River and the Chernobyl disaster. The latter led to a major rethinking in Germany on its proclivity to nuclear. Soon after, Chancellor Kohl declared that the climate issue represented the most important environmental problem. A study was commissioned, where both the ruling and opposition parties agreed that energy use had to change profoundly.

It was in this background that the Electricity Feed in Law (StrEG), 1991 was introduced by the CDU/CSU/FDP coalition. The law was in fact adopted in an all-party consensus. Though the Law had limited success, mostly for small hydroelectric stations, it managed to build a consensus in Germany on renewable energy and against nuclear energy.

The Green Party came into power at the national level in a coalition with the Social Democratic Party in 1998. The Red-Green party's major objective was to phase out nuclear power in Germany by 2020. Legislation mandating this phase out was adopted in April 2002. This nuclear phase-out along with the need to meet emission reductions target under the Kyoto Protocol, left Germany with no other choice but to adopt renewable in a big way.

The Red Green Coalition government of 1998 brought policies and legislation promoting the growth of renewable energy. The 1999 Ecological tax reform initially increased the taxes on motor fuels, fuel oils and natural gas, and also levied an electricity tax across all sectors. This coalition passed the Renewable Energy Act (EEG) in 2000 and struck a compromise with the big four generation utilities in the same year to shut down Germany's nuclear reactor sites gradually over a period of thirty years.

Coal miners and other organised labour groups have historically had a large influence on Germany's Social Democratic Party. This party and its supporters strongly opposed the proposed amendment to the Renewable Energy Law in 2003, which aimed to double RE share to 12.5% by 2010. It was only when it was agreed that a federal subsidy of 17 billion Euro would be made available to the hard coal industry between 2006-2012 that the amendment went through. The SPD coalition partner, the Green Party, agreed to higher subsidies in exchange for sharp reduction in German coal production and mine closure over the period 2006-2012. There were protracted negotiations between the (Green led) Environment and the (SPD led) Economic Ministries over the impact of RE costs on the competitiveness of industry. Policy makers agreed that both large and medium size companies would be exempted from energy taxes used to subsidise renewable generated electricity. Federal subsidies for wind and solar power were also reduced under heavy pressure in 2003.

Supports of Conventional Energy

The big four energy producers (E.ON, RWE, EnBW and Vattenfall), the transmission system operators, the energy intensive industries, as well as their aligned organizations are in favour of maintaining the status quo.

The big four energy producers own 80% of total conventional power generation capacity. Their market share in electricity supply to final customers has considerably declined from 53.9% in 2003 to 44.0% in 2010. The residual part is owned by local municipalities, industrial companies, railways or financial investors.

The conventional electricity companies collectively bargain through their Associations. All electricity companies are part of the Federation of German Energy and Water Industry. Municipal utilities are organized in the Association of Local Utilities representing over 1,400 companies from the sectors energy, water, sewage and waste. The large commercial energy consumers are organized in the Association of the Energy and Power Industry which foremost pushes for low energy prices.

The industry is collectively represented by the Federation of German Industry. This Association is considered to have vital influence on political decision-making. It mainly lobbies for keeping electricity prices low to ensure competitiveness of industries. It therefore is more inclined towards conventional fuels and nuclear.

For long, the big four power producers have not considered investing in RE as they see the largely decentralised nature of RE as a possible end of their naturalist monopoly. The shut-down in 2011 of Germany's 17 nuclear power plants and the planned shutdown of the rest by 2022 has significantly reduced the generation capacity of utilities.

These big four companies have in the past complaint against the mandate to purchase RE at fixed prices. They contest that fixed prices, preferential grid access to RE and guaranteed payments leave little incentive for RE producers to reduce costs. They have instead argued for quota system for promoting RE. They claim the need for conventional power to maintain a secure and steady power supply and to keep energy costs low for consumers, specially for the energy intensive industry. They favour a European Market to ensure cost effectiveness rather than decentralised generation.

These producers went with a complaint unsuccessfully to the European Court, where they argued that Germany's EEG provision violates EU legislation regarding government assistance to domestic industries. The big energy groups reportedly have excellent access to the highest levels of politics and are therefore able to assert their interests. Gradually the companies are reinventing themselves and getting into the renewable space, in energy management, etc

The grid operators who also account for almost 90% of total power generation capacity reportedly use their dominance to block access to the grid for other power generators. Similarly, energy intensive industries highlight the volatility and costs of renewables resulting in the loss of competitiveness for the German industry. The Conventional energy coalition is also supported by the proponents of NIMBY initiatives, particularly for wind farms.

The utilities have also supported status quo and the Ministry of Economic Affairs has been their chief ally (Jacobsson & Lauber). The Ministry, in the initial phases, asked utilities to buy renewable energy produced in their area of supply at avoided costs. This has little impact on RE purchase. The Ministry was of the view that energy technologies had to prove themselves in the market and that it was not prepared to subsidise technologies that were not mature (Jacobsson & Lauber). The Ministry of Nuclear Affairs, which was in charge of renewable supported only R&D and some small demonstration projects but focussed more on nuclear.

While overall, citizens have been a strong votary of renewable energy, there are provinces,

where citizens have protested against renewable. There have been ‘not in my backyard’ campaigns, for instance against wind projects due to noise generated and impact on birds. Issues have also been raised regarding the transparency of the siting and permitting processes of new wind plants. There have been protests in the Bavarian region against power lines planned to transport wind power from the North and Baltic Sea to the industrial hubs in the south. Plans for onshore wind turbines have been met with protest in Otterndorf. The first party of anti-wind power activists “Free Horizon”, was established in early 2016. Just like in the south, wind power opponents argue that the turbines are “destroying the cultural landscape”.

As consumers of electricity, citizens are organised into The Federal Consumer Association. The Association generally tries to protect consumers against rising energy bills. While in general, the Association is supportive of ‘renewables as means of democratization, liberalization and market diversification of the energy market’, they have raised concerns on the high feed in tariffs offered and its resultant impact on consumers.

Supporters of Renewable Energy:

Renewable energy developers support their claim by arguing that RE costs will come down in future and that conventional energy does not include cost of externalities. They call for equal support for RE similar to the manner in which coal and nuclear were subsidised by the country earlier. They also emphasise the large positive employment effects of the growing renewable energy industry.

Renewable developers association, environmental research associations and environmental NGOs have also played an important role in pushing renewables. The Institute for Ecology, Freiburg was set up in 1977 and came up with several proposal to support renewable and counter the influence of conventional power producers and the government. Civil Society and environmental NGOs have strongly supported RE. WWF, and Greenpeace, were some of the first advocates of the energy transition(Hertie,2013). In order to support the EEG law, Greenpeace Energy and the German Wind Energy Association (2012) -conducted a study that highlighted the hidden costs of conventional power and the lower costs of renewables if externalities were to be taken into account. Members of German Parliament formed Eurosolar in 1988 for campaigning within the political structure for support of renewables. These members remained independent of political parties.

Renewable energy has found a strong support in German citizens. Citizens perceive, the design of future energy system not just a matter of politics and energy, but a societal problem’. Most of the investments in renewables were made at the local level all over Germany. By end of 2010, private citizens, largely through energy cooperatives, owned 40% of the company’s total of 53 GW installed renewable energy capacity. In addition farmers owned 11% and project developers 14%. Energy companies had a share of only 13.5%, mainly hydro stations. Banks and investment funds owned 11% and commercial companies 9%. Feed in tariffs have been the main attraction for private citizens, particularly in case of rooftop solar.

Environment Associations

Through demonstrations and protests, environmental associations seek to generate media attention and public support for their interests. The national anti-nuclear movement in

Germany is considered as the strongest worldwide, with numerous protest groups spread throughout the country and a close alliance with environmental associations, churches, unions and supportive political parties. Public opinion and media attention provide framework conditions for political competition. In Germany, surveys regularly report continuously high levels of environmental awareness among the population.

Farmers Groups;

Farmers are organised into the German Association of Farmers which enjoys significant political influence through strong ties to CDU/CSU and FDP. Renewable has provided a second mainstay of income for farmers and hence renewable has found support with farmers.

European Union

In March 2007, the EU Council under German presidency approved a new energy policy package, including the seminal “20-20-20 targets” by 2020: 20% renewables in total EU energy consumption, 20% energy efficiency increase and 20% greenhouse gas reduction. The EU Commission issued specific national targets in January 2008, with a target of 18% renewables in Germany by 2020. This also gave further momentum to renewable energy in Germany.

India & Germany: Comparison and Conclusion

Role of Political Parties

Renewable in Germany began as a response to concerns about nuclear power and environmental degradation. The Green Party was a flag bearer for the push for renewables but over time almost all political parties agreed on the need for renewables. In fact to begin with, the Feed in Tariff Law of 1991 was pushed through an all-party consensus. The Green Party gave renewables a firmer ground when it introduced the Renewable Energy Act of 2000. The Conservatives did have a traditional vote bank amongst the labour unions particularly the coal mine workers but gradually even they came around to accepting renewable energy.

In India, it is only very recently that renewable energy has become a matter of debate at the national level. During the years of the Congress led United Progressive Alliance (UPA) at the centre (2004 till 2014, 3 occasions), renewable began as an experiment and gradually some states picked up wind in order to meet captive requirement of their industries. The National Action Plan for Climate Change, 2008 was launched under the UPA, which identified solar power as one of the important Missions to combat climate change. At the time of the most recent elections at the centre in 2014, The Indian National Congress (INC) Party in its election manifesto in 2014 did delve on the need for a greater thrust on renewable. It outlined its plans to ensure accelerated implementation of the JNNSM as well as the new National Mission on Wind Energy. The Bhartiya Janta Party (BJP)'s manifesto identified energy as an important priority and recognised the need for diversified sources of energy. It identified both renewable energy and energy efficiency as priority areas. On coming to power in May 2014, the National Democratic Alliance (NDA), under the leader of Prime Minister Narendra Modi announced an extremely ambitious renewable energy target of 175 GW, with significantly greater focus on solar. This ambitious plan is perhaps driven by the Prime Minister's own experience of successfully pioneering development of solar energy in Gujarat.

Overall, unlike Germany, in India renewable is not seen as an alternate to conventional power but as a supplement to it in order to meet the objectives of energy access and security. While climate change and emissions may be important drivers for the centre, (perhaps under international pressures), states largely see renewable as a 'development' activity. Unlike coal based stations, renewable projects can be set up in less than a year and hence are favoured by political parties nearing elections to showcase 'development'.

Citizens as Producers, as Consumers, as Project Affected

Citizen's influence on the growth of renewable has to be seen in different perspectives. In Germany, more than 40% of renewable projects are owned by citizens and farmers through cooperatives. Renewable energy has translated into a source of second income for farmers securing them from fluctuations in prices of farm product. Germany has also offered generous feed in tariffs for solar rooftop and this has attracted numerous households who

for several years used utility power and sold their own generated power to the grid at a premium. As consumers of renewable citizens in Germany have had concerns as the additional charge on account of renewables, referred to as the EEG charge is paid by them. This charge has grown significantly in the last few years. Since renewable energy is concentrated in a few regions, citizen groups have raised concerns on some adverse impact of renewable plants, in the form of noise, and impact on the scenery, etc. The more serious adverse impacts are already taken care of through the provision of mandatory environmental and social impact assessment of renewable projects.

In India, there is negligible participation of consumers in renewable energy production, barring few instances where solar rooftops have been set up. Unlike Germany, most states in India are primarily promoting solar rooftop for self-consumption given the grid integration issues and possible financial losses for utilities. As consumers of renewable energy, there is very little awareness or demand for 'green power' by citizens. Affordability and access are more important. Environmental concerns about renewable projects are very rare. Renewable projects are exempt from EIA and SIAs in India. Some think-tanks have recently demanded their introduction to RE projects.

Industry as Consumers of Electricity, as Producers of Electricity (Conventional and non-Conventional)

Industrial consumers in Germany have mostly been exempt from paying for the EEG surcharge on account of renewable energy. In the past they have been against renewable energy for reasons that it may impact their competitiveness in the international market. In India, industrial consumers already pay higher tariffs, as they are made to cross-subsidise domestic consumers. They are interested to an extent in renewable to avoid power shortages and since solar power is reaching grid parity.

The big conventional power producers in Germany opposed renewable energy and for long did not themselves venture into this business. Since the electricity suppliers are separate from the producers of electricity, they did not side with any particular source. In India, the unbundled generation companies have traditionally focussed on coal and in some cases hydro. They too have not ventured into renewable, which has been primarily developed by private players. Supply is still not separated from distribution in India and there still is no competition in distribution (barring some instances in Mumbai). The Distribution companies, historically, were one with the generation company (as state electricity board), hence mostly they are in favour of the large conventional state generation companies. These distribution companies are most apprehensive of renewable energy given its novelty, intermittency and impact on grid and prices. The public electricity generation companies have historically resisted going in for renewable energy. Interestingly the private distribution companies do see business proposition in solar and are keen to establish their own systems on roofs of consumers (such as Tata Power Delhi Distribution Company).

Legal and Regulatory Environment for Renewable Energy

Germany pushed renewable energy through a separate law, first the feed in law and then the EEG. The must run status, preferential access and guaranteed remuneration were ensured by this law. The 2004 RES set renewable energy targets giving both investors and developers a sense of the future renewable market in the country. The Renewable Energy Sources Act, 2009 provided compensation to developers if they were asked to back down during periods of grid congestion. In India, some aspects for promoting and managing renewable have been integrated with the Electricity Act, 2003 and its subsequent amendments. Other provisions are promoted through policies like Tariff Policy, Electricity Policy and Integrated Energy Policy. These policies are however not binding on states. In Tamil Nadu for instance, developers had approached SERC for compensation for losses when they were asked to back down renewable due to grid congestion. The SERC however clarified that there was no legal provision for this. The proposed Renewable Energy Act that was recently circulated by MNRE attempted to provide stronger guarantees for payment and compensation to developers through its backing by law. Renewable energy targets have varied from state to state in India and only in 2014 the central government has set overall renewable targets.

In Germany, the EEG introduced an annual gradual reduction (“degression”) of tariffs for new installations put into operation after a certain cutoff date, in order to exert cost-pressure on manufacturers and hence encourage technological innovation and cost reductions. Degression rates differed: 1% for biomass, 1.5% for wind and 5% for PV. This degression rates, spelt upfront, gave a direction to investors for their upcoming projects. In India, Regulators fix feed in tariffs based on estimation of costs and a reasonable profit. Tariffs are revised time to time, which are applicable for new projects. There is however no clear indications on how tariffs would move in the future. Tariffs are also not revised on a regular basis. If PPAs are signed after the project has come up, it becomes difficult for developers to predict the tariff they will receive and this makes investment decisions uncertain.

Germany has faced issues in multi-level coordination issues as renewable energy projects are impacted by decisions made by European Union, Federal Government, State Governments and Local Governments. Similar issues will arise in India as renewable energy generation picks up. The draft Renewable Act amongst other things, tried to clarify the roles and responsibilities of centre and state governments. However the draft Act was heavily loaded in favour of the centre and hence perhaps has not progressed any further.

As India, has been a relatively late player to join the renewable energy programme and therefore is in a position to learn from Germany’s extensive experience. The impact of this massive scale of RE on the German economy is of special relevance. Prices of RE technologies have come down significantly in the last decade to the benefit of India. The policy decision to opt for auctions in solar and now wind seems like India’s way of learning from Germany’s experience and moving forward.

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Annexure

A1: Stakeholders interviewed in Gujarat (20-24th November, 2016)

Name	Designation	Organization
Ketan Limbachiya	Senior Executive-Projects	Solgen solar pvt Ltd
K J Shah	CMD	Zodiac energy pvt ltd
	VP (Gujarat chapter)	National Solar Energy Federation of India (NSEFI)
Priyam Patel	Technical Executive	Sanelite solar pvt ltd
Sachin Shah	MD	Star Renewables pvt ltd
	Member	National Solar Energy Federation of India (NSEFI)
J Pandhya	Manager (Operations)	Wagh Bakri Tea Group (Commercial consumer)
C Kansara	Technical Executive	Shivam Photovoltaics
Mr Trivedi	D.E. (Sabarmati-Net metering)	UGVCL
Mr. Harish	Technical Manager (RSPV)	Torrent Power

A2: Stakeholders interviewed Andhra Pradesh (15-17th November 2016)

Name	Designation	Organization
Balaji	Manager-Projects	Ecoren Energy India Pvt Ltd
Sailendra. V	Project Coordinator	Indian Wind Power Association
Ravi Kumar	President	Axis Wind Energy Ltd
A. Gurunathan	Dy. General Manager (Regulatory affairs)	Gamesa
Dr. V. Bapeshwar Rao	President (India Business)	Suzlon
D.V. Giri	Secretary General	Indian Wind Turbine Manufacturer Association
A.G. Rangaraj	Deputy Director (Technical)	National Institute of Wind Energy

Padmanabhan Joshi	GM – Project & Business Development	Leap Green Energy Private Ltd.
P.V. Ramesh	Project Director	New & Renewable Energy Devp. Corp. of A.P. Ltd