Chapter 8

Conclusion

The purpose of this chapter is to present a summary of the research in terms of outcomes and overall contributions. Wind power sector in India as a sub set of the Indian energy sector is characterised by rapid growth, favourable institutional ecosystem that has led to demand creation and agencies having international interlinkages. Collaboration and interlinkages between firm and non firm actors has provided dynamism to the sector affecting its knowledge base and learning.

This research addressed the lack of an all-encompassing and exhaustive perspective of SSI in the wind power sector, one of the most promising RET.

The study focuses on an often ignored developing country context as compared to the more common developed country contexts. Unlike developed countries where the growth of RETs is driven more by environmental concerns and domestic regulations, in developing countries like India acute power shortage, exploitation of scant resources and broad basing of energy profile have played a major role.

Wind power technological regime in a developing country is quite different than that of any developed country. Thesis supports this view as research findings point out that the major factors determining the adoption of wind power are the acute power shortage and financial incentives rather than environmental concern. Thesis supports the Malerba & Orsenigo (1997) that every sectors characteristic is dependent on the agencies and institutions which by their interaction, learning and knowledge accumulation give a unique identity to a particular sector.

Different technological regimes are shaped by the institutions that are at the core of the innovation process. Institutions have a profound role in the adoption of any technology. Policy measures in the sector have precisely addressed the issue of higher capital cost by giving fiscal incentives in the early stages of the wind power development. Fiscal incentives in the form of accelerated depreciation created demand that resulted in the rapid deployment of the wind power. Electricity Act 2003 created an innovative ecosystem that provided the sector a definite growth path.
Regulatory body’s role is most overarching in the sectoral dynamics. As creation of different institutional paradigms, their role has changed significantly in the sector. In the initial phase of “technology push” they decided about the choice of technology and provisioned imported technology. Their role in later phase changed to that of facilitator and regulator. They created new appropriation conditions which were used by the firms to innovate and fulfil the demand. Emergence of regulatory bodies can be attributed to the changes in institutions. In a developing country, that has witnessed transformation of its economy in last two decades this has been particularly prominent.

A country with federal polity, the policy coherence at both the state and union level has importance for the stable development of the sector. In India this has been the case and wherever segmentation in development can be seen is due to differences in resource base or investment climate. Concentration of wind power in a few states such as Tamil Nadu, Karnataka, Maharashtra, Gujarat, Andhra Pradesh, and Rajasthan can be attributed to the availability of wind resource base and proactive policies of the respective governments.

Market based approaches in the diffusion of RETs have also contributed to the growth of wind power. Project based mechanisms such as CDM although have a small share in the total installed wind power but they are novel in terms of financing of wind power and stringent regulation related to production. CDM’s claim of transfer of clean technology is not found in the study as international participation in the projects is minimal. Majority of the projects are found to be of small scale with low technological intensity.

Markets in Renewable Energy Certificate are an upcoming area that is created to indirectly promote inter-State transaction of renewable energy. Analysis of the trade data reveals that market is still in nascent stage. Enforcement of RPOs will be key to the success of the REC mechanism. Very few independent power producers in the wind power sector is the major reason, as most of the wind farms have tie ups with utilities for power evacuation.

International organisations, firms and multilateral bodies have been important actors in the wind power sector. As a source of technology, finance and skills they have contributed in many ways to the wind power sector. Multilateral bodies with
their finances have remained an important source of capital needed to establish wind power generation. In the post reform period by way of technology licensing and formation of joint ventures with Indian firms they seeded innovative dynamism in the wind power sector. Role of venture capital and technology incubators have also emerged recently.

Emergence of IPPs has led to the new modes of financing such as project based financing that are much conducive for the independent growth of wind power than earlier practised balance sheet financing.

Wind power sector in India is also characterised by the presence of few large firms that have a dominant share in the in number of WTG machines and installed capacity. Private firms have been dominant in the wind power sector expect few demonstration wind farms established by the government in the 1980’s. With major share two firms Suzlon Energy Ltd. and Enercon India Ltd. have a combined market share of more than 75 % in the total installed capacity. These are the players that have of the share of 43% and 6% in patents granted by the national patent authority in the wind power generation technologies. Enercon’s large knowledge base and technological capability with low market share of only 23% could be explained by the organisation and management innovation by the rival firm Suzlon. Suzlon has adopted a wind-farm approach for the project development and provides integrated solution for the entire value chain of wind power generation. Enercon has the unique advantage of its patented technology with it, it is a world leader in gearless WTG machines that have proven advantage over other WTGs. Despite low overall market share, Enercon also holds a 50% market share in the IPP segment that looks for advanced technology rather than other ancillary benefits and facilitations. Other firms have a limited market penetration despite high appropriability made available by demand creation. A very high appropriation opportunity in the wind power sector due to changed institutional regime has led to the domestic engineering firms to enter in the wind power sector. These firms have gained access to technology mostly through technology licensing from foreign firms. They have a limited role in the sector.

In a sector the size of the firm is also determinant of its dominant market position. Two firms Suzlon and Enercon have total number of personnel employed as 14000
and 5800 with sales turnover of 6870 cr. and 3504 cr. respectively in the year 2011-12, where as other firms not employ more than 2500 personnel. The sector thus exhibits typical Schumpeter Mark II characteristics, i.e. “creative accumulation” with the prevalence of a stable core of few large firms and the presence of relevant barriers to entry for new innovators. A technological (learning) regimes characterized by high appropriability and high cumulativeness (at the firm level) conditions and a generic knowledge base has led to a Schumpeter Mark II pattern.

Another finding of the research is the actors in the sector have developed a unique business model in which wind turbine manufactures themselves develop project, take all project clearances and then sell the individual wind turbines to potential investors. This has been the case in majority of the wind power projects except a few independent power producers. Such organisational innovation has resulted in WTG manufacturers playing a key role in terms of selection of site and choice of technology. Wind power sector in India can thus be categorised as a “supplier dominated sector” in terms of the categorisation developed by Pavitt (1984). In such sectors the new technology is embodied in new components and equipment and new technology is learnt by doing and using. WTG technology has undergone a lot of advancement in past few decades and the actors in the sector have used various inter-linkages and collaboration to gain advanced know-how.

In a SIS, technological base plays an important role in the innovation and production. A typical knowledge domain of wind power sector includes comprehensive assessment of wind resource base, availability of appropriate wind turbine manufacturing base and readiness of the grid for power evacuation. Each domain requires effort at different levels with different capabilities.

Two public funded institutes NAL and CWET are the dominant actors in the wind power sector. NAL’s presence can be attributed to its technology spin-offs from its primary research area in aerospace where latter have a clear mandate for the research in wind power sector. CWET is mainly in the testing, certification and sponsored study for wind resource assessment and has limited contribution in the basic technology in the wind power area. It has no patents and insignificant academic papers. CWET has acquired more of a role of regulator rather than a
purely R&D institute. It certifies the new WTGs for installation in India for the MNRE and publishes RLMM (Revised list of Manufactures and Models) list biannually. Its certification process is different and respondents complained of them inconsistent with international best practice of IEC codes and GL numbers for WTGs.

R&D in the wind power is mainly done by private sector firms, that too in other countries. Few domestically grown companies like RRB Energy and NEPC Ltd. report domestic R&D but they have a long presence in the wind power sector and are in less than 500KW WTG category. Firms such as Suzlon have acquired R&D facility abroad. Vestas, a multinational enterprise has a R&D lab in Chennai. Most the domestic firms have little leaning and innovation capability as can be seen from any new model of WTG introduced by them outside their foreign alliance.

To analyse the knowledge and innovation in the wind power SIS, different measures of innovation such as design and innovations in tower, rotor blades and wind turbine generators by different firms were analysed in detail in the thesis. Foreign firms with accumulated knowledge and technology are the leaders in introducing novel and patented technology. Domestic firms have gained technology mostly through licensing route. Pitch system and WTG sets are the two most knowledge intensive domains of wind power technological system. In these respective domains also, select foreign firms have technologies that are far ahead of their domestic competitors. As evident on the global scale, in India also Enercon, Vestas have WTG sets that are technological superior than other firms with novel design and next generation technologies.

Over a period of time WTG machines regardless of their manufacturer being domestic or foreign firm have become more efficient with higher available time per WTG. Technological learning has taken place as evident from the installation and corresponding production data.

In most of the Sectoral Systems of Innovation universities have played a key role in basic research and human capital formation, and in some sectors (such as biotechnology and software) they have also been a source of start-ups, and even innovation. In wind power sector in India apart from their contribution by way of human capital formation, they are nonexistent in patenting landscape. University-
Industry linkage is also not found in the sector. NAL, a premier institute of CSIR is the only public funded R&D institute that has contributed to the knowledge production by patents, transfer of technology and collaborative R&D in WTG.

Thesis has used the innovation output research to ascertain the technological base of the sector. Patenting activity is analysed in the sector and theoretical S curve fits to the observed patenting activity in the wind power sector. It also explains effectively the various phases of patenting activity. But the underlying reasons for the observed pattern such as domestic technological development over a period of time might not be fully captured in the theoretical model. Indian wind power sector presents a typical case of few dominant firms, imported technology and weak domestic R&D base as far as “basic” wind power technology is concerned. Role of institutions is overarching in the sector and the given patenting trend can be explained only by taking these factors in account.

Offshore wind power development and improvements in the industrial value chain of the wind power SIS are the dynamic developments in the wind energy SIS. These endeavors have changed the boundaries of wind energy SIS and provided new dynamism and appropriability conditions.

Suppliers and users also affect the boundaries of sectoral systems, by greatly affecting sectoral linkages and interdependencies. Demand, as composed by users and by consumers, has often resulted in the redefinition of the boundaries. Indian wind power sector’s knowledge base and inter linkages have also transformed in its evolution. As a sector with concentration of knowledge in few firms and geographical regions its boundaries have although remained more or less same.

A vast range of factors internal and external to firms were considered that influence firm-oriented innovation as a result of their interplay. Entering into collaborative projects with foreign firms is yet another strategy for Indian companies to set the stage for innovation by gaining access to valuable skills, expertise and proprietary technology. Development of products and technologies is often mediated through joint ventures between Indian and foreign organizations.

Foreign firms interested in tapping into the large Indian market are partnering with local firms for their distribution networks and knowledge of the local regulatory
landscape and legal system. It is found that the majority of alliances in the wind power sector are not vertical. Collaboration does not unite the efforts of two firms and they remain engaged in relatively distinct sets of activities along the value chain in the wind power.

Public private partnership has lately emerged as a preferred mode of research in the sector. The New Millennium Indian Technology Leadership Initiative program has resulted in bringing together private firms, national R&D laboratories and academia to develop products of national relevance.

Role of external agencies is found to be profound in each sphere of the wind power Sectoral Systems of Innovation resulting in a characteristics SSI of wind power in India. Sectoral knowledge base, learning and inter-linkages are affected by the external actors more than the domestic actors.

By a thorough analysis this thesis offers a powerful explanation of the complex interplay of SSI elements (sectoral structure) in context of a developing country. Further research can be taken to explore the cross country differences, particularly in the case of emerging Asian economies. Research is also required in other renewable energy technologies using SIS framework in the context of India which has ambitious targets with regard to RETs. A detailed analysis is required for other RETs particularly solar energy that is an emerging technological regime.

By integrating the conceptual and theoretical aspects of System of Innovation (SI) particularly its variant Sectoral System Of Innovation (SSI) with empirical evidence, this research not only enhances understanding of SSI beyond a mere conceptual approach but also provided new perspectives to the approach. An all-inclusive analysis of wind power sector with the emphasis on the knowledge base, actors, institutions and their inter-linkages resulting in dynamism of the sector has given new insights that are no doubt, relevant in policy design and implementation.
Annexure 1

International Patent Classification (2011.01): Subclass F03D

Wind motors

In this subclass, the following terms or expressions are used with the meanings indicated:

- "wind motor" means a mechanism for converting the energy of natural wind into useful mechanical power, and the transmission of such power to its point of use;
- "rotor" means the wind-engaging parts of the wind motor and the rotary member carrying them;
- "rotation axis" means the axis of rotation of the rotor.

F03D 1/*

<table>
<thead>
<tr>
<th>00</th>
<th>Wind motors with rotation axis substantially in wind direction (controlling F03D 7/00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>having a plurality of rotors</td>
</tr>
<tr>
<td>04</td>
<td>having stationary wind-guiding means, e.g. with shrouds or channels (F03D 1/02 takes precedence)</td>
</tr>
<tr>
<td>06</td>
<td>Rotors</td>
</tr>
</tbody>
</table>

F03D 3/*

<table>
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<tr>
<th>00</th>
<th>Wind motors with rotation axis substantially at right angle to wind direction (controlling F03D 7/00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>having a plurality of rotors</td>
</tr>
<tr>
<td>04</td>
<td>having stationary wind-guiding means, e.g. with shrouds or channels (F03D 3/02 takes precedence)</td>
</tr>
</tbody>
</table>

F03D 5/*

<table>
<thead>
<tr>
<th>00</th>
<th>Other wind motors (controlling F03D 7/00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>the wind-engaging parts being attached to endless chains or the like</td>
</tr>
<tr>
<td>04</td>
<td>the wind-engaging parts being attached to carriages running on tracks or the like</td>
</tr>
<tr>
<td>06</td>
<td>the wind-engaging parts swinging to-and-fro and not rotating</td>
</tr>
</tbody>
</table>

F03D 7/*

<table>
<thead>
<tr>
<th>00</th>
<th>Controlling wind motors</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>the wind motors having rotation axis substantially in wind direction</td>
</tr>
<tr>
<td>04</td>
<td>Regulation, i.e. controlling automatically</td>
</tr>
<tr>
<td>06</td>
<td>the wind motors having rotation axis substantially at right angle to wind direction</td>
</tr>
</tbody>
</table>
### F03D 9/*
| 00 | Adaptations of wind motors for special use; Combinations of wind motors with apparatus driven thereby (aspects predominantly concerning driven apparatus, see the relevant classes for such apparatus) |
| 02 | the apparatus storing power |

### F03D 11/*
| 00 | Details, component parts, or accessories not provided for in, or of interest apart from, the other groups of this subclass |
| 02 | Transmission of power, e.g. using hollow exhausting blades |
| 04 | Mounting structures |

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**International Patent Classification (2011.01): Subclass B60L**

Propulsion of electrically-propelled vehicles

### B60L 8/*
| 00 | Electric propulsion with power supply from force of nature, e.g. Sun, wind |

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**International Patent Classification (2011.01): Subclass E04H**

Buildings or like structures for particular purposes; Towers; Masts, poles

### E04H 12/*
| 08 | of metal |
| 12 | of concrete or other stone-like material, with or without internal or external reinforcement, e.g. with metal coverings, with permanent form elements |
| 16 | Prestressed structures |

---

**International Patent Classification (2011.01): Subclass H02K**

Dynamo-electric machines

### H02K1/*
| 18 | Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures |
| 24 | Rotor cores with salient poles |
| 30 | Using intermediate part or parts, e.g. Spider |
Annexure 1

H02K3/*
28  Layout of windings or of connections between windings (windings for pole-changing)
30  Windings characterised by the insulating material

H02K16/*
04  Machines with one rotor and two stators

International Patent Classification (2011.01): Subclass H02J

Circuit arrangements or systems for supplying or distributing electric
Ac or dc mains or distribution networks;
Circuit arrangements for battery supplies, including charging or control thereof, or co-ordinated supply
Systems for supplying or distributing electric power by electromagnetic waves.

H02J 1/*
16  Using dynamo-electric machines coupled to flywheels

H02J 3/*
18  Arrangements for adjusting, eliminating, or compensating reactive power in networks
38  Arrangements for parallelly feeding a single network by two or more generators, converters, or transformers

H02J 7/*
32  for charging batteries from a charging set comprising a non-electric prime mover

H02J 13/*
00  Circuit arrangements for providing remote indication of network conditions

International Patent Classification (2011.01): Subclass H02P

Control or regulation of electric motors, generators, or dynamo

H02P9/*
04  Control effected upon non-electric prime mover and dependent upon electric output value of the generator
14  by variation of field
30  using semiconductor devices
H02P 25/*

| 08 | Reluctance motors |
| 18 | with arrangements for switching the windings, e.g. with mechanical switches or relays |

International Patent Classification (2011.01): Subclass F16H

Combinations including mechanical gearings

F16H 1/*

| 28 | with gears having orbital motion |

F16H 57/*

| 04 | (control of lubrication or cooling in hydrostatic gearing |

F16H41/*

| 26 | Shape of runner blades or channels with respect to function |

International Patent Classification (2011.01): Subclass B29C

Shaping or joining of plastics; shaping of substances in a plastic state

B29C70/*

| 70 | Completely encapsulating inserts |

Keywords: wind* turbin*
Which of the following best describes your area of work?

- Government
- Public enterprise
- Academic or research
- Media
- Other (specify) __________
- Institution
- Private enterprise
- International organisation
- Not-for-profit organisation

1. What motivates a company to start a CDM project?

   - [ ] Growth in bottom line of the company
   - [ ] Persuaded by a CDM consultant
   - [ ] Approached by a foreign firm
   - [ ] Image building as an environmentally committed company

2. Did your firm have had the clean technology in absence of CDM Revenue?

   - [ ] Yes
   - [ ] No
   - [ ] Don’t Know

3. Are the prospective CER’s main drivers for starting a CDM project?

   - [ ] Absolutely agree
   - [ ] Strongly agree
   - [ ] Slightly agree
   - [ ] Agree
   - [ ] Don’t agree
4. Do fluctuations in CER prices affect your decision to start a CDM Project?

   Absolutely agree   strongly agree   slightly agree   Agree   Don’t agree
   □                  □                  □                 □                 □

5. How far do you rate the risk involved in starting a CDM project?

   Very high   Quite high   somewhat high   slightly high   No risk
   □               □               □                  □                  □

6. Is CDM able to lower the adoption risk of clean technologies?

   Absolutely agree   strongly agree   slightly agree   Agree   Don’t agree
   □                  □                  □                 □                 □

7. Do you have external funding for the projects?

   Yes               No                Don’t Know
   □                  □                  □

   Can you give some examples of who those funders are? ______________

8. Did you take any help from a CDM consultant?

   □                  □                  □

   If yes, then name of the Consultant ____________________________

9. Did you set up an in house team to set up a CDM project or outsourced it?

   In house Team   Outsourced   Don’t Know
   □               □                  □

   If set up an in house team then its strength

   <5               5-10             >10
   □               □                  □
10. Are adequate skills being transferred along with the transferred technology?

11. Do you consider involvement of a foreign participant leads to a higher rate of technology transfer?

12. How do you rate the overall technology transfer experience?

13. How do you rate the Host DNA?

14. Do you consider criteria’s for sustainable development are adequate?

15. Is transaction cost a major barrier in small scale projects?

16. Do you consider CDM will help in boosting renewable energy production?
18. Does lack of prompt and clear guidance on the CDM regulations beyond 2012 affect decision making on financing of CDM projects?

YES ☐ NO ☐

19. Which amongst the following do you think are the major impediments for institutions participation in CDM project related activities?

- Long project cycle ☐
- Complex CDM procedures ☐
- Lack of clarity on the legal ownership of the CERs ☐
- Difficulty in understanding the ‘additionality’ argument ☐

Any other (please specify): _________________________

20. What do you consider as a major barrier in diffusion of clean technologies?

- High upfront cost ☐ Poor reliability ☐
- Lack of finance ☐ High running and maintenance cost ☐
- Lack of operational know-how ☐ Lack of awareness and exposure ☐

Domestic IPR and Patent Regime ☐
Further contact:

If you have found this issue interesting or useful and would be willing to be interviewed for this research that would also be very supportive. Please tick this box and leave your contact details below

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

Contact Details: ______________________________
Tel. no.               ______________________________

Many thanks,

Manish K. Singh

Email: mks_1857@yahoo.com
Tel: +91 (0) 9871 475777
Postal address: CSSP, SSS, JNU, New Delhi-67.

THANK YOU FOR YOUR COOPERATION!
Which of the following best describes your area of work?

- Government
- Public enterprise
- Academic or research
- Media
- Other (specify) __________
- Institution
- Private enterprise
- International organisation
- Not-for-profit organisation

1. What motivates a company to start a Wind Power Project?

   - Growth in bottom line of the company
   - Persuaded by a CDM consultant
   - Approached by a foreign firm
   - Image building as an environmentally committed company

2. Did your firm have had the clean technology in absence of GBI Revenue?

   - Yes
   - No
   - Don’t Know

3. Are the prospective Tax benefits main drivers for starting the project?

   - Absolutely agree
   - strongly agree
   - slightly agree
   - Agree
   - Don’t agree

---

Annexure 3

Questionnaire-2

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223
4. Do financial barriers affect your decision to start a wind power project?

<table>
<thead>
<tr>
<th>Absolutely agree</th>
<th>strongly agree</th>
<th>slightly agree</th>
<th>Agree</th>
<th>Don’t agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

5. How far do you rate the risk involved in starting a wind power project?

<table>
<thead>
<tr>
<th>Very high</th>
<th>Quite high</th>
<th>somewhat high</th>
<th>slightly high</th>
<th>No risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

6. Are Government Incentives lower the adoption risk of clean technologies?

<table>
<thead>
<tr>
<th>Absolutely agree</th>
<th>strongly agree</th>
<th>slightly agree</th>
<th>Agree</th>
<th>Don’t agree</th>
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<td></td>
</tr>
</tbody>
</table>

7. Do you have external funding for the projects?

Yes          No         Don’t Know

Can you give some examples of who those funders are? ______________

8. Did you take any help from a consultant?

<p>| | | |</p>
<table>
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<td></td>
</tr>
</tbody>
</table>

If yes, then name of the Consultant ____________________________

9. Did you set up an in house team to set up the wind power project or outsourced it?

<table>
<thead>
<tr>
<th>In house Team</th>
<th>Outsourced</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If set up an in house team then its strength

<table>
<thead>
<tr>
<th>&lt;5</th>
<th>5-10</th>
<th>&gt;10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. Are adequate skills being transferred along with the transferred technology?

11. Do you consider involvement of a foreign participant leads to a higher rate of technology transfer? (WTG manufacturer)
   Absolutely agree  strongly agree  slightly agree  Agree  Don’t agree

12. How do you rate the overall technology transfer experience?
   Very Satisfied  Quite Satisfied  Somewhat Satisfied  Slightly Satisfied  Not Satisfied

14. Do you consider criteria’s for sustainable development are adequate?
   Absolutely agree  strongly agree  slightly agree  Agree  Don’t agree

15. Is transaction cost a major barrier in small scale projects?
   Absolutely agree  strongly agree  slightly agree  Agree  Don’t agree

16. Do you consider Regulations will help in boosting renewable energy production?
   Absolutely agree  strongly agree  slightly agree  Agree  Don’t agree
20. What do you consider as a major barrier in diffusion of clean technologies?

- High upfront cost
- Poor reliability
- Lack of finance
- High running and maintenance cost
- Lack of operational know-how
- Lack of awareness and exposure
- Domestic IPR and Patent Regime

Further contact:

If you have found this issue interesting or useful and would be willing to be interviewed for this research that would also be very supportive. Please tick this box and leave your contact details below.

YES  NO

Contact Details: ______________________________
Tel. no.               ______________________________

Many thanks,
Manish K. Singh
Email: mks_1857@yahoo.com
Tel: +91 (0) 9871 475777
Postal address: CSSP, SSS, JNU, New Delhi-67.
THANK YOU FOR YOUR COOPERATION!
## Annexure 5

### Policies & Incentives introduced by the state governments for private sector wind power projects

<table>
<thead>
<tr>
<th>S. No.</th>
<th>State</th>
<th>Tariff (Rs./KWh)</th>
<th>Period</th>
<th>RPO</th>
<th>CDM Sharing</th>
<th>Wheeling</th>
<th>Banking</th>
<th>State Nodal Authority</th>
<th>Other Incentives</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>Rs. 3.50</td>
<td>10 years</td>
<td>5%</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>5% of energy wheeled</td>
<td>Not allowed</td>
<td>New and Renewable Energy Development Corpn. of Andhra Pradesh (NRDCAP)</td>
<td>Industrial Status</td>
<td>project to be operational from 1 year to 3 years as per the project capacity from100 MW to 600 MW</td>
</tr>
<tr>
<td>2</td>
<td>Gujarat</td>
<td>Rs. 3.56</td>
<td>25 years</td>
<td>5% in 2011-12 5.5% in 2012-13 for wind</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>4% of energy wheeled</td>
<td>surplus energy at end of month shall be deemed as sold to Utility</td>
<td>Gujarat Energy Development Agency (GEDA)</td>
<td>Electricity duty exempted</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Karnataka</td>
<td>Rs. 3.70</td>
<td>10 years</td>
<td>7 to 10% in diff. DISCOMs for non solar</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>5% of energy wheeled</td>
<td>Permitted @ 2% of energy Input</td>
<td>Karnataka Renewable Energy Development Limited (KREDL).</td>
<td>No Electricity Duty for 5 Years, LOC from Green Energy Fund Facility by the ESCOMS to developer</td>
<td>Local Employment, Panchayat Tax, Stringent CAMPA norms</td>
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<td>4</td>
<td>Madhya Pradesh</td>
<td>Rs. 4.35</td>
<td>25 years</td>
<td>2.1% in 11-12 to 6% in 14-15 for non solar</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>2% of energy wheeled</td>
<td>Permitted</td>
<td>Madhya Pradesh Urja Vikas Nigam Ltd. (MPUVN)</td>
<td>No Electricity Duty for 5 years, Green Energy Fund</td>
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<td>5</td>
<td>Maharashtra</td>
<td>Varying from Rs. 3.58 to Rs. 5.37</td>
<td>13 years</td>
<td>6.75% in 11-12 to 8.5% in 13-14 for non solar</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>2% of energy Wheeled + 5% as T&amp;D Loss</td>
<td>permitted for 12 Months</td>
<td>Maharashtra Energy Development Agency (MEDA)</td>
<td>Power evacuation arrangement, Approach Road, No Electricity Duty, Loan to Cooperative Societies, No Octroi/Entry Tax, Green Energy Fund.</td>
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<td>6</td>
<td>Rajasthan</td>
<td>Rs.4.22 and Rs.4.44</td>
<td>25 years</td>
<td>7.5% in 11-12 for Wind</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>50% of normal charge for 33 KV, transmission charges of 3.6% &amp; surcharge</td>
<td>permitted for Six Months</td>
<td>Rajasthan Renewable Energy Corpn. Ltd. (RRECL)</td>
<td>Exemption from Electricity Duty @50% for 7 years</td>
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<td>7</td>
<td>Tamil Nadu</td>
<td>Rs. 3.39</td>
<td>20 years</td>
<td>9% in 11-12 for non solar</td>
<td>100% to developer to reduce by 10% every year from 2nd year till the share becomes equal</td>
<td>5% of energy wheeled</td>
<td>5% (12 months)</td>
<td>Tamil Nadu Energy Dev. Agency (TEDA),</td>
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<td>8</td>
<td>Kerala</td>
<td>Rs. 3.14</td>
<td>20 years</td>
<td>5 %, Wind 2%</td>
<td>As per KERC</td>
<td>As per KERC</td>
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<td>Agency for Non-conventional Energy and Rural Technology (ANERT)</td>
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<td>9</td>
<td>Orissa</td>
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<td>Orissa Renewable Energy Development Agency (OREDA)</td>
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<td>10</td>
<td>West Bengal</td>
<td>Rs. 4</td>
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<td></td>
<td></td>
<td>7.5% of energy wheeled</td>
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<td>West Bengal Renewable Energy Development Agency (WBREDA),</td>
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