

„CDM – So What?": Analysing Determinants of Private Sector Participation in Renewable Energy Deployment in India

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Abstract

Faced by pressures to increase energy supply as pre-requisite for sustained economic growth and secured social well-being, the Government of India seeks to harness all available energy sources for power generation. By 2012, the Indian Government envisions a 10% contribution of renewable energy sources to power generation of which 7% has been achieved so far (Planning Commission, Government of India 2006). In distinction to the state-dominated conventional power sector, the renewable energy sector constitutes a dedicated private sector undertaking. Furthermore, the Clean Development Mechanism (CDM) of the Kyoto Protocol provides an additional regulatory structure translating into incentives for private investment in renewable energy. This gives rise to the assumption that new regulatory incentives channelled through the CDM become a driver for private sector participation in the renewable energy sector.

Looking at the geographical distribution of renewable energy deployment in India, which is reflected in the location of CDM projects, a bias towards certain Indian states is apparent. Since this spatial disparity cannot easily be explained by the availability of natural resources, questions about determining factors and conditions for private participation in the renewable energy sector arise.

This article aims to look closer at the determinative factors and conditions of private sector participation in renewable energy deployment. As for an empirical background, the wind sector in the states of Tamil Nadu and Kerala is analysed. Approaches from political sciences and (relational) economic geography will guide attempts at explaining determinants and drivers for private sector participation in renewable energy deployment.

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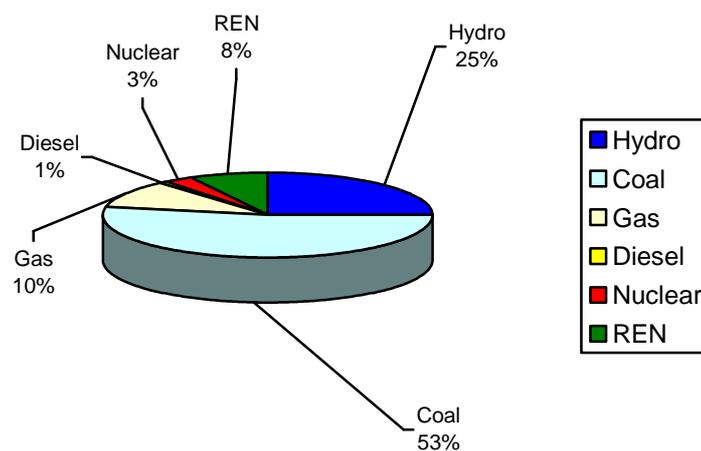
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1. Introduction

Renewable energy constitutes a small but crucial part of many developments and debates: In the context of climate negotiations at the international level, promoting renewable energy to displace fossil fuels is considered one important means of climate change mitigation. At the national level, renewable energy has a role to play in supplementing the energy portfolio in order to secure power generation for present and future growth and to cater to development requirements. Furthermore, renewable energy (REN) as a domestic fuel reduces the dependence on imported non-renewable resources such as fossil fuels. At the local level, renewable energy resources are 'common-pool resources' (Ostrom 2005: 24) that are harnessed in order to ensure stable and sustainable energy supply as part of secure social welfare provision (Benz 2001).

In the Indian context, the above-mentioned rationales led to a re-newed government emphasis on renewable energy deployment. From currently 7.7% contribution to the energy mix (Central Electricity Authority 2008), the 11th Five-Year-Plan (2007-2012) envisages an increase in the installed capacity of renewable energy resources up to 10% until 2012 (Lamb 2004).

Figure I: Indian Power Sector Composition



Source: Government of India; Central Electricity Authority: 31.01.2008

Historically, renewable energy sources have been an important fuel for power generation especially in rural areas through traditional biomass usage. From the 1960s onwards, the Indian Government started to systematically promote renewable energy applications (Ravindranath et. al., 2000). As the only country in the world, India institutionalised a dedicated Ministry for New and Renewable Energy Sources (MNRE) in 1992. The ministry's main objective is to promote renewable energy sources through encouraging private sector involvement and investment. In contrast to power generation in the conventional fuel sectors, to date, the renewable energy sector sees a nearly 95% private sector participation (Planning Commission, Government of India: 2002: 75). Yet the implementation of renewable energy technologies varies widely between different Indian union states which in many cases do not harness their existing potential. Taking the wind sector as an example, this is reflected in the following table:

Table 1: Indian Wind Sector

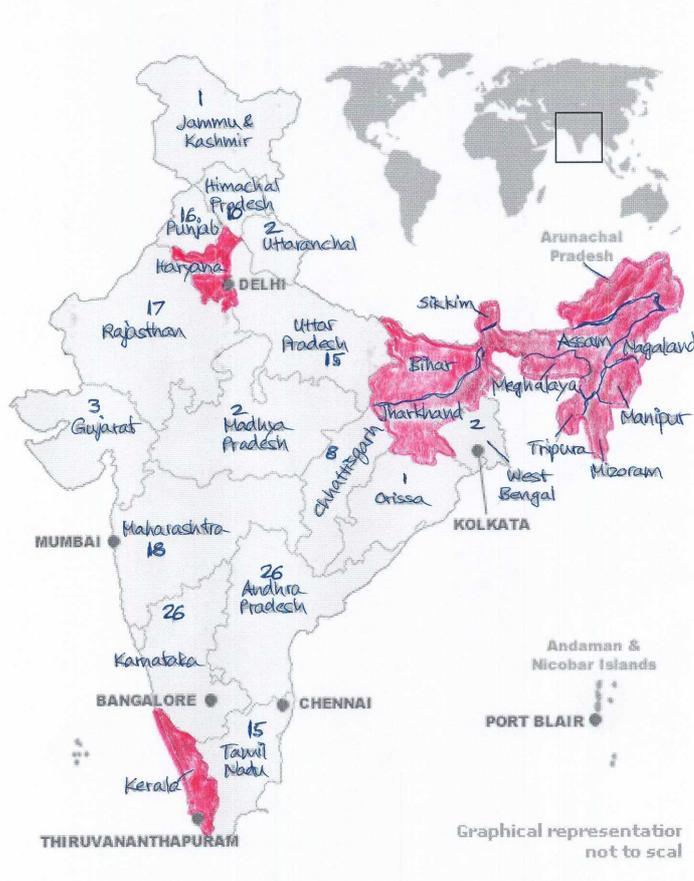
State	Installed Wind Capacity 2007 (MW)	Gross Wind Power Potential (MW)
Tamil Nadu	3492.7	3050
Karnataka	821.1	6620
Maharashtra	1487.7	3650
Rajasthan	469.8	5400
Andhra Pradesh	122.4	8275
Madhya Pradesh	57.3	5500
Kerala	2.0	875
Gujarat	636.6	9675
West Bengal	1.1	450
India	7090.3	45195

Source: InWEA 2007

Power sector reforms, demonstration and commercialisation of renewable energy technologies and renewable energy applications in rural areas have also been supported by international development assistance. However, reports agree on the fact that many of these attempts have for various reasons been of limited success (Kochhar 2006; World Bank 1996).

Lately, the Clean Development Mechanisms (CDM) of the Kyoto Protocol was established in order to facilitate investment in climate mitigation projects, for example in the renewable energy sector, in developing countries. Although India undoubtedly looks at a success story of CDM development (Friberg et al 2008), the geographical distribution of project activities in the renewable energy sector is uneven. This raises questions about determinants and requirements of CDM investment specifically and about private sector participation in the renewable energy sector in particular.

Map 1: CDM in India – Distribution of registered projects in the renewable energy sector



Source: UNFCCC CDM Pipeline June 2007

In summary, the puzzle underlying this paper is why private sector participation in the renewable energy sector differs between Indian union states notwithstanding similar resource potential? What are the requirements and drivers for private actor involvement in the renewable energy sector? How are incentive structures and conditions changed due to the emergence of the CDM as a multilevel, market-based policy instrument?

As a comparative case study to illustrate and examine this puzzle, the wind sector in the Southern Indian states of Tamil Nadu and Kerala is selected¹. Approaches to inductively derive analytical explanations for private sector participation in these cases will be guided by an analytical framework, which is elaborated in the following section.

Concluding on the empirical field research in India², two contextual factors emerge as central explanatory entry points to private sector participation in the wind sector in these two states. While the one holds the stability and credibility of policy and regulatory frameworks and conditions as important, the other emphasises the capabilities and willingness of public and private stakeholders to interact and interrelate with each other in the given context. Finally, promises of the CDM as regulatory structure established at the international level to trigger private participation in the wind sector have so far failed to meet expectations.

¹ The Indian states were selected as comparative cases on the criteria of similarity of natural resource potential (wind sector) given differences in installed capacity and CDM projects as well as locational similarities.

² Empirical analyses are based on qualitative interviews and substantiating material and documents if available (e.g. annual reports, minutes of public hearings) conducted and collected during a field visit to Indian and the respective union states from September 2007 until January 2008.

2. Private Sector Participation in Renewable Energy Deployment: Towards an Analytical Framework

Applications of Governance Concepts

In the case of electricity supply the public goods characteristics of energy becomes apparent when one talks about the *secure* supply of energy (Abbott 2001: 32). Considered in the context of an 'area of limited statehood' (Risse/Lehmkuhl 2007: 14) like India, the aspect of energy security is of crucial importance: The leverage of individual consumers to stimulate private investment in generation or to pressure government is limited. Additionally, secure energy supply is pre-requisite for social and economic development (Barnes & Floor, 1996). Energy security due to its public goods characteristics is conventionally expected to be provided by government (Abbott 2001: 32). The securing of energy supply can be hence conceptualised as a governance service.

The concept of governance referred to in this paper draws on the understanding of governance as "institutionalised forms of socially coordinated action for designing and implementing collectively binding regulations and for providing collective goods to a defined social group" (Risse/Lehmkuhl 2007: 20). Decisions on what makes 'collective goods' are historically and spatially contingent as well as subject to political negotiation (Risse/Lehmkuhl 2007:21). In the Indian context, electricity supply is understood in terms of energy security and conceived of as collective good. This implies that government holds the ultimate responsibility (Rao 2004) for providing regulatory structures and mechanisms in order to incentivise public and/or private participation in energy sector investment.

The provision of this governance service takes place and is influenced by a range of factors on multiple governance levels. Consequently, the conceptual angle from which private sector participation in wind sector development in the selected Indian states is examined comprises a so-called multi-level governance system (Bache/Flinders 2004). The multi-level governance concept recognises the growing complexity of policy-making and thus looks at networks of governmental, business and civil society actors interacting across local, national and international levels (Marks 1992: 215). Since particularly renewable energy systems are complex (Smith 2007:10), the multi-level governance approach allows for looking beyond the role of hierarchical government measures to include the roles of market actors and civil society interrelating across several levels. Even though this strand is rooted in EU studies, it will be applied to analysing multi-level governance situations in other contextual settings acknowledging the Eurocentric bias.

Perspectives from governance theories thus provide the conceptual background for the empirical-analytical examinations of contextual factors driving private sector participation in the renewable energy sector.

Specifically, two sets of approaches are drawn upon to guide the empirical analysis, which will be elaborated in the following:

Approaches from Economic Geography Theories

On the one hand, private sector participation in renewable energy investment is driven more or less common-sensical by certain incentive structures. Economic geography provides one entry point to understanding location factors that make investors decide to go for activities in one rather than another region: Economic geography as spatial science aims at explaining location structures, trade movements and spatial agglomerations of companies (Schätzl 1998: Chapter 1). Traditional approaches looking specifically at the issue of location argue that industrial localisation, i.e. decisions on business activities in certain areas, are influenced by certain locational advantages (Bathelt 1991: Chapter 12). Depending on the industry sector, these refer to specific technological, economic and social framework conditions. Investment decisions are made according to whether and to what extent industrial demands are met by existing location factors (Bathelt/Glückler 2003: 137). Transferring these insights to the case of private sector participation in the renewable energy sector, the context factors of relevance for triggering activities in certain states pertain to the power supply situation, the

constitution of the electricity grid, transport infrastructure, access and availability of land. In summary, these will be referred to as 'energy market conditions'.

However, economic geography has undergone much criticism and change (Bathelt/Glückler 2003: 155) due to underlying paradigm shifts and in the course of the challenges and developments of globalisation. One critical strand which has hence emerged is called Relational Economic Geography. In contrast to the traditional theories, a relational economic geography regards business activities as embedded in concrete structures of socio-institutional relations and evolutionary, path dependent developments (Bathelt/Glückler 2003: 155). As one perspective, the embeddedness approach departs from the assumption that economic activities do not take place between isolated actors but are embedded in a network of social relations (Granovetter 1990: 98). Drawing upon this line of thinking, private sector participation in renewable energy projects is influenced by the extent to which private actors relate and interact with each other in the given context, the extent to which public entities communicate effectively and purposefully among each other and the extent to which public and private stakeholders interrelate and interact in the specific settings. These issues will be referred to as 'business networks'.

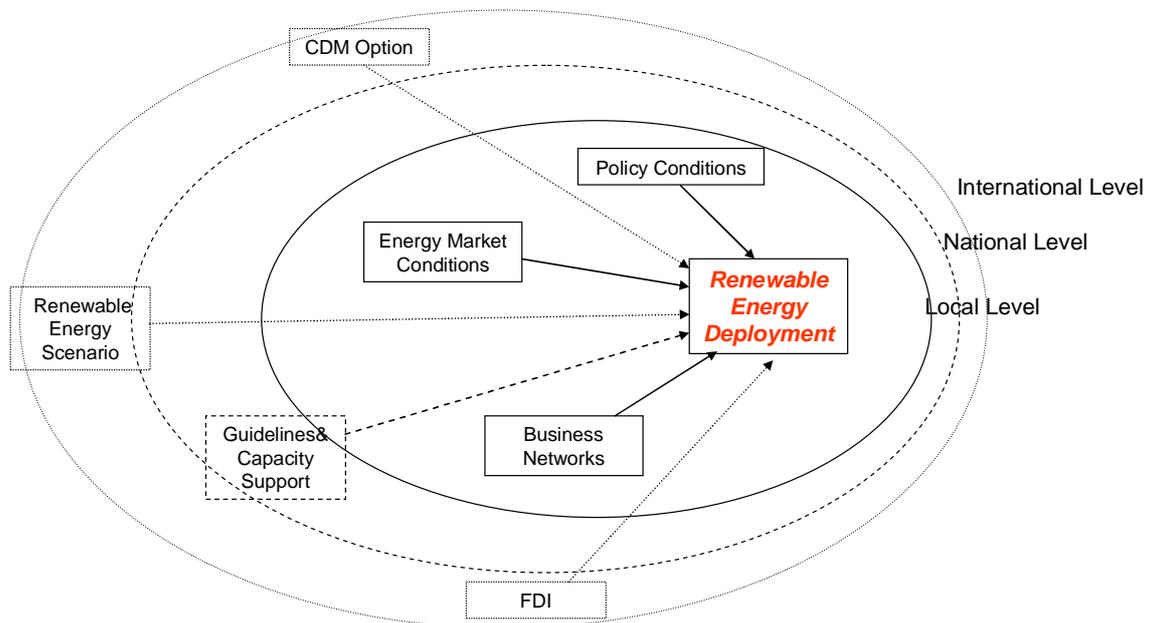
Approaches from Neo-Institutional Theories

On the other hand, without doubt, the overarching policies and regulations shaping the renewable energy sector bear an influence on private sector participation. Ultimately, it is not the design of these framework conditions per se but the institutions designing and shaping them that matter (Matthews 1986: 903) in driving private sector investment decisions. Neo-Institutional Theories underlie this assumption and are drawn upon in order to understand the impact of policy and regulatory conditions on private sector participation. Generally speaking, Neo-Institutional Theories regard institutions as structural features of a polity/society whose members share some values and meanings, which influence individual behaviour (Peters 1999: 18). Among the various theory streams, rational choice institutionalism looks at behaviour as a function of rules and incentives inherent in systems, i.e. institutions, which are defined as decision rules (Peters 1999: 47). Even though bidirectional interactions between institutions shaping individual behaviour and vice versa are acknowledged, at this stage only the endogenously-derived impact of institutions channelling and constructing human behaviour is examined (Peters 1999: 57).

For analytical purposes, this research article distinguishes between policies that refer to guidelines as well as laws for private sector participation in renewable energy projects and regulations that lay down the concrete incentive structures and cost benefit ratios for renewable energy investment. Consequently, this translates into 'policy conditions' describing policies and institutions of state government and state energy development agency as well as comprising energy regulations and practices of state electricity boards and state electricity regulatory commissions³.

Leaning on the theory strands discussed above, the potential explanatory factors inductively derived at are illustrated in the following diagram:

³ According to the Electricity Act 2003, state electricity boards were supposed to be functionally segregated (i.e. unbundled) and privatised. In the case of Tamil Nadu and Kerala this has not yet happened to date, which is why this entity still remains part of government. However, as this is not the case with the second sector study forming part of my dissertation and functionally the electricity boards do regulate renewable energy purchase and sale, they are subsumed under the 'regulatory context'.



In summary, the following propositions are developed that will guide the empirical-analytical quest for explanatory factors of private sector participation in the wind sector in the states of Tamil Nadu and Kerala. While the first and third propositions originate in (Relational) Economic Geography, the second one leans towards Neo-Institutionalism whereas the fourth proposition draws on multi-level governance concepts:

1.) Proposition on energy market conditions

Renewable energy deployment takes place whenever and wherever the market fundamentals are right. This means that the characteristic features of energy markets such as power supply and electricity grid conditions, land access and accessibility, availability of finance and general governance conditions are structured in such a way as to create the demand for renewable energies.

2.) Proposition on policy conditions

Renewable energy investment and related CDM activities take place according to the given opportunity structure of the energy governance system. This requires on the one hand appropriate policies and regulations to be in place. On the other hand, apart from these framework conditions respective institutions⁴ need to be supportive of stimulating investments in the renewable energy sector.

3.) Proposition on business networks

Not the structural setting characterised by market and policy/regulatory conditions alone but the interaction and embeddedness of/between public and private stakeholders matter. How stakeholders shape and what stakeholders make of the given context condition creates the momentum for private sector driven renewable energy deployment.

⁴ In the Indian context, the relevant public institutions governing the energy sector at the state level are the energy department of the state government, the state nodal agencies of the MNRE (SNA), the state electricity boards (SEB) and the state electricity regulatory commissions (SERC).

4.) Proposition on intervening factors at the national and international levels

Renewable energy technologies as well as the CDM have been promoted by central level governance institutions and actors in India. Additionally, developments at the international level pertaining to the global renewable energy market as well as foreign economic activities impacts on how Indian states take up renewable energy deployment. The CDM as a new regulatory mechanism promises additional incentives to current policy and market mechanisms for promoting private sector participation.

Before these propositions are explored in the case of the wind sector in Tamil Nadu and Kerala, a short introduction to the general picture of wind energy development is provided. After the discussion of empirical-analytical results, conclusions are drawn on the explanatory power of the proposed contextual conditions for wind sector development.

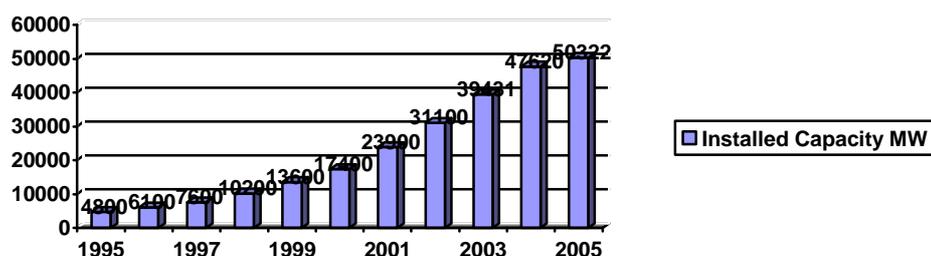
3. Introducing the Research Context: Wind Sector Development

In order to explore private sector participation in the wind sector in the local contexts of the selected Indian states, a short background to the wind sector globally and in India is required:

3.1 Global Wind Sector Development

At the international level, harnessing wind resources for grid-connected power generation has taken off since the oil shock of 1973, which created the need to exploit alternative sources of power generation for energy security as well as environmental reasons (Pillai 2006). With the transition to renewable energies becoming imperative and potential wind energy technologies already waiting in the backyards of research labs (Pillai 2006: 3), the creation of enabling policy and regulatory frameworks facilitated the take-off of wind power. Within a decade the installed capacity from wind energy grew with an annual growth rate of 28% (2000-2005) from 4800 MW in 1995 to 59.322 MW in 2005 (Pillai 2006:5).

Figure II: Global Wind Sector Development



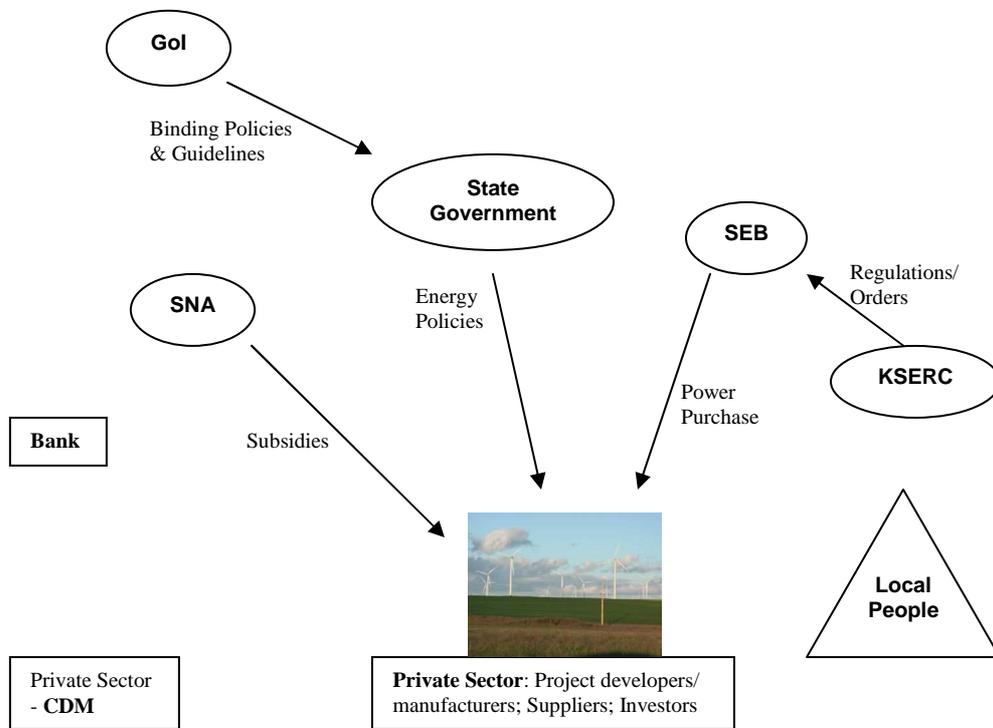
Source: Wind Direction March/April 2006 (adopted from Pillai 2006)

According to the Global Wind Energy Council, the global wind energy market is expected to at least double its capacity by 2010. The global turnover of the wind industry in 2005 was about \$12 billion out of which \$1.8 billion accrued to India alone. Since 1995 the wind industry has grown tenfold (Pillai 2006: 387). This has led to a concentration of the industry in this sector, which took place in the two phases of 1997-1998 and of 2002-2004. Nowadays the global international structure of the wind sector is characterised by few major global players, some smaller regional actors and few niche market suppliers (Pillai 2006: 388). These global market developments that went along technology growth are explained by the necessity to mobilise large financial, humans and physical resources.

3.2 Indian Wind Sector Development

Understanding wind sector developments in the Indian context requires a short excursion into the energy governance system in India: Manifested in the Indian Constitution, energy

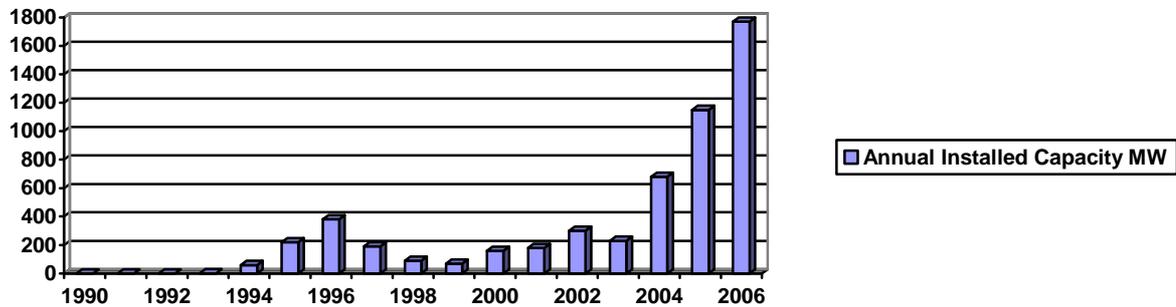
constitutes a concurrent subject, which means that jurisdictional and legislative authority are both with the central but ultimately with the state governments. At the national level (Government of India: GoI), the most important piece of legislation for the energy sector is the Electricity Act 2003 that among other mandatory measures obliges state governments to set up regulatory authorities, which guide and oversee state energy sectors. Particularly for the renewable energy sector, the MNRE policy guidelines are important pieces of legislation, yet optional for state governments to adopt. At the state level, the triad of state government, state electricity board (SEB) and state electricity regulatory authority (SERC), which are state-level equivalents to central-level institutions, are the public entities predominantly important for designing and implementing policies and regulations for the energy sector: While the state government is responsible for issuing energy and renewable energy policies, state electricity boards deal with all matters related to the purchase, distribution and transmission of power⁵. Since 2003 power purchase specifications (e.g. tariffs) and mechanisms are regulated and overseen by the semi-autonomous bodies of state electricity regulatory authorities. State energy development agencies as MNRE subsidiaries (SNA) mainly have the role to channel central government renewable energy fiscal and financial incentives and programmes in addition to state government-initiated activities.



⁵ According to the Electricity Act 2003, states are obliged to unbundled electricity boards in respectively three functional units, which for various reasons has not happened in Tamil Nadu and Kerala yet.

For the last three decades, the renewable energy sector in India has seen a slow but continuous growth (Pillai 2006: 392).

Figure III: Wind Sector Development India



Source: adapted from Pillai 2006: 393

By the end of the 1980s the (now) MNRE⁶ started the National Programme for Wind Energy Development. The designated objective of this programme was to induce private sector participation in this field and to render it a commercially viable contribution to energy capacity addition (Rajsekhar et al 1999: 670). The programme included systematic wind resources assessments as well as demonstration projects starting in 1986. In 1993 the MNRE developed policy and tariff guidelines for state government in order to promote renewable energy technologies (Pillai 2006: 392). In addition to central fiscal and financial incentives, central financial assistance was provided by the Ministry's financial arm, IREDA. Until 1993 the wind sector did not grow significantly but experienced a boom period in the mid-1990s. However, several factors such as the Asian financial crisis, the reduction of central-level incentives (Basu 2007), performance backlashes of poor wind technology installation and operation practices as well as specific state policy developments contributed to the decline of this sector (Pillai 2006: 393). Around 2000 the wind sector started to recover. Over the last few years, capacity additions through wind energy deployment have soared:

Table 2: Wind Capacity Addition India

State	March 2007	March 2006	March 2005	March 2004
Tamilnadu	3492.7 MW	2894.6 MW	2037 MW	1361.6 MW
Karnataka	821.1 MW	584.5 MW	410.7 MW	209.2 MW
Maharashtra	1487.7 MW	1001.3 MW	456.2 MW	407.4 MW
Rajasthan	469.8 MW	358.1 MW	284.8 MW	178.5 MW
Andhra Pradesh	122.4 MW	121.1 MW	120.6 MW	98.8 MW
Madhya Pradesh	57.3 MW	40.3 MW	28.9 MW	22.6 MW
Kerala	2 MW	2 MW	2 MW	2 MW
Gujarat	636.6 MW	338 MW	253 MW	201.9 MW
West Bengal	1.1 MW	1.1 MW	1.1 MW	1.1 MW
Total	7090.3 MW	5341 MW	3594.3 MW	2483.6 MW

Source: InWEA 2007

From the mid-1980s until the mid-1990s the wind industry sector in India was dominated by few major European manufacturing companies (InWIND 2006: 11). However, this scenario has changed towards a cartelised market dominated by few companies practising a specific Indian business model⁷ (InWIND: 2006: 14).

⁶ Before 1992, the MNRE was institutionalised as Department for Non-conventional Energy Sources under the Ministry of Science and Technology.

⁷ Developed by SUZLON, this model is based on manufacturing companies providing complete integrated solutions from project development to operation & maintenance of wind farms to investors, which is adapt to the peculiarities of the Indian market.

About two third of wind energy capacities generated are used for captive consumption in energy-intensive industries, e.g. textile and steel industries, and by corporates to avail of tax benefits (Dang 2007: 11). To a small but increasing extent independent power producers have entered into wind power generation for electricity sale triggered by the introduction of renewable portfolio standards.

Across all India, the key drivers for wind sector development to date are regulatory specificities in terms of fiscal and financial incentives such as tax benefits, e.g. 80% accelerated depreciation on capital investment, as well as the provisions of the Electricity Act 2003 obligating states to stipulate policy and regulatory frameworks (Dang 2007: 12).

Still, experts caution against too much optimism as challenges and barriers exist that impede wind sector development in India. Apart from the availability and assessment of appropriate sites and turbine supply, power evacuation and grid management (Kacker 2007: 7), and wind project financing remain the key issues (Dang 2007: 12). However, since these obstacles are similar across all India, they do not convincingly explain the puzzle why Kerala has hardly managed to harness its wind potential while Tamil Nadu has more than fully achieved to install its wind capacities.

Nowadays, the impetus for wind power expansion does not only stem from increasing and prospective power shortages but also from the need to combat climate change (Purohit 2007: 2). Apart from large upfront costs, the main barriers to the large scale dissemination in India are identified as unstable policies and institutional frameworks at the state level (Purohit 2007: 2). How and with what impact factors like energy market conditions, policy conditions and business networks play together to shape incentive structures for private participation in the wind sector will now be illustrated in the cases of Tamil Nadu and Kerala.

4. Determinants of Renewable Energy Investment in Kerala and Tamil Nadu

4.1 Private Participation in the Wind Sector in Kerala⁸

Diplomatically put, the wind sector in the state of Kerala constitutes an 'emerging market': Out of a wind potential of 800 MW capacity addition, only 2 MW have been installed and commissioned to date (InWEA 2007). As will be elaborated below, the failure to harness wind energy is mainly accounted to the resistance and stickiness of relevant policy and regulatory institutions. In conjunction with reluctant attitudes of the respective leadership to wind energy these result in late and volatile policy formulation and inconsistent/non-existent regulatory practices. Furthermore, private stakeholders have experienced difficulties interacting with these public institutions and the local community. In the absence of a complementary business network, the bargaining power and interrelatedness of public and local stakeholders outweighs attempts of private parties to interact purposefully with them.

According to the first proposition, energy market conditions in Kerala are not favourable for attracting the private sector in the wind sector. Indeed, until the mid-1990s Kerala did not have much incentive to explore the potential of wind energy for electricity capacity addition. Until then, Kerala was not short of power supply and focussed on harnessing alternative resources such as hydro and thermal power. However, with an increase in domestic electricity consumption and the emergence of industrial sectors such as IT, buildings and hotels, the energy demand has been outgrowing installed capacities.

Table 3: Annual Power Import (in M.U.)

State/Year	1992	1997	2000	2001	2002
Kerala	1855	3298	4275	5543	5699.53
Tamil Nadu	7257	9747	16,616	18,358	21,460

Source: IndiaStat 2007 (available at: <http://www.indiastat.com>)

⁸ Many observations originate from interviews conducted with public, private and local stakeholders during the empirical research September 2007-January 2008 in India including field trips to Kerala and Tamil Nadu.

Noticeable, due to the lacking industrialisation, potential energy demand from the commercial sector, which creates niches for captive wind power consumption (Rajsekhar et al 1999), is missing. Even though electricity infrastructure is not a problematic issue per se, the availability and accessibility of land for both extending the grid and for constructing wind farms constitutes a serious problem. This is due to the hilly terrain but also to the highly politicised issue of land ownership (Interview with Sureesh 2007).

Policy conditions, as mentioned in the second proposition, until recently have not been favourable for attracting private investment in the wind sector. The failure of a MNRE-subsidised wind demonstration project by the Kerala State Electricity Board (KSEB) in 1992 proved a bad start for the wind sector in Kerala. Despite policy drafts for a Renewable Energy Policy in the mid-1990s, several government changes contributed to the delay of issuance until 2002. However, it was not until 2006 that policy specifications on wind power were amended and a regulatory order was stipulated. Explanations for the delay of policy and regulatory design point towards the relevant institutions and their leadership (Interviews with Harikumar and Sureesh 2007): State government has not shown much interest in propagating wind energy in Kerala. This is due to the comfortable power supply situation, the focus on alternative resources for power generation, an aversion to private sector investment in the Communist state and non-existing political pressure from any industrial lobbies, which pertained until the late 1990s.

Changing underlying contextual conditions in conjunction with change of government and a new energy minister has rendered the policy environment friendlier towards wind power and private sector investment. However, the bureaucratic procedures politically stipulated for wind farm installations are still characterised by high administrative hurdles. ANERT, as state nodal agency of the MNRE, is assigned additional watchdog-functions, which due to internal institutional deficiencies such as lacking expertise, changing staff, no continuous leadership it is unlikely to fulfil (Interviews with Unnithan and Balakrishnan 2007). The KSEB constitutes a significant power player due to the single-buyer model⁹, its labour strength and as the only government entity incurring income vis-à-vis a deficit state budget, which gives it greater bargaining power over state government. In conjunction with past negative experiences of failed demonstration attempts, a negative mindset prejudiced against wind energy persistent not only on managerial but also on staff level have rendered purchase policies and practices of wind power less credible and stable. Mashed between two powerful public stakeholders, the Kerala State Regulatory Commission (KSERC) as autonomous, judicial body was incepted only in 2002 with the tasks to establish a level playing field and instil investment certainty through independent tariff regulation and supervision. Despite the issuance of a seemingly attractive tariff order in 2006, its role as advocate for private investors in the wind sector is doubtful. Due to the appointment process, members have a background in the public sector/government and hence do not have much credibility to stand up against government's and utility's interests (Harikumar 2007; Sureesh 2007).

⁹ The energy governance systems in Kerala and Tamil Nadu are institutionalised in such way that public electricity utilities, which belong to state governments, are the only and autonomous entities purchasing power from generating companies. Even though according to the Electricity Act 2003, power sale to third parties and open access to the electricity grid is allowed, in reality huge implementation deficits mostly prevent alternative structures to this single-buyer model from emerging.

Table 4: Regulatory Policies for the Wind Sector

Regulatory Policies	Kerala (24.06.2006)	Tamil Nadu (18.05.2006)
Tariff (average annual)	Rs 3.14	Rs 2.76 for existing and Rs 2.90 for new units
Annual escalation	3.6% for 25 years	4.5% for 10 years
Tariff Period	20 years	Review after 3 years
Wheeling	5% charges	5% charges
Banking	12 months	12 months
Renewable Portfolio Standards	5% for all renewable sources; out of which 2% from wind	10% for all renewable energy sources

Sources: Tariff Orders on Renewable Energy

With reference to the third proposition, business networks constituted of the structuring and the relations between and amongst public and private stakeholders are weakly developed and characterised by the dominance of public-public alliances. To date, the first private sector participants in the wind sector start opening offices in Kerala in order to broaden their geographical scope of activities and to harness a quasi-virgin but potentially profitable area. Even though they provide all-around services to potential investors and rely on existing supplier networks in other parts of India, they are required to establish new networks firstly with investors, secondly with local people and most and foremost with public stakeholders. Building and maintaining good relations with local people is the first difficult issue encountered by project developers/manufacturers. Environmental awareness and caution against impacts of wind installations, a culture of local protest and participation and the significance attached to land have already resulted in clashes with private developers. This has also led government to build in security measures in policy processes (e.g. participatory procedures, additional approval requirements) as to prevent and pre-empt local upraise. The second difficult issue is building and maintaining interactions and relations with public stakeholders as to argue their case for private investment into wind energy. Particularly the accessibility and approachability of government officials and utilities has been characterised as cumbersome and complex not only because of openly adverse attitudes but also because of the lack of any substantial bargaining power. Given the close ties between state government and utilities as well as the absence of a private sector lobby and push for wind energy, interactions evolve into one-way-streets where promises and deals are often not followed up by public sector stakeholders (Interviews with Sureesh 2007). The extent to which regulators will play a mitigating role and reflect private sector interest more precisely still remains to be seen.

Lastly, considering the fourth proposition, positive stimuli for wind energy deployment in Kerala emerging from national and international levels have not found hold. Opportunities and developments in the global wind sector or the Kyoto mechanisms have not impacted on private sector investment in Kerala. State government to date has not put any efforts into designing favourable frameworks for attracting private investors and tapping these opportunities. In a similar manner, renewable energy policy guidelines or capacity development initiatives emerging at the national level have not been adopted by the Kerala state government. With regard to the international investment climate, Kerala until recently suffered from a bad reputation of being politically averse to private sector investment and economic liberalisation. Even though this situation has changed and investment interest from Keralite guest workers abroad exists, factual foreign direct investment (FDI) is still quite low.

In conclusion, explanations for private sector investment in wind energy in Kerala emphasise the role and nature of public institutions as well as the interrelations between public, local and private stakeholders as determinative contextual factors.

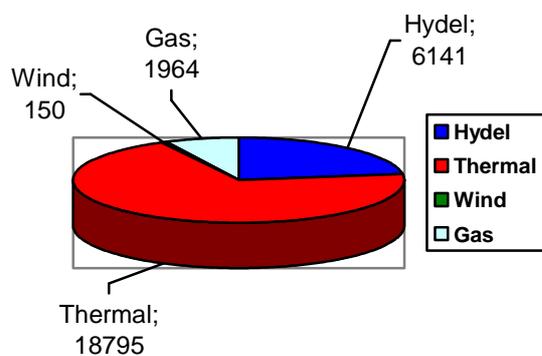
4.2 Private Participation in the Wind Sector in Tamil Nadu¹⁰

In contrast to Kerala, Tamil Nadu is the model state for wind sector development in India. Out of a wind power potential of 3050 MW, to date, Tamil Nadu has achieved an installed wind power capacity of 3492.7 MW (InWEA 2007). As will be elaborated, the main reasons are the continuous and stable policy and regulatory framework and practices emerging from the respective institutions and their pro-active leadership. Moreover, closely-linked business networks in this sector emerged, and the degree and kind of interaction and interrelation with public stakeholders increased in conjunction with the bargaining power of private actors.

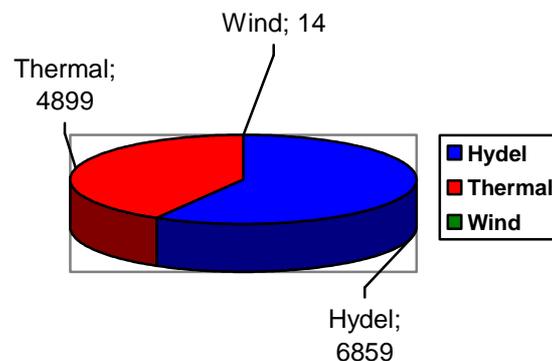
Energy market conditions in Tamil Nadu, as put forward by the first proposition, are shaped in favour of attracting private sector investment in wind power. With regard to its power supply position, Tamil Nadu always had a high demand for power and pressure to increase installed capacities. Alternative fuel sources such as coal, oil and gas exist but have outgrown actual and future power scenarios.

Figures IV and V:

Tamil Nadu: Power Sector
Composition 2005/6 (in M.U.)



Kerala: Power Sector
Composition 2005/6 (in M.U.)



Sources: IndiaStat 2007 (available at: <http://www.indiastat.com>)

The demand stems mostly from the commercial sector as Tamil Nadu was one of the first Indian states experiencing industrial development under British Colonialism and even today accounts for the highest degree of industrialisation in India. Textile, steel, foundries, cement and fireworks are the sectors with the highest power demand. In order to reduce the dependence on expensive and erratic grid supply a strong interest in potential energy sources for captive power consumption such as wind emerged in these industries. Despite available grid infrastructure, issues of evacuation and power planning are occasionally mentioned as obstacles to future wind power expansion (Interview with Kacker 2008). Due to the location of potential wind sites in flat terrain the accessibility of land and transport infrastructure is advantageous. Similarly, land ownership is distributed amongst private local people and hence land access is not an issue (Interview with Saibaba 2007).

As suggested in the second proposition, policy conditions in Tamil have from the late 1980s onwards oriented towards promoting or at least not discouraging private sector investment in wind energy. In 1986 a joint effort of the MNRE, international assistance from DANIDA and the Tamil Nadu Electricity Board (TNEB) as project owner contributed to the success of a wind farm demonstration project. As a success story this model had multiplication effects not only within Tamil Nadu but was replicated in other Indian states. In Tamil Nadu, the foundation was laid not only for private investment in the wind sector but for the state

¹⁰ Many observations originate from interviews conducted with public, private and local stakeholders during the empirical research September 2007-January 2008 in India including field trips to Kerala and Tamil Nadu.

government to adopt MNRE policy guidelines in 1993. Despite government changes, the energy ministry's attitude remained favourable, which resulted in the stability and continuity of wind energy policy. In 2006 the propositions relating to wind power purchase policies and conditions entrenched in the energy policy were with only slight changes translated into the regulatory order. All in all, state policies and regulations for wind power in Tamil Nadu have so far been perceived as favourable (Interviews with Balraj and Giri 2007).

In order to explain the design of these framework conditions, a closer look at relevant public institutions is required. Recognising the industrial demand vis-à-vis power supply situation in Tamil Nadu, not only state government officials in the energy ministry but also the Chief Minister have taken an interest in electricity capacity addition through harnessing wind resources. Similarly as in Kerala, the TNEB is a powerful player, and as employer and income generator holds substantial bargaining power. Yet, due to the free power policy, power constitutes a highly politicised issue as well as political instrument dominated by state government interests. In the course of the early wind demonstration project, strategic moves by the MNRE to get the TNEB Chairman and the TNEB as project owner on board rendered a 'natural reluctance'¹¹ to wind power significantly less (Interviews with Gupta and Kacker 2008). TNEB purchase policies and practices were thus credible and consistent. How much an individual leader's attitudes translate and affect an institution's performance became apparent with the change of TNEB chairmanship in the late 1990s until 2000. Disinterest in and hostility towards wind power adversely reflected on wind power purchases and contributed to the overall decline of the wind sector during this period of time. Apart from promotional functions, TEDA as state nodal agency of the MNRE was not assigned any significant role in wind power development since the state government decided to introduce a single-window-clearance system. In order to reduce bureaucratic hurdles and facilitate private sector participation the entire wind power project procedures were channelled through the TNEB. The timely set up of the Tamil Nadu Electricity Regulatory Commission (TNERC) paid respect to the role of the regulator. As previously mentioned, government policies were more or less adopted in the regulations. However, to date these are constantly and vociferously contested especially by the private sector. Similarly as in Kerala and given the same procedures for appointment and institutional set up¹², the significance, leverage and attitude of regulators in Tamil Nadu still remains to be seen.

The third proposition puts emphasis on the business networks, which in the case of Tamil Nadu cannot be rated important enough. As the state from which replication effects for wind project development emerged and a 'model tariff order' on wind energy was anticipated (Interview with Gupta 2008), the interplay between private as well as public stakeholders is of enormous importance. Tamil Nadu is one of the cradles of the Indian business model in the wind sector. Since this depends on close ties with supplier networks, technology providers and experts, the interaction and relation between private stakeholders is very intense and located at strategic centres mostly in and around Tamil Nadu. As one result of these developments, the wind industry is highly cartelised allowing for little competition in specific niche segments. As another consequence, the formation of lobby networks and organisations around a new technology, i.e. wind turbines, has been very easy. Thus, the Indian wind lobby is characterised as very strong and interrelated not only with central but also with state level agencies. The interaction between private sector and public sector stakeholders in Tamil Nadu is characterised as accessible and open. Representing a growth industry, which caters not only for the state's power demand but most and foremost to the industries' captive power demands, private wind sector stakeholders do have some bargaining leverage with public entities (Interview with Giri 2007). Interrelations with local people are perceived as insignificant. With no vociferous environmental lobbies and no

¹¹ In general, electricity boards in India are not much in favour of renewable energy and specifically wind due to the negligible contribution to power capacity addition, the higher prices at which they are obliged to purchase and technical difficulties such as grid interfacing and power management.

¹² These procedures are stipulated in the Electricity Act 2003, which is a binding legislation for all Indian union states.

tradition of protest, local people if affected by wind farm installations are in most cases acquiesced into paid consent (Interview with Radakrishnan 2007). The interrelation between the public stakeholders, i.e. state government, TNEB and TNERC, seems to be slanted in favour of promoting wind power. Although government and TNEB interests might clash with changing leadership of the institutions leading to a deadlock in wind sector development, the likelihood of diverging attitudes is minimised by the path dependence and history of wind energy in Tamil Nadu. To what extent the TNERC evolved into a mouthpiece of government, i.e. following purchase policy suggestions by the TNEB, or to what extent it will be open to 'convincing' by private stakeholders thus positioning itself against public stakeholders remains to be seen.

Reflecting on the forth proposition, developments and opportunity structures at the international and the national level clearly had an impact on wind sector development in Tamil Nadu. Specifically the adoption of MNRE guidelines and their influence at the early stages of wind development signifies openness and receptiveness of public stakeholders. Notwithstanding, global wind market developments have from the beginning influenced the establishment of the wind sector in Tamil Nadu. To date, in the area of technical expertise and capacity development, Tamil Nadu draws back on close ties and interactions with international technology hubs. However, with the development of an Indian model and own expertise and capacities, the Indian wind sector has now started to play a role in regional and also global wind markets. The proneness of Tamil Nadu to become a cradle for wind sector development is not only explained by the excellent wind conditions but also by openness to private and foreign investment. This is reflected in the degree of industrialisation as well as in the receipt of FDI. In order to tap the opportunities provided by the CDM, state government has recently assigned facilitative functions to public institutions.

Table 5: FDI in Tamil Nadu and Kerala

State/FDI	Total approved FDI (Rs mio) 1991-2004	Share FDI 1991-1998	Share FDI 1999-2004	Share FDI 1991-2004
Kerala	15,520	0.48%	1.03%	0.72%
Tamil Nadu	250,720	10.98%	12.41%	11.59%

Source: Government of India, Ministry of Commerce & Industry, Secretariat for Industrial Assistance; SIA Newsletter 2002

In conclusion, as in the case of wind sector development in Kerala discussed before, all of the context conditions brought forward in the propositions amount to a smaller or greater extent to driving private sector investment in the wind sector. Strikingly, the leadership role and attitudes of key public stakeholders stand out as well as the interrelations within complex private stakeholder networks and their interactions with public stakeholders.

In summary, the theory-guided empirical analyses of different context conditions explaining wind sector development in Kerala compared to Tamil Nadu have given to a greater or lesser extent justice to all the propositions suggested. The tricky hen-and-egg question that poses itself now is which one of these context conditions is more significant in explaining wind sector investment? Furthermore, how come certain context conditions emerge as more powerful factors driving private sector participation in the wind sector? Finally, to what extent has the CDM introduced as a regulatory structure at the international level provided additional incentives for private participation in the wind sector?

5. Concluding Discussions

This research paper started from the puzzling empirical observation that despite similar natural resource potential in the case of wind energy in the Indian states of Tamil Nadu and Kerala private sector investment reflected also in the CDM project distribution differs. In order to understand private sector participation in the cases selected, several context conditions were inductively derived from theory approaches of Neo-institutionalism and (Relational) Economic Geography. These guided empirical-analytical examinations of the case studies selected in the framework of multi-level and governance concepts. Summarising the main findings of empirical-analytical examinations of private sector participation in the wind sector in the selected Indian states allows for several key observations:

Firstly, contrary to the first proposition, energy market conditions do not alone determine private sector participation in the wind sector. Interviews with private and public stakeholders allow for the conclusion that factors such as accessibility and land availability or power supply situation might be important at the initial stages of wind sector development but in general do not drive investment decisions. This commensurate with social constructivist approaches that argue for situations being what 'actors make of them' (Wendt 1992).

Secondly, in both states not only the policy conditions per se but also the ways they have been designed, implemented and upheld create the required certainty, stability and predictability for private investment. This can be traced back to the attitudes, leadership inherent in and relations between the relevant public institutions.

Thirdly, the constitution of business networks in the wind sector and their relations to local stakeholders has created an enabling environment through instilling the possibility to actively shape wind sector development. In addition to private stakeholders' embeddedness in the local context, the interrelation and interaction with public stakeholders influences business activities in the wind sector.

Lastly, renewable energy and foreign investment developments and opportunity structures at the international and the national level exerts a positive impact on stimulating private sector participation at the state level. This, however, depends on the extent to which local public stakeholders are receptive to these windows of opportunity and adapt them in shaping the framework conditions for private sector participation in the wind sector.

However, a different case can be made with regard to the CDM: The *governance concept* (Risse/Lehmkuhl 2007) allows for understanding the CDM as a regulatory mechanism and regulatory structure at the international level that aims to encourage private sector participation in climate mitigation and adaptation activities. As for the energy sector in India, government and market failures (Bhattacharya/ Patel 2005: 415) have so far contributed to the inability of harnessing renewable energy sources for power capacity addition to their full potential. The CDM thus provides an additional and complimentary regulatory structure next to governance and market structures and mechanisms. Consequently, it bears the potential to provide incentives for private sector participation in the wind sector where incentives from existing government and market structures might not be sufficient. So far, empirical analyses of the status and the role of CDM incentives for private investors in this sector lead to the conclusion that the impact of the CDM is negligible:

Table 6: Significance of the CDM for the Wind Sector

State	Installed Wind Capacity 2007 (MW)	Installed Capacity of registered CDM projects (MW)	Share of registered CDM projects in installed wind capacity (%)	Installed Capacity of total CDM projects (MW)	Share of total CDM projects in installed wind capacity (%)
Tamil Nadu	3492.7	74.42	2.13	965.92	27.66
Karnataka	821.1	184.45	22.46	451.25	54.96
Maharashtra	1487.7	117.5	7.9	434.21	29.20
Rajasthan	469.8	113.7	24.24	364.3	77.67
Andhra Pradesh	122.4	0	0	18.0	14.75
Madhya Pradesh	57.3	6.25	10.96	20.15	33.35
Kerala	2.0	0	0	0	0
Gujarat	636.6	8.75	1.31	123.85	19.47
West Bengal	1.1	0	0	0	0
India	7090.3	505.07	7.12	2377.68	33.53

Sources: UNFCCC CDM Pipeline (June 2007); InWEA (2007)

CDM incentives are ranked as subordinate factors in investment decisions for participation in the wind sector. Additionally, CDM stakeholders are accounted a marginal role in the business networks and structures identified by private sector stakeholders.

Even though CDM regulatory structures might be transmitted, e.g. with additional promotional mechanisms, to national and state levels, these incentive mechanisms provided directly affect private stakeholders at the local level. Studies on the role of the CDM in the wind power sector emphasise the positive impact of CDM returns on project revenues (IRR = internal rate of returns) that given certain debt and interest rate estimates renders more projects commercially viable (Purohit 2007; Basu 2007). The CDM hence constitutes an important market based method for promoting wind energy projects and the utilisation potential of wind potential in India (Purohit 2007: 12), however, given the developments and constraints of supportive policies and uncertainties in the investment environment. The empirical case study looked at came to the preliminary conclusion that incentive structures provided by this regulatory structure are acknowledged but ranked subordinate to incentive structures emerging from state level hierarchical and market structures. This conclusion comes at a surprise since the rationale of establishing additional or complimentary regulatory structures such as the CDM in order to stimulate private sector participation in this sector has been considered necessary in order to mitigate government and market failures. Consequently, interesting questions to be discussed are how, why and with what implications and effects CDM regulatory and incentives structures are taken on by private and public stakeholders in contrast to 'traditional' modes of governance?

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