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## Private Equity Financing for CleanTech Infrastructure

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### INTRODUCTION

With the intensive use of natural resources in general and fossil fuels in particular, humanity is faced with its adverse impact on the environment. Without lowering the emission of carbon in the environment, there is a greater consensus today among scientists and researchers that the adverse climate change will become imminent. It has become, therefore, imperative that cleaner technologies, in terms of higher efficiency, using renewable resources, and lower carbon footprints, are adopted to continue

economic development without impacting the environment adversely. *The environmental imperative has been supported by fundamental macroeconomic drivers, energy security, and increasing economic viability of cleaner technologies.* The CleanTech<sup>1</sup> sector worldwide has attracted an increasing share of investment. Equity investment globally has been growing at a 36 per cent compound annual growth rate (CAGR) and reached a level of about \$ 19 billion in 2009 (see Figure 5.1).

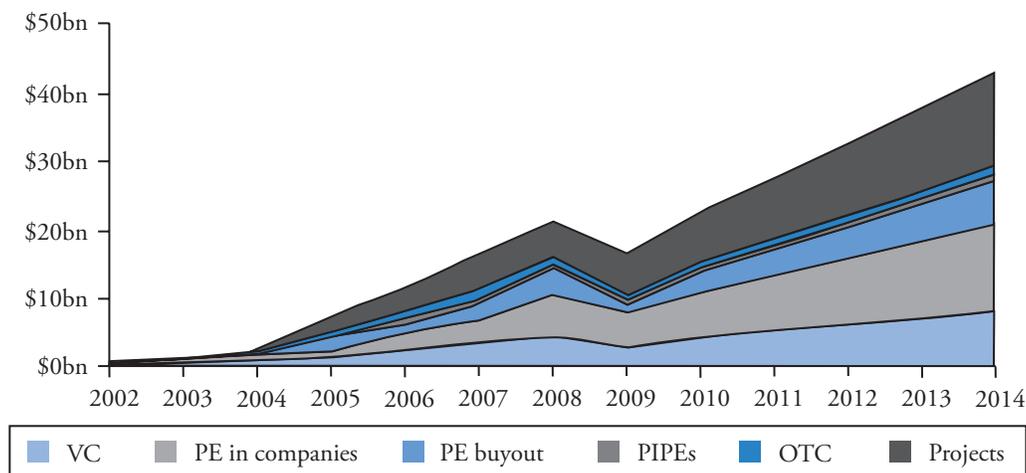


FIGURE 5.1 Global Growth in CleanTech Infrastructure Private Equity Investments<sup>2</sup>

Source: Bloomberg New Energy Finance.<sup>3</sup>

<sup>1</sup> CleanTech is a term used to describe technologies that address the resource limits in energy, water, and materials. In this chapter, the term has been used to primarily mean renewable energy.

<sup>2</sup> PIPE: Private Investment in Public Equities.

<sup>3</sup> Bloomberg New Energy Finance publication titled, *Cleaning up 2009* in April 2009.

It is noteworthy that almost 80 per cent of the investment has been pumped into deployment of CleanTech Infrastructure, that is, into projects and value chain enablers. This trend has accelerated as many of the technologies are now in the deployment phase which is very capital intensive. In the Indian context, which is the focus of this paper, *deployment of CleanTech infrastructure is of paramount importance* to address India's current energy supply and security issues that can decelerate the buoyant growth.

The deployment of CleanTech is very capital intensive. The sources of equity capital as shown below in Figure 5.2 to fund the deployment involving manufacturing scale-up and asset finance include private equity (PE), public equity, and corporate finance. CleanTech entrepreneurs tend to be small and tapping the public equity markets need more scale. Hence PE plays an important role in the deployment phase by investing in growth equity as the entrepreneurs scale up their operations.

Hence it is important to understand what drives the private equity investment. Thus this chapter examines the fundamental drivers in the Indian context, the types of opportunities that have attracted PE investments in the CleanTech infrastructure space (with a focus on renewable energy infrastructure which is a subset of the CleanTech infrastructure space), so far, and factors that could be further worked upon to accelerate this trend.

## INVESTMENTS IN CLEANTECH IN INDIA

We are at the beginning of a transition phase in the power sector wherein a significant portion of the energy mix will switch to renewables by the end of the century. The supportive policies, technological progress, and macro drivers have so far created a congenial climate for investment. This has channelized a lot of investment in the space, but mostly towards asset deployment.

### The Role of Market Drivers in CleanTech Investments

The global energy market has been driven by five key drivers—energy prices and volatility, energy security, climate change, policy and technological innovation (see Figure 5.3). These drivers are not only applicable in the Indian context but are also much more pronounced due to the baseline resource/energy shortage, the high growth rate and huge energy imports. The solution is available in the form of huge renewable resources waiting to be tapped. The prospects are bright as only about 14 per cent of the overall renewable energy<sup>4</sup> potential in the country has been tapped so far. These several strong and sustainable drivers have established India as one of the most attractive CleanTech infrastructure investment destinations in the world. India has a leading position in several segments

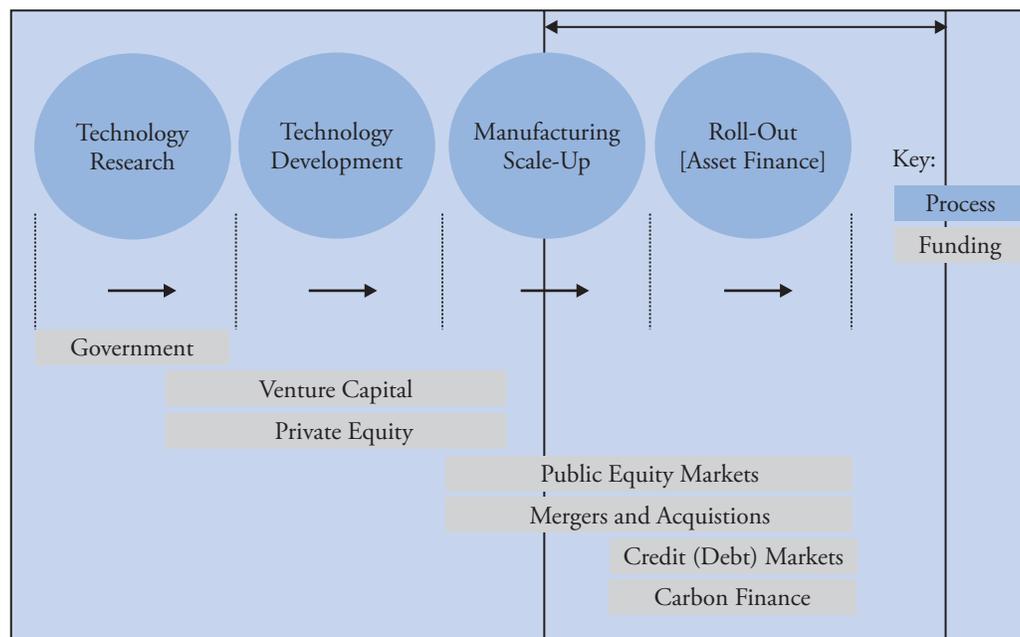


FIGURE 5.2 Role of Private Equity in the Investment Spectrum

Source: Authors' own.

<sup>4</sup> Ministry of New and Renewable Energy.

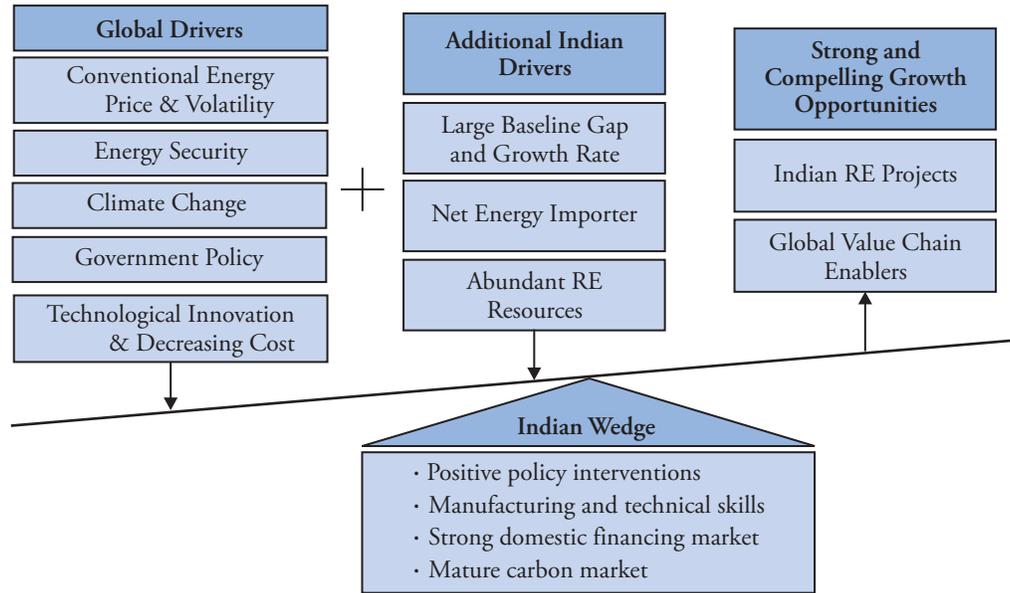


FIGURE 5.3 India has the Macro Drivers and Wedge in Place to be a Key Market

Source: Authors' own.

including a fifth global rank in wind.<sup>5</sup> Further, a positive policy direction, inherent strengths in manufacturing, large domestic financing market, and a mature carbon credit market presents compelling growth opportunities for CleanTech in India in the form of project-based opportunities and global value chain enablers.

Buoyed by the factors discussed above, the PE investments in this sector<sup>6</sup> in India started in 2004, when Citigroup Venture Capital (CVC) invested \$ 22.5 million in Suzlon Energy Ltd. The investment in the sector has been growing at a CAGR of about 25 per cent since 2005. The decline in 2009 was triggered by the global financial crisis; however the growth has picked up again this year. The Indian investment landscape has been dominated by investment in projects/assets especially in the wind and small hydro sectors. However, the capital flow has been quite small compared to the global investment in the sector.

### The Challenge of Grid Parity

Private equity investors also want to see attractive business models based on fundamental cost competitiveness without incentives, as the risks then would be much lower. Hence the 'heart of the matter' is the race to grid parity. As most of the technologies for electricity generation based on renewable energy sources are currently costlier than the

conventional sources, there is an inbuilt reluctance and economic disadvantage associated with their use. If the costs of the electricity generated by the renewable sources of energy and delivered to the grid could be brought close to or lower than the costs associated with conventional sources, the adoption of these technologies will be embraced without any special incentives or interventions. This is where India occupies a strategic position on two counts: (1) India has a large domestic market that can provide scale and reduce cost by being a testing ground for technologies at the inflection point of commercialization and (2) The inherent strengths of technical competence with cost leadership make companies supplying to the global market very attractive. So India is in an advantageous position for accelerating the race towards grid parity. For instance, in India wind farm costs are almost half of that in Europe and the United States. The levelized cost of energy (LCOE) analysis below (see Figure 5.5) illustrates this point.

One of the key observations from the above figure is that there is a very wide range of renewable energy costs ranging from INR 17 per unit in case of solar Photo Voltaic (PV) to as low as INR 2.20 per unit in case of small hydro projects. However, except solar, the LCOE for all renewable energy technologies/options is comparable

<sup>5</sup> Bloomberg New Energy Finance.

<sup>6</sup> In this article, the word 'sector' primarily refers to renewable energy which is a subset of the CleanTech Infrastructure sector.

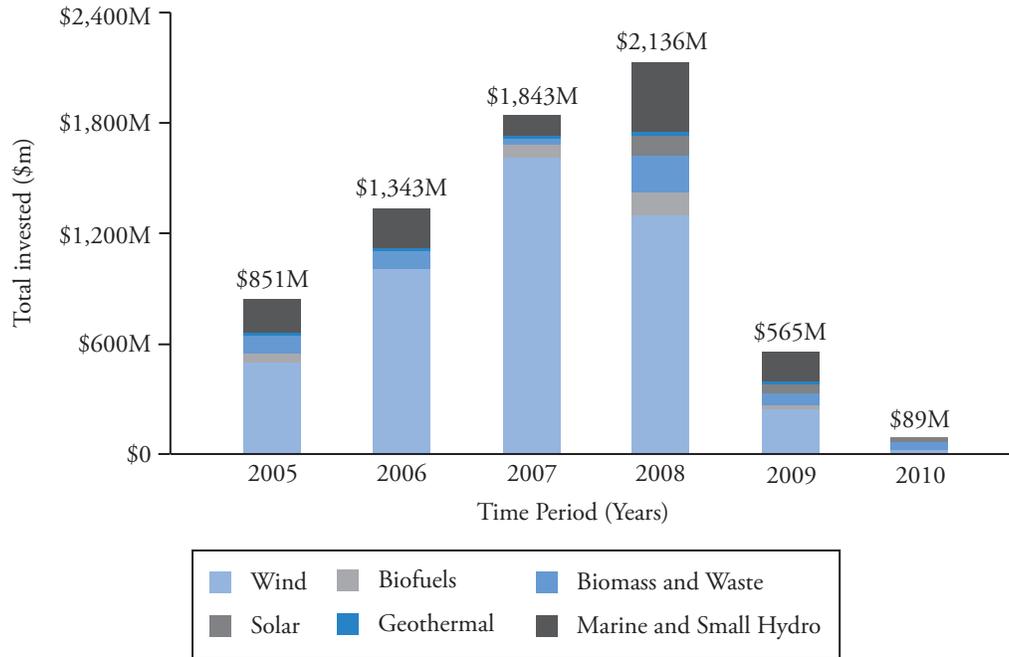


FIGURE 5.4 CleanTech Infrastructure (Energy) Investments in India

Source: Bloomberg New Energy Finance database.

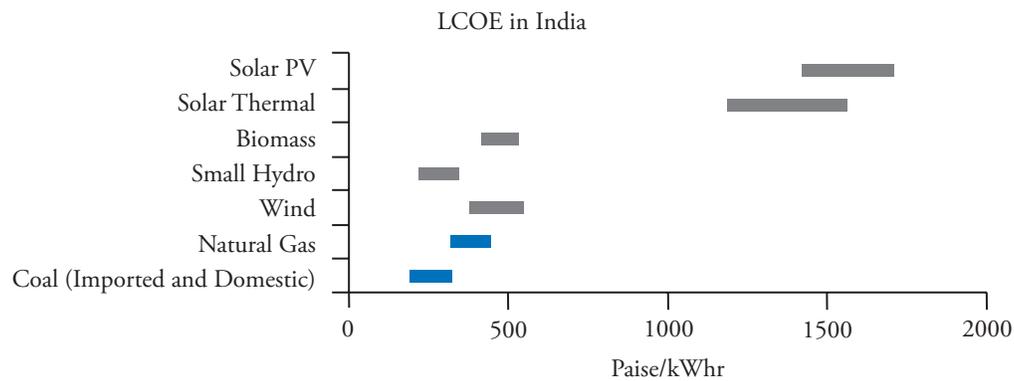


FIGURE 5.5 Increasing Competitiveness of Renewable Energy Based on Indicative LCOE

Source: IDFC Private Equity research.

to conventional power costs. It is found that under Case I of the competitive bidding for procurement of electricity, where the fuel source and location is not specified for medium- to long-term power purchase agreements, the revealed prices for fossil fuel based electricity have ranged between Rs 3–4 per unit. For the short-term merchant power from fossil fuel sources, the price realized is between Rs 4–8 per kWh.

### PE INVESTMENT OPPORTUNITIES IN INDIA

The Private Equity Investment opportunities in India have been in different segments or parts of the value chain, and there have been different responses in each

segment by the investors. In this section, we identify the underlying segments and the activity levels, attractiveness, and challenges in each of these segments.

### Project-based Investment Opportunities

#### Investment Activity so far

Given the regulatory framework prevalent in the country, most of the investment in the renewable energy sector started through balance sheet financing of medium- and large-sized corporations, where these entities took advantage of the depreciation tax shield to reduce their tax liability. However, with the emergence of Independent Power Producers (IPPs) in the renewable energy space over the

last four years, the Indian financial institutions have evolved from balance sheet financing to project financing. In 2006, about 50 per cent of the amount invested in the renewable energy sector was balance sheet funding which reduced to 30 per cent in the year 2008. A number of these IPPs have received backing by PE funds (see Table 5.1).

**Segment Attractiveness**

The project deployment segment has become increasingly attractive as more technologies have improved in terms of the risk-return combination. India is very attractive for this segment on account of several reasons as shown in Figure 5.6 and the key reason is that the deployment cost is amongst the lowest in the world. For instance, even in the mature wind segment, it is half the cost when compared to the US or Europe. Further, policy and regulatory directions, with the announcement of generation-based incentives, national solar mission, renewable energy tariffs, and proposed renewable energy certificates combined with the availability of project debt financing, have positioned IPPs as an attractive investment opportunity.

**Preferred Business Models**

The key attributes that PE investors look for in these IPPs is a focus on renewables, strong management teams with technology, development, financing and regulatory expertise, and asset diversification with a significant component of operating assets. Rather than small single project developers, the IPP model has been attracting much more investments as it provides economies of scale to boost project returns and create an entity that can be listed based on multiples valuation or a valuation that provides value to the asset pipeline to amplify the overall returns. Some PE companies have taken the initiative to create innovative business models and then invest in those; the setting up of Green Infra Limited being a case in point (See Box 5.1).

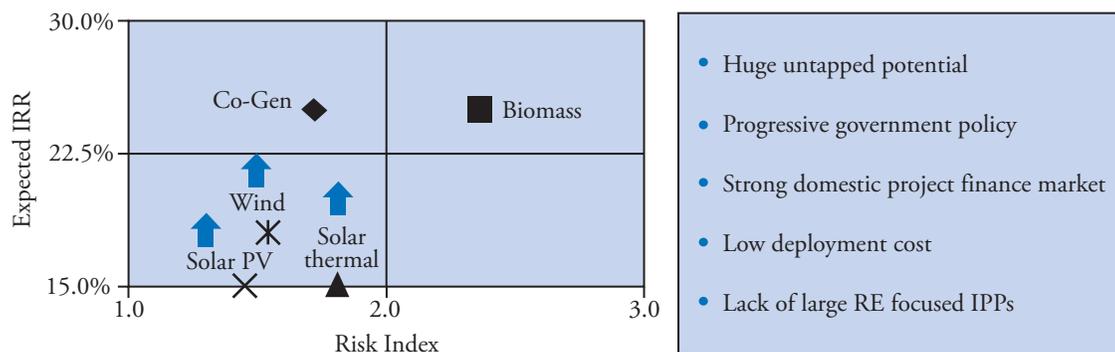
**Potentially Competitive Global Suppliers**

From 2004–5 onwards when the global CleanTech market took off, some sectors such as wind and solar grew so rapidly that the supply-chain was unable to keep pace. By 2008, the supply chain moved into balance as the credit crisis hit the world, leading to an over-capacity situation that put severe pressure on prices. Since 2009–10

**TABLE 5.1** IPPs in Renewable Energy Segment Received Support of PE Funds

Company	Set-up	Investor	Operational Capacity (MW)
Green Infra Ltd.	2009	IDFC PE Fund II and Fund III	124 MW (Wind)
Orient Green Power	2007	Olympus Capital, Bessemer Ventures, Shriram EPC	175 MW (Biomass—40MW, Wind – 135MW)
Greenko	2006	Global Environment Fund, Aloe Environment Fund, TPG Growth	120 MW (Hydro—78MW, Biomass -42MW )
Auro Mira Energy	2005	Baring PE	17.5 MW (Biomass)
Shallvahana Green Energy	1980s	Axis PE, IL&FS Financial Services	35 MW (Biomass)

Source: IDFC Private Equity research.



**FIGURE 5.6** Renewable Energy Project Segment—Risks, Indicative Returns, and Attractiveness of India

Source: Internal IDFC Private Equity research.

## Box 5.1

## Green Infra Limited: An Innovative Business Model

## Introduction

Green Infra Ltd. ('GI' or 'Company') was set up by funds managed by IDFCPE to build a platform with aggregation and development capabilities in the renewable energy sector. GI is an IPP and develops/operates renewable power generation projects across the wind, solar, biomass, waste-to-energy, small hydro, and energy efficiency verticals. At present, the Company has 124 MW of operating assets in India and aims to reach 1GW of total capacity in the next 2–3 years.

## Business model

GI generates power utilizing renewable sources of energy and sells it to a variety of customers. The Company follows both organic and inorganic routes to develop generation capacity across verticals. Through the acquisition-led route, the Company seeks to acquire attractive operational assets to provide an immediate boost to its generation capacity. It also provides a plug-and-play platform for smaller entrepreneurs in the sector. For the organic route, the Company works with leading project advisors/technology providers to identify and develop greenfield project opportunities in the above mentioned sectors. The Company has a diversified customer base, including public sector utilities and some of the leading corporations in India, including the Tata Group. The strategy enables GI to maximize the returns at a listing event while realizing synergies and economies of scale across the projects.

## Journey so far

Within 18 months since inception, GI has become one of the largest renewable energy IPPs in the country (one that is not a subsidiary or arm of a large corporate group) and today has 124 MW of high-quality operational wind assets. It has successfully pioneered the sale of wind power on a group captive basis. In July 2009, the Company acquired a 100 MW portfolio of operating wind farms from BP, one of the largest recent transactions in India's renewable energy sector. This year, it is evolving as the first renewable IPPs in India to have a presence across each technology vertical. The Company has a pipeline in excess of 500 MW across different verticals.

*Source:* Authors' own.

onwards, some key markets such as Germany and Spain announced cut backs in the incentives being given to CleanTech segments. These trends at different points in time underlined the importance of cost advantage as the key criteria to define market survival and leadership. In this period, since 2003 onwards, the local Indian market started opening up for renewable energy projects and thus became a good testing ground for technologies developed in the west that were at an inflection point of commercialization. As far as the suppliers are concerned, the local

market also became a hedge to the volatility of the global markets. These trends created a very strong investment case for enablers supplying to the global market. There has been an evolution of a complete ecosystem including a strong manufacturing base for the alternative energy sector. Given India's strength in cost-efficient manufacturing, the companies involved in manufacturing/production of wind turbines and, solar cells have drawn strong PE interest. Some of the transactions in the CleanTech value chain in the last five years are highlighted in Table 5.2 below:

**TABLE 5.2** Select PE Transactions in Enablers along the Renewable Energy Supply Chain in India

<i>Company Name</i>	<i>Sector</i>	<i>Amount raised (\$ million)</i>	<i>Key Investors</i>
Moser Baer Photo Voltaic	Solar	200	IDFC PE, Morgan Stanley, CS, Nomura, GIC, CDC
Winwind	Wind turbine manufacturing	174	Masdar
Suzlon Energy Limited	Wind turbine manufacturing	44	Citigroup Venture Capital, Chrys Capital
Vestas RRB India	Wind turbine manufacturing	55	Merril Lynch
Seforge Limited	Wind turbine components	83	IDFC-PE
Shriram EPC	EPC-biomass and wind turbine manufacturing	39.5	Bessemer Venture Partners, ChrysCap, UTI ventures, Argonaut
Emergent Ventures India	Carbon advisory	10	IDFC-PE

*Source:* Internal IDFC Private Equity research.

### Investment Opportunities in Value Chain Enablers

The key attributes of an enabler along the renewable energy supply chain that a PE investor would be looking at would include sales diversification in terms of geographies and a mix of short-term and longer-term orders with an anchor customer, sustainable cost advantage, access to technology, and a strong cohesive team. Some of the segments along the supply chain in the CleanTech space that PE investors may find attractive and the attributes or business models that underscore their attractiveness are discussed below.

#### Solar Energy Segment

The global solar segment has been a hotbed for innovation as it is destined to be the long-term market leader. It has been going through a down cycle following the global economic crisis of 2008–9 that is leading to a shakeout. After the crisis we are in an oversupply market that is going to last. As a result, the market price has dropped sharply by 40–50 per cent. It is a survival of the fittest situation

and a winner would need staying power plus scale, cost advantage, ability to keep pace with changing technology, sales diversification, and a strong domestic market. India is a good market to create successful enablers targeting the world market as the National Solar Mission has opened up a strong domestic market in addition to the other reasons as shown in Figure 5.7 below.

For example, IDFC PE invested in Moser Baer PV in 2007–8 that straddled multiple technologies while developing a customer base in Europe and leveraging its experience in lowering the manufacturing cost. The opening of the Indian market would provide a good hedge to the downturn in the European markets.

#### Wind Energy Segment

Recovery from the oversupply situation in the global wind segment is in sight. Again, to be successful in this segment one needs staying power in addition to customer diversification, scale, and cost advantage (See Figure 5.8). The key reason why India is a germane market for this is the very large and mature wind market in India.

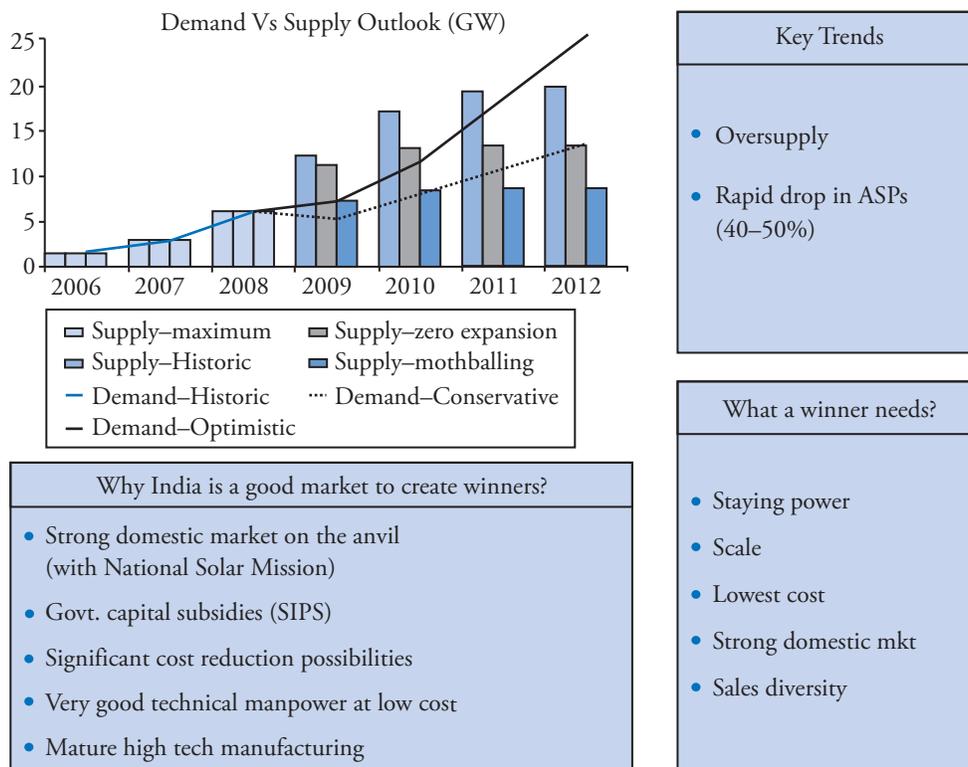


FIGURE 5.7 The Global Solar Enabler Segment

Source: Bloomberg New Energy Finance<sup>7</sup> and internal IDFC Private Equity research.

<sup>7</sup> Bloomberg New Energy Finance presentation dated 5 November 2009 in London by Michael Liebrich in E2DS conference.

Two types of business models are attractive to investors in this segment. The first model is to manufacture wind turbines by getting access to superior technology and which can be combined with the local manufacturing advantage. But the challenge is to penetrate an overcrowded market. The large local market, alliances with farm developers outside India and the ability to provide attractive pricing can mitigate the risk. One such example is Masdar Cleantech Fund's<sup>8</sup> investment in WinWind.<sup>9</sup> Further, it may be also attractive to manufacture components of wind turbine generators that can supply to the global wind market and is not dependent on the sales of one turbine supplier. An example of such an investment is IDFC Private Equity's investment in SE Forge.<sup>10</sup> The challenge in this model is to develop the components and develop a large diversified customer base. The challenge could be mitigated by an anchor customer concept followed by customer diversification by supplying to other wind

turbine manufacturers as well as non-wind segments such as power and heavy engineering.

**Carbon Mitigation Services Segment**

The global carbon market has been at the crossroads with a failure to reach a global consensus post-Kyoto Protocol. The way that the climate policy negotiations are evolving, it is envisaged that the post-Kyoto period, that is the post-2012 phase, will be marked by the emergence of several local markets for carbon trading. A successful service provider to the carbon market needs a high local supply base to get to scale, access to low cost quality manpower and access to the global buyer market. India is a good place for creating winners as the local carbon mitigation market is huge.

An example of an innovative model in the carbon segment is Emergent Ventures India (EVI). In 2008, IDFC PE invested in EVI and it has emerged as one of the top

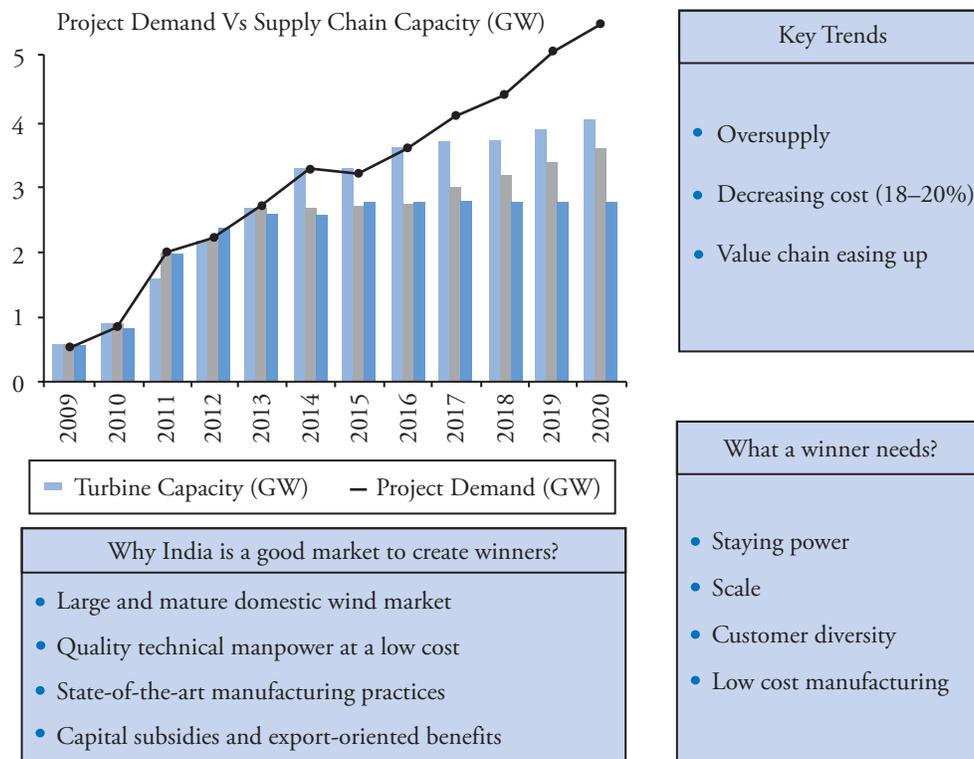


FIGURE 5.8 The Global Wind Segment

Source: Bloomberg New Energy Finance<sup>11</sup> and internal IDFC Private Equity research.

<sup>8</sup> Masdar Cleantech Fund is a leading fund based in United Arab Emirates.

<sup>9</sup> WinWind is a recent entrant in the wind market with turbines based on technology developed in Finland and manufacturing facilities in India.

<sup>10</sup> SE Forge is a subsidiary of Suzlon Energy Limited. It has one of the largest state-of-the-art forging and foundry facilities in India. It supplies large castings and forgings to the Indian and global wind turbine manufacturers.

<sup>11</sup> Bloomberg New Energy Finance presentation dated 5 November 2009 in London by Michael Liebrich in E2DS conference.

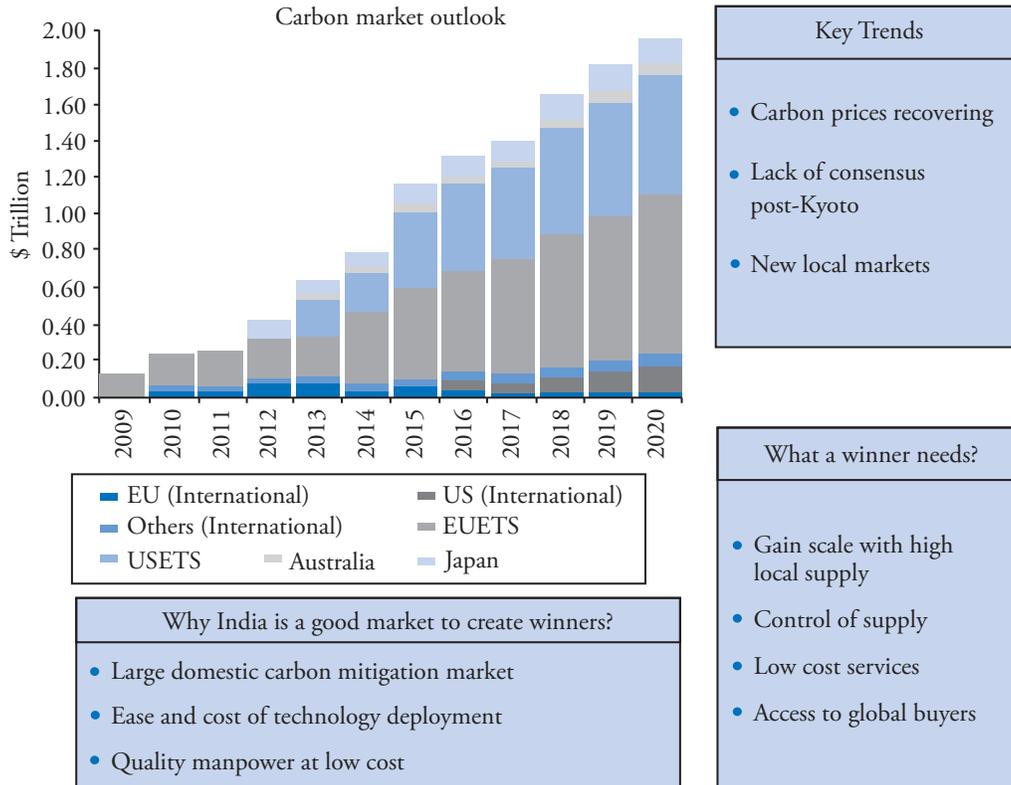


FIGURE 5.9 Global Carbon Enablers

Source: Bloomberg New Energy Finance<sup>12</sup> and internal IDFC Private Equity research.

carbon service providers in India. The uniqueness of the business model of EVI was that it has evolved iteratively over time. It started with a carbon advisory business that expanded around the world in buyer and supplier countries. Then it developed the carbon procurement business by proactively developing renewable energy projects and is evolving as a master contractor for such projects. As a third step it developed a carbon value advisory business by providing climate change consulting services to corporations. Each business vertical is complementary and has served as a hedge to the other business vertical in order to mitigate the post-Kyoto risk.

## ROLE OF THE POLICY

### Policy Evolution

Policy is the key to leverage the flow of PE capital into the CleanTech Infrastructure sector. The overall policy direction in India has been positive in terms of increasing the attractiveness of the sector for the flow of PE capital.

However long-term policy stability is important as the nature of the underlying cash flows justifying these investments is long term. The key drivers for PE capital have been the renewable portfolio standards, generation-based incentives, capital subsidies, opening up of power trading, and more recently the National Solar Mission and the REC policy. It is important that the policy interventions are made at the right point to increase the flow of PE capital. For instance, the GBI not only incentivized the maximization of the utilization of the wind resources but also made the segment more attractive for IPPs and not just driven by tax breaks.

### Policy Implementation

But the real challenge so far has been in the implementation of the policies, which needs to be improved to convert the huge interest generated by policy announcements into real investments. For instance, a huge interest resulted from the announcement of the National Solar Mission. However the implementation could be delayed as several

<sup>12</sup> Bloomberg New Energy Finance presentation dated 5 November 2009 in London by Michael Liebrich in E2DS conference.

issues such as the bankability of the power purchase agreement (PPA), the selection criteria, and localization component in the solar farms have become contentious.

### Measures for Higher PE Investments

The policies that would accelerate PE capital into value chain enablers is a subset of those needed for project-based companies. If the demand and viability of projects improve then the customer base for the enablers would increase. In addition, cross-border trade policies would also impact the attractiveness of the value chain enablers. The value chain enablers are also impacted by the global policy and regulation but that is outside the scope of this chapter. Hence some instances of policy measures that would accelerate PE investments are:

#### Policies for increasing the demand and supply of renewable energy projects:

- Strict enforcement of the state renewable portfolio standards and an enforceable national renewable portfolio standard.
- A mandatory carbon foot printing and mitigation policy for top corporations and government institutions can increase the demand for renewable energy and other carbon offset projects.
- Make it mandatory for independent power producers and state/central utilities to have a certain percentage of renewable energy generation base.

#### Policies for improving the economics of renewable energy projects

- Policies to enable tax benefit driven and cash returns driven investors to come together in the same wind project so as to bring down the weighted average cost of equity as the tax driven investor has a lower cash return appetite. Joint participation by both sets of investors had been a very strong driver of equity investments in the US wind market.
- Dedicated long-term lending for the sector wherein the banks need to allocate a certain percentage of the loan book to the sector.

#### Policies for accelerating the cross-border partnerships to transfer, deploy, and localize clean technologies

- There are several technologies that have gone through the long research and development phase and are now

ready to be commercialized. Deploying such technologies in India can meet India's current energy needs, commercialize the technology, and bring down their cost by localization. However to make such projects commercially viable for equity investors, a significant amount of debt is needed. But since these projects have a significant technology risk, the lenders may not have the risk appetite. A loan guarantee scheme from the government for projects using new technologies, such as concentrated solar power, that have a strong localization potential along the lines of Department of Energy loan guarantees in the US would accelerate such investments.

- Subsidies for such ventures/partnerships/joint ventures that bring new technologies into India and also develop India as a sourcing base for their deployment elsewhere would also make these ventures attractive for equity investments.

#### Miscellaneous policies

- Capacity building initiative at various institutions as there is a serious need for trained human resources in the sector.

### CONCLUSION

Overall, based on the experiences and learning so far, there are clear messages emerging for the key stakeholders in the sector namely; the PE investors, the entrepreneurs, and the policymakers. For the PE investor in the sector, it is clearly an attractive opportunity with a potential of strong secular growth based on robust drivers. Though, some operational challenges continue to exist but with clearer government support towards the sector, the issues should be resolved in the near term. That drives the message for the regulators and policymakers, who need to focus on policy stability, quick implementation, and a stronger interface with the industry players to provide the impetus at the right place and time. The entrepreneurs, on the other hand, have several innovative business models to build a renewable energy platform. However, the key to attracting PE capital is to focus on sustainable competitive advantage that can be achieved through cost leadership, being ahead on the technology curve, development expertise, and development of diversified customer base.