

CASE STUDY:

ALTERNATIVE ENERGY INVESTMENTS

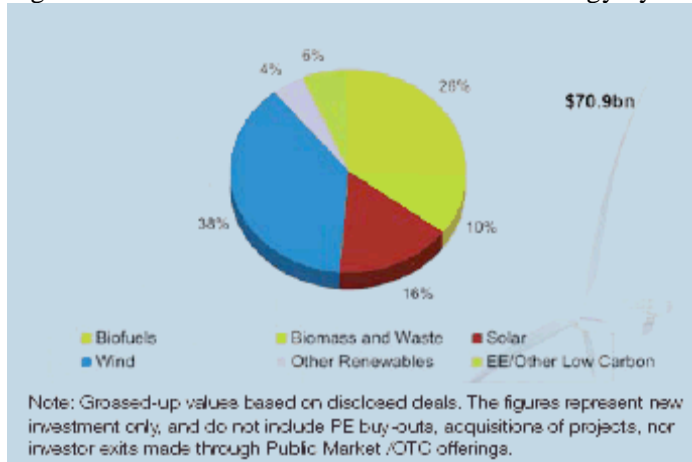
1 Trends in Alternative Energy Investments

Investment in renewable energy and energy efficiency globally has been rapidly increasing in recent years. It has grown from \$33.4 billion in 2004 to \$148.4 billion in 2007, nearly quintupling over this period and increasing by 60 percent over 2006. Strong growth in 2007 was driven mainly by government policies to promote renewable power and cleaner fuels, the \$100 per barrel price of oil, and rising corporate and investor awareness of the opportunities in clean energy (NEFb, 2008). This trend is expected to continue in the coming years but the current levels of investment are still inadequate if industrialized countries are to meet their own greenhouse gas emission reduction targets. Michael Liebreich, CEO, New Energy Finance feels, “a further fivefold increase is required for major countries to meet their own ambitious targets for reductions in greenhouse gas emissions.” (NEFb, 2008)

1.1 Investment trends by technology

Sectors showing the highest levels of investment globally have been the wind, solar, biofuels and biomass/waste. The wind sector attracted the most investment (38 percent) followed by biofuels (26%) and solar (16%) (Greenwood, 2007). These technologies have benefited from different policies and incentives in developing countries. The most exciting story is the different types of private investment (discussed below in detail) flowing towards these technologies reflecting both the level of maturity of the different technologies and the risk appetite of different types of investors.

Figure 1: Global Investment in Sustainable Energy by Technology



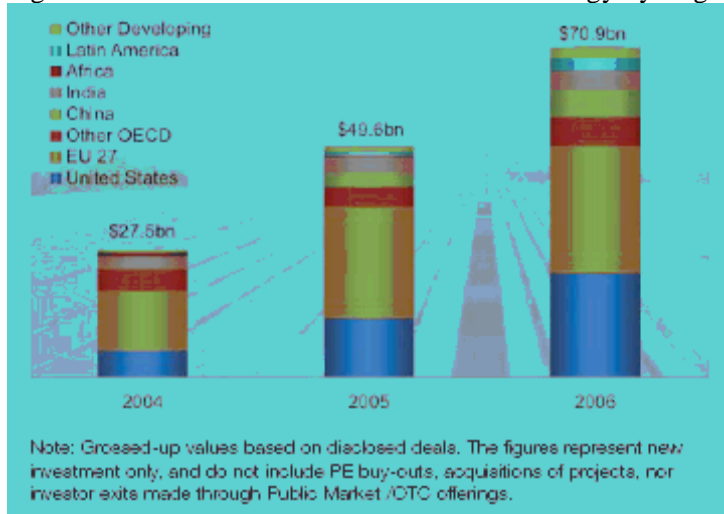
Source: Greenwood, 2006

Wind and biomass, the two longest-established renewable energy generation technologies, raise much of their capital in the form of asset financings reflecting the relatively low risk levels associated with it. The next most mature technology – solar – receives most of its capital via share issues in the public markets for manufacturing equipment expansion while biofuels emerged as a dynamic but high-risk sector attracting mainly venture capital/private equity (VC/PE) investments with a particular interest in the US (Greenwood, 2007).

1.2 Investment trends by region

The heaviest capital flows in 2006 was witnessed in the US, EU-27 and large emerging economies such as China and India. OECD countries dominate with the US and the EU together accounting for more than 70 percent of the investment in 2006. They also have a broader financing spectrum unlike developing countries (Greenwood, 2007). However, investments in emerging economies are increasing quickly led by China, India and Brazil.

Figure 2: Global Investment in Sustainable Energy by Region



Source: Greenwood, 2006

In 2006, developing countries share of investments in renewable energy and energy efficiency stood at 21 percent (\$15 billion) up from 15 percent (4.2 billion) in 2004. China alone accounted for a 9 percent share with investments in wind, biomass and energy efficiency and like OECD countries received a broader spectrum of financing. India was a little behind China but witnessed energy investment activity in wind energy and Brazil in its sugar-based ethanol sector. Both these countries received investments mostly in the form of asset financing in these sectors. Africa, too, is starting to see small levels of asset financing in renewable energy and efficiency driven in part by its power shortages. The shift in private capital to developing countries in recent years is unambiguous (Greenwood, 2007).

2 Investment Drivers

The principal drivers of investment in renewable energy and energy efficiency are climate change and energy security policies. Thus, pricing carbon and investing in technological development and deployment are the key priorities. Many of the policies to address climate change and energy security challenges include a broad array public finance incentives and regulatory support to encourage investments alternatives. But, policy is not the only driver. Recent investor appetite suggests that some of the existing technologies have matured and are ready to be scaled up (Greenwood, 2007).

2.1 Pricing carbon

An appropriate carbon price either explicitly through tax or trading, or implicitly through regulation ensures that people are faced with the full social cost of their actions. This will lead them to switch away from high-carbon goods and services, and to invest in low-carbon alternatives (Stern, 2006). The choice of tools or the combination of them will depend on national circumstances, the

characteristics of particular sectors, and the relationship between climate change, energy and other policies. It will also depend on their efficiency, distributive and revenue effects.

To influence behavior and investment decisions, investors and consumers must believe that the carbon price will be maintained into the future. This issue is particularly pertinent for investments in 'long-lived capital stock', in assets such as power stations, buildings, industrial plants and aircrafts, whose productive life lasts for many decades. If there is uncertainty about policies, then businesses may not factor a carbon price into their decision-making resulting in overinvestment in less than ideal long-lived, high-carbon infrastructure. Governments need to provide regulatory certainty focusing on long-term and predictable policies as it provides clarity over the life-cycle of assets.

2.1.1 Through fiscal measures (taxes and subsidies)

Tax incentives can be highly effective, especially when applied at the point where assets are nearly ready for the market. For example, they can be used to help accelerate the payback on low carbon investments through allowances on leasing (UKSIF & Carbon Trust, 2007). Governments could also provide guarantees for investments in low carbon assets, which would effectively reduce the cost of asset acquisition especially for small and medium-sized enterprises. Further, financing measures can help investors overcome the possible constraints to paying the upfront cost of efficiency improvements.

2.1.2 Through markets (trading)

Trading schemes can be effective in equalizing carbon prices across countries and sectors thereby enhancing the efficiency of allocation of investments across technologies and regions. The EU Emissions Trading Scheme is now the centrepiece of European efforts to cut emissions and the Kyoto Protocol trading mechanisms the centerpiece of global efforts. In order to maximize the benefits of trading schemes, they must provide incentives for flexible and efficient responses.

2.1.3 Through regulation

Regulatory measures can also play a powerful role in cutting through barriers that prevent action even when cost-effective alternatives exist by providing greater clarity and certainty (Stern, 2006). For example, minimum standards for buildings and appliances have proved to be a cost-effective way of encouraging investments in energy efficiency. Further, governments themselves could take the lead in acquiring low-carbon assets helping establish markets.

2.2 Accelerating technology development & deployment

Global public spending on research, development and demonstration in the energy industry has fallen significantly in the last two decades to \$10 billion and is now low relative to other industries (Stern, 2006). In the US too, there has been a broad-based decline in energy R&D investments since the mid-1990s, including by the private sector, even as overall investments have grown by 6 percent (Nemet & Kammen, 2007). More recent data, however, show that private sector investment in energy R&D globally is improving. It increased from \$13 billion in 2005 to \$16.3 billion in 2006.

One of the factors driving the increased investment in renewable energy is the maturity of some of the technologies. Onshore wind energy is one such example. Further, the investment in these technologies have now reached a critical mass that even if oil prices were to drop below \$40, it may slow down investments but not stall it altogether (Greenwood, 2007).

The private sector plays a major role in technology research, development and diffusion. But, closer collaboration between government and the industry can stimulate the development of a broad

portfolio of low-carbon and high-efficiency technologies on an urgent timescale also reducing costs. Many low-carbon technologies are currently more expensive than fossil-fuel alternatives. But evidence suggests that the costs of technologies fall with scale and experience. If the scale of existing deployment incentives provided by governments worldwide were to increase by two to five times from the current level of around \$34 billion per annum, then a range of technologies could be brought forward through innovation across the private sector (Stern, 2006).

Governments are starting to implement a range of new financial mechanisms using public funds mostly targeting the pre-commercialization financing gap, which today plagues new technology developments. These mechanisms include contingent grants, technology incubators, convertible loans and public/private venture capital, which is used to help get alternative energy technologies from the R&D and demonstration phases through to full-scale commercialization (Makinson, 2005).

3 Role of Governments: The Past and the Future

Policy instruments used by governments are numerous and often bewildering because of frequent complicated amendments resulting from political compromises. Quite frequently, two or more instruments have a bearing on a particular technology. Tax concessions on costs combined with price support on output is a classic example. Despite their diversity, the policy instruments usually have a couple of things in common – they reduce the private costs and risks of investment and it increases the cash flow receipts. In other words, they raise the private rate of return to investment such that a large number of energy companies and manufacturers also invest in the development and use of the technologies (Anderson, 2006).

3.1 Economic Instruments

Economic instruments provide an explicit price signal to firms and individuals, and are particularly useful when the appropriate response varies between different regulated firms or if there are information asymmetries such that the regulator does not fully know the firm's costs. They include price-based instruments such as fiscal incentives or quantity based instruments such as cap-and-trade schemes (Hepburn, 2006).

3.1.1 Fiscal Incentives

3.1.1.1 Taxes

Some of the tax measures used include carbon taxes in Sweden and Norway, and excise taxes and corporate tax allowances such as reduced taxes on biofuels in the UK and the US. The fiscal impact of taxes is quite significant. Therefore, it has been shunned by most governments in favor of technology- or innovation-oriented policies in order to allow options to be developed, demonstrated and brought into commercial use (Anderson, 2006).

3.1.1.2 Subsidies

Subsidies are quite widely used to promote alternative energy technologies. They include capital grants for demonstrator projects and programs such as those employed in the US, Germany and Japan for solar PV 'rooftops', investment programs in marine renewables in the UK and Portugal, procurement policies used historically to purchase nuclear energy in OECD countries and currently in use in China, and subsidized interest-free loans for green projects (Anderson, 2006).

3.1.1.3 Financial guarantees

The concept of price guarantees is a new idea that is now being discussed. For instance, tranches of 'no-carbon generation' could be guaranteed a price thereby introducing a technology-neutral measure

allowing energy from different sources such as nuclear, fossil fuels with carbon capture and storage and renewable energy to all benefit from it. It could be financed either through taxes, a levy on electricity sales, or from the revenues generated by a buyout price (Anderson, 2006).

3.1.2 Developing Markets

Governments can play a role in developing markets that encourage investments in renewable energy and energy efficiency projects. The market for carbon credits is an example of such a system.

Carbon markets are principally characterized by two types of systems – cap-and-trade mechanisms and project-based offset mechanisms. In 2006, the carbon market grew to an estimated value of \$30 billion tripling in size over 2005. This was driven mainly by trades in European Union Allowances under the EU ETS but project-based emission reduction activities also rose significantly driven mainly by growth in the Kyoto mechanisms (Capoor & Ambrosi, 2007).

The Kyoto mechanism for trading between industrialized and developing countries (CDM) has been a significant driver of investment in renewable energy and energy efficiency projects in developing countries. In March 2008, 76 percent of CDM projects in developing countries registered at the UNFCCC were renewable energy and energy efficiency projects (UNEP Risoe Centre, 2008).

The future of the carbon markets is uncertain. The EU has set itself a target of cutting its emissions by 20-30 percent by 2020. This will create a source of demand for international carbon reduction projects up to 2020 but if they were to go it alone, this would lead to a 60 percent fall off in project development activity undermining the confidence of investors who have taken early positions in this market. Were other countries, particularly the US to join them, then this would create a market two to three times the size of that observed in the pre-2012 period (NEFa, 2008).

An analysis of the bills before US Congress suggest that the US will have \$1 trillion carbon market by 2020 if a domestic cap-and-trade system were created allowing only domestic trades. The price of carbon in the US would be \$40 per ton by 2015, consumer energy prices would rise by 20 percent for electricity, 12 percent for gasoline and 10 percent for natural gas leading to major investments in renewable energy, energy efficiency and other GHG mitigation projects (NEFc, 2008). If the market were opened up to other countries, it would reduce the cost for the US but also lead to clean energy investment flows in to developing economies.

3.2 Command-and-Control Instruments (Regulations)

Command-and-control systems require that firms or individuals comply with specific standards such as technology or performance standards. Such measures are preferred when the regulator has good quality information and the risk of government failure is low (Hepburn, 2006).

3.2.1 Standards & Labeling

Efficiency standards for building materials and appliances are often supported by tax credits and grants in many countries (Anderson, 2006). Fuel or fleet efficiency standards and labeling of consumer appliances are measures commonly used to improve efficiency in the end-use of energy.

3.2.2 Renewable Obligations

Renewable obligations in the form of renewable portfolio standards creates a quota-based systems whereby utilities are obligated to purchase electricity from renewable sources at feed-in tariffs, at prices that offer premia over electricity from other sources. This is done for wind and solar PVs in Germany and Spain, biofuels and wind in Austria, wind in The Netherlands and renewables in twenty states in the US (Anderson, 2006).

4 Role of the Private/Financial Sector: The Past and the Future

4.1 Venture Capital and Private Equity

Venture capital and private equity (VC/PE) investments include investments into companies developing sustainable energy technologies or providing services to the sector. VC/PE investments in clean energy companies jumped 34 percent in 2007 to \$9.8 billion (NEFb, 2008). In 2006, the biofuels sector dominated in this segment with \$2.9 billion flowing into the sector, twice as much as the next strongest VC/PE technology – solar.

4.2 Public Markets

Public markets refers to new equity investments in listed companies developing and manufacturing sustainable energy technologies, and building and operating clean energy power generation capacity. Equity investments in this category soared by 123 percent to \$23.4 billion in 2007, driven in large part by the record breaking initial public offering of Iberdrola Renovables, the Madrid-based leader in installed wind energy investments (NEFb, 2008). In previous years, there have been other sectors, notably biofuels and solar energy that have outperformed in the wind sector. In 2006, the solar energy sector witnessed \$5.7 billion in investment activity.

4.3 Asset Financing

Asset financing refers to investments in renewable energy generation projects from internal company balance sheets, debt financing, or equity financing. Financing of this type climbed 68 percent to \$84.5 billion in 2007 with investments mainly in wind farms and biofuel plants (NEFb, 2008). Wind dominated asset financings in 2006 as well, accounting for more than 50 per cent of the capital invested in this class. This trend is reflective of previous year, where these two sectors have seen the highest investments of this type. The US leads in new asset financing followed by German, Spain and China (Greenwood, 2007).

4.4 Mergers and Acquisitions

Mergers and acquisitions (M&A) include existing equity purchased by new corporate buyers in companies developing sustainable energy technologies or operating sustainable energy projects. Mergers and acquisitions also include private equity buy-outs, asset re-financings and investor exits through public market and over-the-counter transactions. In 2006, M&A deals were up by 34 percent valued at \$16.9 billion. The wind manufacturing sector was driving activity picking up strategic stakes to secure supplies of key components. The trend is towards companies in emerging economies acquiring assets in OECD countries (Greenwood, 2007).

4.5 Investment Funds

Investment funds include both publicly listed and private funds. Private funds are further split between specialist funds and generalist fund managers. In 2006, \$18 billion was under management in approximately 180 investment funds focused on renewable energy and energy efficiency. Publicly listed funds grew by 43 percent while private funds grew by 59 percent.

5 Conclusion

The market for clean energy investments is becoming more liquid and more global. Various forms of capital are now being deployed across the value chain in the clean energy sector, an indication that the sector is shifting into the mainstream. The investment community already believes that the technologies available today are ready to decarbonize the energy mix. But, investment growth is underpinned by clean energy policy initiatives making indispensable the role of government in sustaining the investment growth.

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