Clean Energy Investment

Written testimony to the United States Senate Committee on Energy & Natural Resources on the Financing of Renewable Energy and Low-Carbon Technology

In 2006, renewable energy and low-carbon technology industries set a record with more than $100bn worth of financing transactions. Of this, $70.9bn was new investment, an increase of 43% over 2005. The remaining $29.5bn consisted of mergers and acquisition activity, leveraged buyouts and refinancings of assets. As of March 2007, there is no shortage of capital available for new energy ventures and projects, either globally or in the US.

While the European Union remains the global pacesetter in overall clean energy investment, the US has demonstrated leadership in a number of areas, including venture capital and private equity. In 2006, the US took major strides toward closing the overall funding gap with Europe through a massive build-out of its ethanol sector and the addition of 2.5GW of new wind farms.

There are, however, areas in which the US lags. In particular the public markets, where – despite a number of high-profile initial public offerings – volume of funds raised trails Europe, and the carbon markets, where the EU Emissions Trading Scheme is overcoming its teething troubles to establish a clear and convincing lead.

On a sectoral basis, the US has seen substantial investment activity in wind, biofuels and geothermal, but lags behind in other key areas of renewables such as conventional silicon-based photovoltaics, biomass, marine and mini-hydro. Investment activity, however, has not translated into a strong manufacturing base. Taking the broader clean energy industry, the US has strong programmes in "clean coal," but lies far behind Japan in stationary fuel cells, hybrid and electric vehicles.

Looking ahead, the US is among the leaders in several technologies that could revolutionize the energy industry in the medium-to-long term, including thin-film photovoltaics and cellulosic ethanol. America's outstanding research universities, its network of early-stage incubators, its ready supply of venture capital and its culture of entrepreneurship all bode well. Indeed, the growth of companies in these fields could help propel the US to the head of the pack in terms of overall investment.

To get there, however, the US will need sensible, transparent regulations and policies that assure investors of long-term returns from the sector. What investors require are clean energy policies that reduce unnecessary risk and allow for growth over the long haul. They seek ground rules which they know will remain in place for years to come. They appreciate policies that help reduce per-megawatt or per-gallon costs so that new energy technologies can ultimately stand on their own, with little government assistance. They also look for policies that reduce risk and accelerate time to market.

This paper presents a brief look at each class of investment in new energy, ranging from venture capital and private equity, to project finance, to activity on the public stock markets. Along the way, it seeks to place the US within the context of worldwide clean energy investment trends. Finally, it highlights a handful of policy areas the committee might examine as it crafts a solid regulatory framework to further clean energy growth in the US.

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Washington, DC, March 7, 2007

1. Overview

Investment in clean energy worldwide has more than doubled in the last three years, from $27.5 billion in 2004 to $49.6 billion in 2005 and $70.9 billion in 2006, according to New Energy Finance figures (see Figure 1).

The background to this increase includes heightened fears about climate change, fossil fuel depletion and energy security. In addition, there have been a number of significant accelerating factors – the most important of which has been the increase in energy prices since 2004. Others include an aging energy infrastructure in the developed world (leading to periodic blackouts), the risk posed by energy supply bottlenecks to fast-growing developing world economies, the advent of a number of new materials and information technologies, and an overall trend toward deregulation of the energy industry worldwide.

Policymakers around the globe have responded with a raft of support mechanisms, some of which have been particularly effective in encouraging the roll-out of clean energy solutions.

The latest figures are impressive, but there is plenty of room for growth. Generation of electricity from renewables (excluding large hydro) represented a just 2.1% of the world's total electricity generation in 2004, according to the International Energy Agency (IEA), but this will grow to 9.6% by 2030 in the IEA's Alternative Policy Scenario. Similarly, biofuels accounts for around 1% of transport fuel worldwide today. In the IEA's Alternative Scenario, this reaches 7% by 2030.

The 2006 investment came in a variety of forms, including $7.1bn early stage venture capital and private equity investments, $10.3bn in public market fund-raisings and $27.9bn in asset financing for major projects (Figure 2). The additional $29.5bn that changed hands in mergers and buy-outs do not constitute new investment in the industry. Investment was widely spread between the main sectors of biofuels, biomass and waste, solar, and wind.

On the public markets, clean energy stocks have soared. The WilderHill New Energy Global Innovation Index (NEX), which tracks the world's largest, most liquid and representative clean energy stocks, has far outpaced the broader market in the last four years (Figure 3) and even the AMEX oil index, recording a compound increase of 30.2% per annum for the past four years.

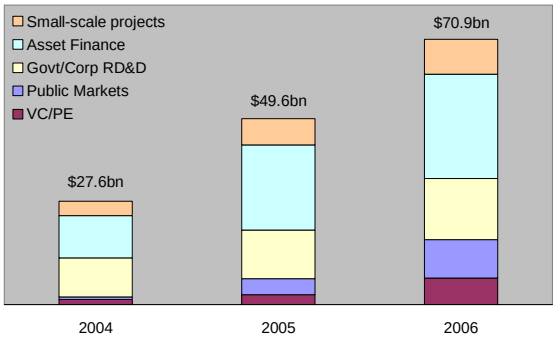
The sudden growth in clean energy has, inevitably, caused supply chain bottlenecks. In solar, the shortage of refined silicon has restrained the expected drop in installed per-kilowatt costs, even as the technology has improved. In wind, the massive gearboxes needed to produce grid-ready electricity are in short supply. Securing the necessary county, state, and even federal permits to build a wind farm can be time and cost-prohibitive.

In biofuels, a lack of ethanol-ready rail cars is a constraint, as is a shortage of rail terminals outfitted with ethanol offtake equipment. The current $4.00 per bushel price of corn represents a critical threat to the economics of many projects, which will only be overcome as farmers dedicate more land to corn for ethanol and new technologies allow the use of cellulosic feedstocks.

For its part, the US was slow off the mark in backing new energy but is now aggressively playing catch-up. The country lags Europe in the manufacturing of equipment but has closed the gap in the roll-out of renewable energy projects and biofuels refining capacity.

One very notable bright spot for the US has been its leadership in investing in cutting edge technologies via venture capital and private equity fundings. Assuming these technologies come to fruition, the US could assume the mantle of global leader in new energy.

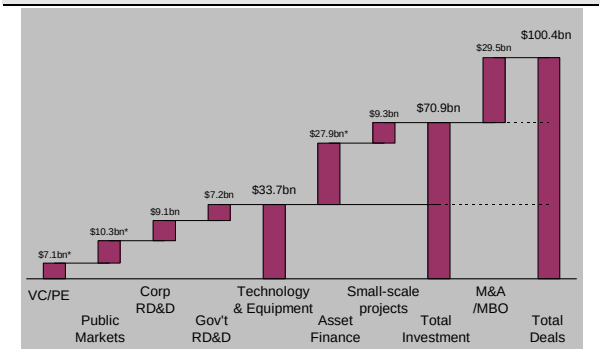
Figure 1. Global Investment in Clean Energy



Notes: VC/PE = venture capital and private equity. Figures are grossed-up based on disclosed deals.

Source: New Energy Finance

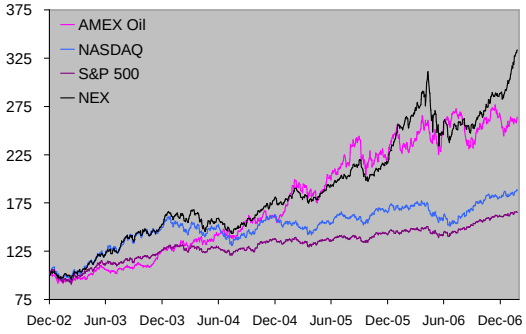
Figure 2. Global Investment, M&A and Refinancing in Clean Energy, 2006



Note: Grossed-up estimates based on disclosed deals

Source: New Energy Finance

Figure 3. WilderHill New Energy Global Innovation Index (NEX) performance 2003-2007



Source: New Energy Finance, American Stock Exchange

2. Venture capital and private equity

US investment in venture capital and private equity has increased very substantially in the past three years, and continues to run well ahead of Europe or Asia.

As the next wave of new energy innovation beckons, US investors appear ready to seize the moment through early-stage investments in start-ups. Last year, the US accounted for $4.5bn of the $7.1bn invested by venture capital and private equity funds in new energy worldwide, or 63% (Figure 4).

While a substantial portion of those US funds went toward the development of projects that use existing technologies, much also went into new technologies. When it comes to early stage technology investing, the US out-invested Europe by a factor of nearly three to one in clean energy in 2005, and seven to one in 2006. US venture capitalists put $390m alone into American solar start ups, for instance. Companies developing so-called "smart meters" to better track energy usage, or researching enzymes to make cellulosic ethanol commercially viable, or finding ways to reduce CO2 emissions from coal plants, among others have all received funding.

The surge in venture capital washing across the sector is not without its risks. Early stage investment made up less than 5% of the total $70.9bn of new money invested in the industry last year. New Energy Finance is aware of no fewer than 1,246 technology incubators, venture capital funds, private equity firms and corporations with a declared strategy of targeting clean energy (Figure 5). Half of them are US-based.

3. Public Markets

Despite its strength in venture capital and private equity, US public markets are trailing in providing funds for clean energy companies.

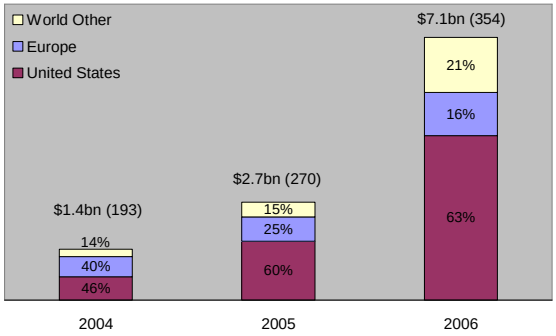
In 2006, the funds raised by clean energy companies via the public markets rose 140%, to $10.3 billion (Figure 6), with the flow of initial public offerings particularly strong in the second and fourth quarters. More than half the total, or $5.9bn, was raised on European markets. Despite high-profile IPOs from US ethanol producers VeraSun, Aventine and others, the US trailed substantially, with just $2.9bn raised in 2006.

As technology and equipment providers scale up to meet the demands of a rapidly-growing clean energy sector, they require access to more liquidity than can be provided in the venture capital community, and healthy public markets are essential. Today, publicly-quoted Japanese, Germany, and Chinese companies are clear leaders in the production of materials used in conventional (silicon-based) photovoltaic panels. Not a single "pure-play" wind turbine maker trades on a major US stock exchange, despite wind's status as the most mature renewable technology.

Meanwhile, London's Alternative Investment Market (AIM) last year hosted 17 IPOs and 14 secondary offerings of clean energy and carbon-related companies, which raised over $1.6bn in new funds. There are now approximately 50 clean energy companies trading on AIM. Most are relatively small, but combined they had a market capitalization of $7.8bn as of January 2007. And 12 of the 50 companies are based in the US. California-based turbine maker Clipper Windpower, for example, chose to list on AIM rather than on any of the US exchanges.

Reasons regularly cited by US CEOs for listing overseas include: high costs of listing domestically, particularly in the light of Sarbanes-Oxley; a perceived higher level of sophistication about new energy on the part of European investors; and a more stable regulatory environment in Europe as evidenced by the fact that the EU is a signatory to the Kyoto Protocol.

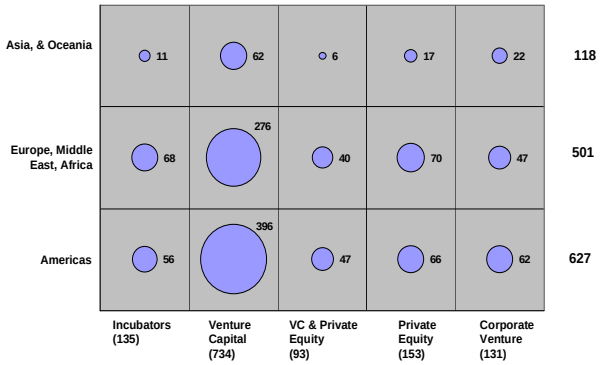
Figure 4. Estimated venture capital and private equity investment, 2004-2006



Note: grossed-up estimates based on disclosed deals

Source: New Energy Finance

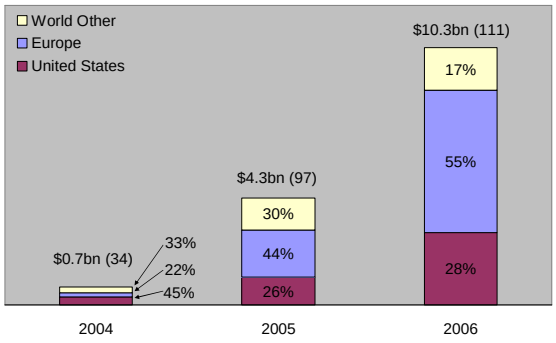
Figure 5. Venture Capital / Private Equity funds known to be targeting clean energy, 2006.



Note: Excludes Chinese incubators; based on 1246 funds known to New Energy Finance to be targeting clean energy technology.

Source: New Energy Finance

Figure 6. Estimated Public Market equity investment, 2004-2006



Source: New Energy Finance

4. Roll-Out of Renewable Energy and Biofuels

A surge of investment in ethanol and wind projects has allowed the US to gain ground in asset financings.

Asset financings – the roll-out of renewable energy capacity and biofuels processing capacity via projects - rose 23% to $27.9 billion worldwide in 2006 (Figure 7). This remains the largest single sector of new investment, accounting for nearly 40% of the 2006 total of $70.9 billion.

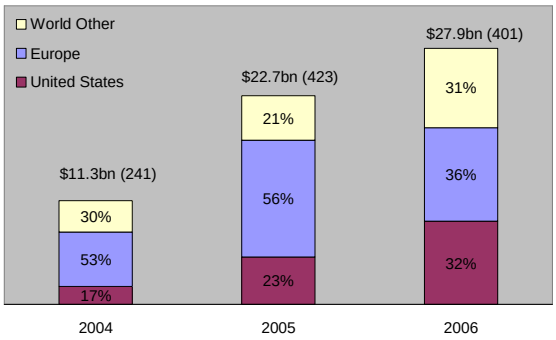
In the US, asset financings have grown from $1.9bn, or 17% of the worldwide total, to $9.0bn, or 32%. The US still trails Europe, which invested $10.2bn, but not by much. Meanwhile, financing of projects in Asia and elsewhere have also grown dramatically in recent years.

A confluence of factors, most notably the establishment of the Renewable Fuels Standard contained in the 2005 Energy Policy Act and the phase-out of MTBE as a gasoline additive, triggered a surge in US ethanol project financings in 2006. In just 12 months, the US added 3bn gallons of new capacity and today has approximately 5.4bn gallons of annual capacity on line. Another 78 plants are currently being built, the Renewable Fuels Association says.

An additional 2.5GW of new wind power was added to the US grid in 2006. This build-out was spurred in part by new state renewable portfolio standards requiring utilities to source certain percentages of their power from renewables. Improved access to lower-cost capital also played an important role.

Worldwide, investment in clean energy in 2006 was widely spread between the main sectors of biofuels, biomass and waste, solar and wind. There were also big variations in the most popular types of finance between the sectors. The main reasons for this are the maturity of the technology and the underlying subsidy regimes. Wind and biomass are the two longest established clean energy generation technologies, and so receive most of their capital via asset financings; solar is next so received most of its capital via share issues in the public markets; biofuels has emerged as a dynamic sector more recently, so much of its funding is coming down the private equity route.

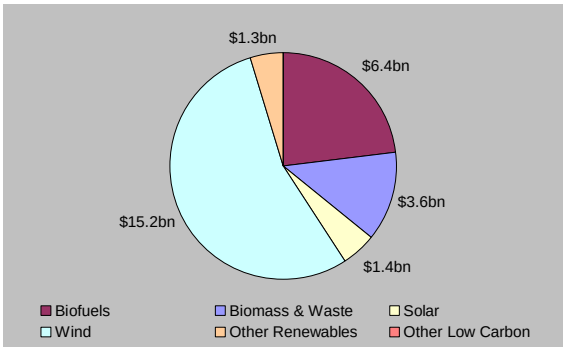
Figure 7. Asset financing trends 2004-2006



Note: grossed-up estimates based on disclosed deals

Source: New Energy Finance

Figure 8. Global Asset Financing by Sector, 2006



Note: grossed-up estimates based on disclosed deals

Source: New Energy Finance

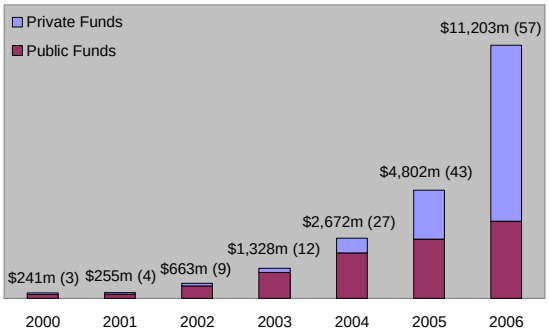
5. Carbon Funds

By March 2007, public sector and private carbon funds had a total of $11.2bn under management.

The lack of a formalized, mandatory carbon trading regime in the US has not stopped investors in New York and elsewhere from establishing funds to trade carbon credits on overseas markets. New Carbon Finance, a division of New Energy Finance, estimates that approximately $1.8bn of carbon funds are being managed out of the US. However, of this, only $599m is private money, the remainder being public funds. For London, the figure for private money is $3.5bn out of a total of $5.1bn, or 60% of all private carbon funds under management

As Northeastern and Western governors prepare to roll out regional carbon credit trading markets, US investors stand ready to participate. Until the US has a federally-mandated cap-and-trade system that covers the entire nation, however, liquidity in the US carbon markets is likely to lag that on the European market.

Figure 9. Global Growth in Carbon Funds, 1999 - 2006



Source: New Energy Finance

6. Key policy areas to address

New Energy Finance is not a policy think tank, it is a provider of research to a growing community of investors in clean energy companies, projects, and the carbon markets. With their perspectives in mind, and at short notice, we offer a few thoughts on policy initiatives.

Above all, it is important to note that in order to improve the return on investment in a particular company or project, it is not always necessary to offer subsidies or policy mechanisms to increase revenue. Investors will be just as attracted by policy that serves to reduce risk, cost or time-to-market.

i. Provide long-term, stable policy support

Renewable energy and biofuels are not currently able to compete with fossil fuels without the benefit of subsidies or support. Current federal renewable energy policy recognises this by providing subsidies, which are in some cases generous, but which periodically terminate. The recurring expiry of the wind Production Tax Credit, for instance, has pushed up the industry's cost of capital, causing bankers to incorporate "political risk" premiums into financing packages, and has kept turbine manufacturers from investing in the US at the level required to create a domestic supply chain – with its attendant jobs. Any policy aimed at the clean energy industry needs to be set in place for at least ten years. It may also build in a declining level of support over time to ensure that only the best technologies and teams receive backing, while still giving investors certainty about future cash flows.

ii. Reduce technology and commodity risk

One particular difficulty with new grid-scale energy technologies is that to produce adequate equity returns even pilot projects must be partly debt-financed, but debt providers will not accept technology risk. There is therefore a role for loan guarantees, or for other sorts of pooled technology insurance mechanisms. Long-term state or federal purchase guarantees should also be used to secure finance.

Volatile prices for commodities cause investors to demand higher interest rates and equity returns. Government cannot (and should not) seek to eliminate commodity risk, but should shield this embryonic industry from the worst effects of the global oil market. Some of the more intriguing financings of US biofuels plants over the past year have involved sophisticated hedges that allow the plants to remain profitable even if oil prices drop precipitously, dragging ethanol prices down. A mechanism under which support for biofuels projects is linked to corn and oil price spreads, so that in good years the subsidy falls away, would act as an insurance policy against narrow margins only.

iii. Accelerate permitting and time-to-market

There is a strong correlation between the growth in clean energy capacity in any region and the speed with which permit applications are processed. The federal government has taken steps to clarify the permitting process for offshore projects in federal waters. The US should consider designating "clean energy zones" where developers know they will receive expedited consideration of wind, solar, geothermal, marine, mini-hydro or biomass projects.

iv. Lead the world in energy efficiency

The US can and should lead the world in energy efficiency, and in reducing per-capita energy consumption. China has pledged to reduce its energy consumption per unit of GDP 20% by 2010 from 2005 levels. Achieving improvements in the US will take political leadership to change consumer attitudes, new regulations to insure compliance, and funding for new technologies. But this is an area where government must take the lead because consumers have shown they are generally not price-sensitive to energy costs and are thus rarely willing to make long-term investments to improve the energy efficiency of their homes or automobiles. There will be an economic prize for countries that lead - rather than lag - the trend in energy efficiency.

v. Establish a federal carbon credit market

To take serious aim at greenhouse gas emissions, an aggressive carbon cap-and-trade system is needed. Such a programme must be established at the federal level, be economy-wide, and be as downstream as possible to target the point of emission. It must set long-term goals, be locked in place for 20 years, and seek to raise the price of carbon to approximately $40 to $50 per tonne. That is what is needed in order to make new coal plants uneconomic and spur the closure of the oldest and least efficient old plants. This would also serve to support the advent of carbon capture and storage, although federal regulation may also be needed to ensure that no new coal capacity is built that is non-CCS compatible. The carbon price needs to drive change in the domestic energy system and it should not be possible to sidestep such change purely by buying credits from other countries.