

Investment trends in European clean energy 2003-2006

Watt bubble or carbonated fizz?

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Foreword

The Carbon Trust, through its activities in investments, research and development, technology accelerators and business incubators and has been supporting the development of the low carbon and clean energy sector since its inception in 2001. A very great deal has changed since then. Carbon Trust Investments has played an active and successful part in making those changes happen.

Five years ago clean energy was not recognised as a sector which could offer attractive returns to serious investors. The supply of venture capital funding or private equity, both in Europe and North America, was restricted to a handful of specialist funds with relatively modest amounts of capital at their disposal. Much of the available capital was supported by government or quasi government funding. Public markets were in the main closed to companies operating in what was considered a new and very unproven field.

The picture is very different now. The last two to three years has seen an influx of private capital into the sector. New fund management groups backed by new investors have appeared. The public markets in Europe and North America have seen an influx of clean energy companies, many exploiting new technologies, some exploiting new business models created by the low carbon economy, and others capitalising on emerging markets around emissions trading.

In the foreword of our May 2005 UK Investment Trends report, I recommended that caution should be applied in making investment decisions based on early indicators of success in the emerging market for clean energy. The actual results for the last two years have far exceeded all our expectations of how far and how fast the sector would develop. I and my colleagues at Carbon Trust Investments are confident that over the next two years clean energy will be one of the fastest growing, and most profitable, sectors available.

Peter Shortt

Managing Partner

CT Investment Partners LLP

Executive summary

This report summarises a comprehensive study undertaken by Cleantech Advisors™ LLC, for Carbon Trust Investments, on the trends in venture capital investing in European clean energy companies between 2003 and 2006.

This report provides the key findings of the study on the ongoing investment trends in European clean energy businesses. This study highlights that companies providing clean energy solutions are being bolstered by an ongoing influx of venture capital investment. However, while investment in Europe has grown, it has not accelerated at the same rate as in North America.

Some of the main findings of the report include:

- A total of €1.96 bn was invested into 300 companies by investors between 2003 and 2006. This capital was disbursed in a total of 444 rounds, with an average of 111 venture rounds and €449m per year.
- On average, clean energy investment accounted for 10% of the total European venture capital investments made per quarter. The clean energy sector is now becoming on par with venture capital investments into European segments of Biotech, IT and Semiconductors.
- UK companies are leading in their ability to attract venture capital investment, with nearly 42% of all the European clean energy deals, followed by Germany, France and the Nordic regions.
- Renewable energy generation technologies are as popular as technologies aimed at energy conservation and energy efficiency in commercial buildings and industrial settings. Significantly more capital was raised for consumption/efficiency technologies than in North America, suggesting an emerging field of specialisation for Europe.
- European clean energy companies raised on average 60% of their North American equivalents by number of investment rounds made and 40% by amount invested.

Towards the end of 2005 and the beginning of 2006, North American venture capital investments in clean energy surged ahead, while European rates remained flat. This steadying in European clean energy venture funding in 2006 was in part due to the effect of the IPO market. Both London's AIM and the Frankfurt Stock Exchange were displacing venture capital investment that would normally be sought by the technology businesses raising growth finance. While we are not experiencing another dot com bubble, we have seen a significant amount of carbonated fizz generated around the emerging publicly quoted clean technology asset class.

However, the IPO market has already softened as the fizz has faded. More recently there have been a number of pan-European venture capital funds raised to capitalise on this growing venture market. Due to this we expect a greater balance of funds being raised from later stage venture capital funds and the public markets.

In assessing the amount of capital required to sustain this level of sector development, three potential growth scenarios were explored. The results indicate that in order to sustain this level of business creation over 2007 to 2010 between €2.5bn and €4.5bn of investment is required.

In the absence of any specific major setbacks, the clean energy sector could become a significant high-growth industry in Europe over the coming years. As this sector of investment is still maturing and there are still many opportunities out there, it is likely that more clean technology funds will emerge in the future. However, Europe should not be complacent otherwise it risks being overtaken by a dominant North American market. If venture capital investing is one indication of the prospective growth in clean energy technology, Europe can expect a vibrant economy fuelled by a venture capital backed clean energy sector.

The clean energy supply chain

Clean energy investing is a sub-set of the larger investment category known as 'cleantech'. Cleantech covers a diverse set of products, services and processes that *"improve operational performance, productivity or efficiency; while reducing costs, inputs, energy consumption, waste or pollution"* (Cleantech Group, 2006).

The Carbon Trust supports innovation in the larger 'ecosystem' of clean energy products and services, not only renewable energy generation. Clean energy companies are those operating within the energy system or supply chain that have the potential to reduce carbon dioxide emissions and other green house gases. Improvements in each of these energy supply chain phases can have system-wide impacts that help to reduce carbon emissions, improve their environmental performance and increase efficiency and productivity for end users.

The universe of technologies and services found in the Carbon Trust's definition can be described through the five main sequential phases in the energy supply chain (Figure 1):

- **Upstream** - the inputs into the energy system, including: hydrogen production, biofuels, renewable exploration, waste to energy systems, and more efficient hydrocarbon production.

- **Generation** - converting the energy source into usable electricity or heat, including: fuel cells, solar photovoltaics, wind turbines and marine energy devices as well as more efficient hydrocarbon generation and nuclear power.
- **Infrastructure** - which helps to transport or connect the electricity or heat to the point of use, including: the distribution of electricity, heat and hydrogen transport, energy storage devices, power conditioning, energy meters and other components that enable the distribution of clean energy.
- **Consumption** - a broad range of technologies that focus on improving the efficiency of energy being converted for useful work, including: lighting and heating appliances, building materials, industrial machinery, power electronics and process improvements.
- **Services** - a range of services that directly improve energy efficiencies and/or mitigate emissions using offsets in the energy supply chain, including: facility management, consulting, carbon trading, IT and financing.

This description of the clean energy sector is complementary to the Carbon Trust's Low Carbon Technology Assessment (see www.carbontrust.co.uk for more details).

The key stages in the clean technology energy supply chain



The three levels of clean energy business models

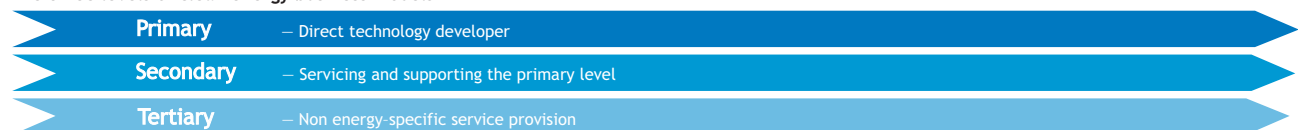


Figure 1 Clean energy supply chain. This definition excludes water and waste technologies which are included in the broader clean technology theme

Why is clean energy hot in Europe?

There are several factors that together have created the 'Clean Energy' opportunity, and it is their co-existence that makes this emerging sector so attractive to investors. Here, five key drivers are highlighted.

1. Energy security

Increased demand for oil and gas due to increasing industrial development worldwide, set against limited supply and suppliers, will potentially lead to higher costs and greater political involvement in regulating supply. For European economies, energy security centres on three main issues:

- Planning supply for rising demand and rapidly diminishing reserves;
- Managing dependence on imports of energy and the consequential security of supply; and
- Matching energy needs to supply.

2. Technology readiness

The clean energy industry today is resting on a trajectory of intensive research and development and testing of technologies stemming from the oil embargo crisis of the 1970s. While some technologies are further away from market adoption, there are many other markets where technologies are genuinely much closer to viability. Indeed, many products are already being bought commercially (including solar, wind turbines and energy management) and some of the largest names in industrial innovation are selling them. In many cases, cost reduction comprises the remaining, unifying challenge, rather than the development of the fundamental technology itself. Furthermore, innovations in other technological sectors such as biotech, IT and nanotech are enabling many clean energy technologies to be brought to scale at lower cost.

3. New markets for clean energy

There are several markets where clean energy solutions are being developed that are likely to succeed without trading on their clean or environmental credentials. For example, mobile computing and telephony is demanding ever more power and putting pressure on existing battery technology: advanced batteries and micro-fuel cells may be the answer. Distributed generation is likely to be one innovative solution deployed by energy utilities as their own business models evolve. Companies do not necessarily use their green credentials as their main value proposition. Rather, they focus on solving other problems such as increasing efficiency, reducing costs, improving reliability and expanding longevity.

4. Environmental pressures

Pressures on the natural environment stemming from the current energy system are gaining wider recognition. Climate change has been clearly linked to human sources of carbon emissions, especially from the burning of fossil fuels used in the energy system, from electricity to heating and cooling of buildings to transportation. Concern over air quality and emissions are also playing a role in shifting how the externalities created by the energy system are managed.

5. Regulatory drivers

Environmental pressures have already had an effect on policy makers around the world. Moves have already been made by governments, particularly in the European Union, to reduce carbon emissions. The European Union Emissions Trading Scheme (EU ETS) went live in January 2005 and responds to the Kyoto Protocol on Climate Change. Clean energy companies are now able to commoditise the environmental benefits they produce making commercial choices towards clean energy technologies more transparent.

As governments increasingly realise that there is a growing need for clean energy solutions to be developed (whether in generation, use, storage, etc) they will also recognise that somebody will develop these solutions and bring them to market. All other things being equal, it is better that such commercial development benefits the domestic economy as a supplier of that solution rather than simply through its adoption and use. A noticeable characteristic of some European governments and the European Commission itself is the amount of support that has been given to their respective clean energy industries, including towards small-scale, early-stage R&D efforts. There is no doubt that this is healthy for the industry and more investment opportunities will emerge as R&D efforts bear fruit.

Venture capital investing

Entrepreneurs who hope to build their ventures into successful companies need to test their product or service, expand operations, hire staff, buy materials and perform other activities needed to run the business. All of these activities require capital - their needs can rarely rely on internal revenue or from founders' initial investments alone. Venture capitalists are one such source of financial capital. These are professional fund managers who invest equity (i.e. buy shares) into young and growing companies.

Venture capital investments are often thought to be bellwethers for industrial innovation. This is because they invest in some of the earliest stage, risky and future oriented companies around. Venture capital investors are taking on technology, market, management and regulatory risks by backing such new companies. They also provide capital in the form of skill, networks and strategic acumen to the venture. Venture capitalists look for companies that show prospects for large-scale growth and high value, so that high rates of return are expected.

Venture capital investments tend to be made in syndicates of investors, so that in any one round there may be between one and five investors. This allows for a more diversified investment portfolio across technologies, regions and stages of investment.

In any one venture capital fund under management, several companies may be invested into, and often several investments are made into the one company in staged rounds over several years. A common way of tracking venture capital investment activity is by counting the number of rounds made, as well as the total amount of capital placed in each round. Investment rounds tend to get larger as the company moves the further along the path of development. Such investment rounds are commonly categorised as:

- **Seed Round** - Investment in a new company with an idea or technology, but as yet with no

commercial production. This may involve continued research and product development and sometimes includes venture capitalists as well as other investors such as business angels, friends and family, or government sponsored incubators. Typical investment range is from €100k to €1.5m.

- **Early Stage Round** - Investment in fast growing companies for product development and initial marketing, manufacturing and sales activities. The Companies' product(s) are either in development or commercially available. Typical investment range is from €750k to €15m.
- **Follow-on or Expansion Round** - Funds provided for the growth and expansion of a company whose sales volume is increasing and which is breaking-even or profitable. Typical investment range is from €3m to €30m.

Venture capital funds generate returns when they 'exit' their investment, by either selling their shares to public investors (after an IPO), a company (a trade sale) or to another private equity investor. These returns are then disbursed to the institutions that backed the fund.

Venture capital investment activity in Europe has strengthened in recent years, though it is still not as large or developed as in North America. European venture capital investments currently sit at around two thirds of the US according to the European Venture Capital Association (EVCA) and the National Venture Capital Association (NVCA) statistics, with the UK showing the strongest venture capital markets within Europe. In Europe, venture capital investing is sometimes also grouped with 'Private Equity' which describes much later stage financing such as buyouts, mezzanine finance and other acquisition activity. A large part of European private equity/venture capital activity is, in fact, for later stage private equity such as buyouts. This report concentrates on venture capital as growth capital only, as this is where we find many of the most innovative

Methodology

This report provides intelligence on recent European clean energy venture capital activity, collected using the clean energy taxonomy employed by the Carbon Trust. The result is a view of a rapidly emerging investment category in Europe and internationally. The report aims to enable Carbon Trust Investments and other investors to make better decisions about deploying capital over the forthcoming investment cycle.

Funding into clean energy products and services worldwide has soared in the past ten years. The report aims to answer the following questions:

- How much of this activity was fuelled by venture capital investment?
- What types of clean energy technologies are being backed in Europe and where is this activity mainly occurring?
- Who is doing the investing in clean energy today and what does this tell us about the future of the sector?

The Cleantech Group™ has been collecting comprehensive data and intelligence on cleantech investing since 2002. In order to systematically search for European clean energy investments, a range of venture capital databases were screened against the clean energy taxonomy and whether the company was headquartered in Europe. Searching between 2003 and 2006, several thousands of initial companies were screened down to the 300 businesses that make up this report.

Data coverage in Europe is, in general, less comprehensive than in North America, and it is especially patchy in Southern and Eastern Europe. In addition, there are many family-owned firms in Europe who do not access venture capital for growth, using instead their own private networks and banking arrangements. Our focus on venture capital means that other flows of capital are not

reported on here - such as debt, grants, angel investing, project finance and buyouts.

The pool of investments into clean energy companies and systems is thus likely to be larger than identified here. This is also because investments as a whole are sometimes not made public to protect the company's competitive advantage. For undisclosed investments, an amount was imputed which reflected the stage of investment, and the clean energy sub-segment which it represented. This information accounted for 20% of the total data set. Every effort was made to triangulate and validate the different data sources in the research for this report.

Europe's clean energy investments

Clean energy powering ahead

Since 2003, investment into European clean energy companies by venture capitalists has shown steady, but not spectacular growth. From 2003 until 2006, a total of €1,960m was invested by venture capitalists into European clean energy companies. In this period, some 300 companies raised money in 444 rounds. This averages 28 rounds and €122m per quarter for the period.

An important part of the clean energy story over the period is the rise of the IPO market for clean energy investments. Over the same period, 45 venture capital backed clean energy businesses based in Europe raised over €2.5bn from the quoted markets. The phenomenal rise of both the London and Frankfurt stock exchanges in 2005 and 2006 may in part explain the lack of growth in the overall venture capital market during that period.

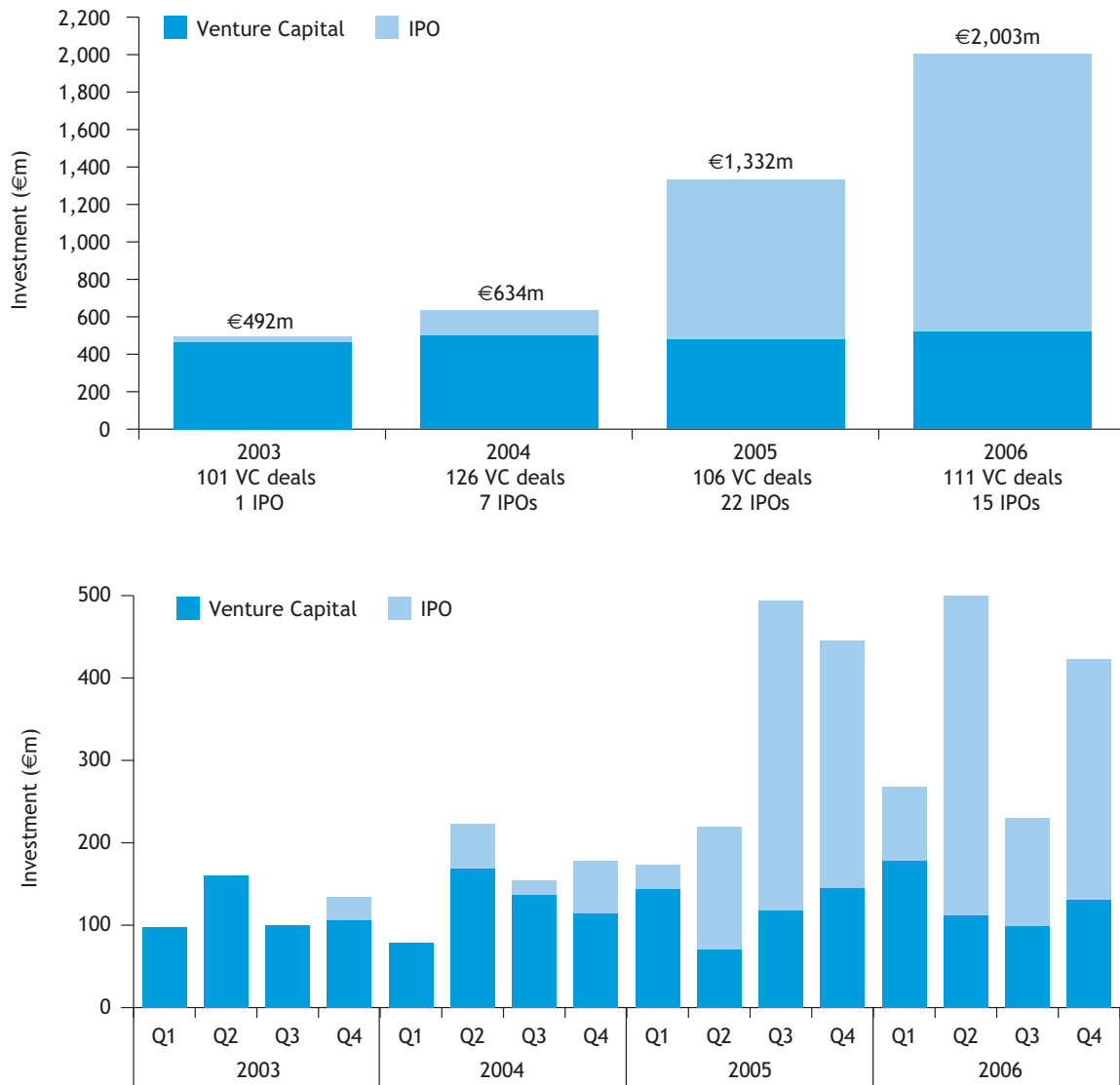
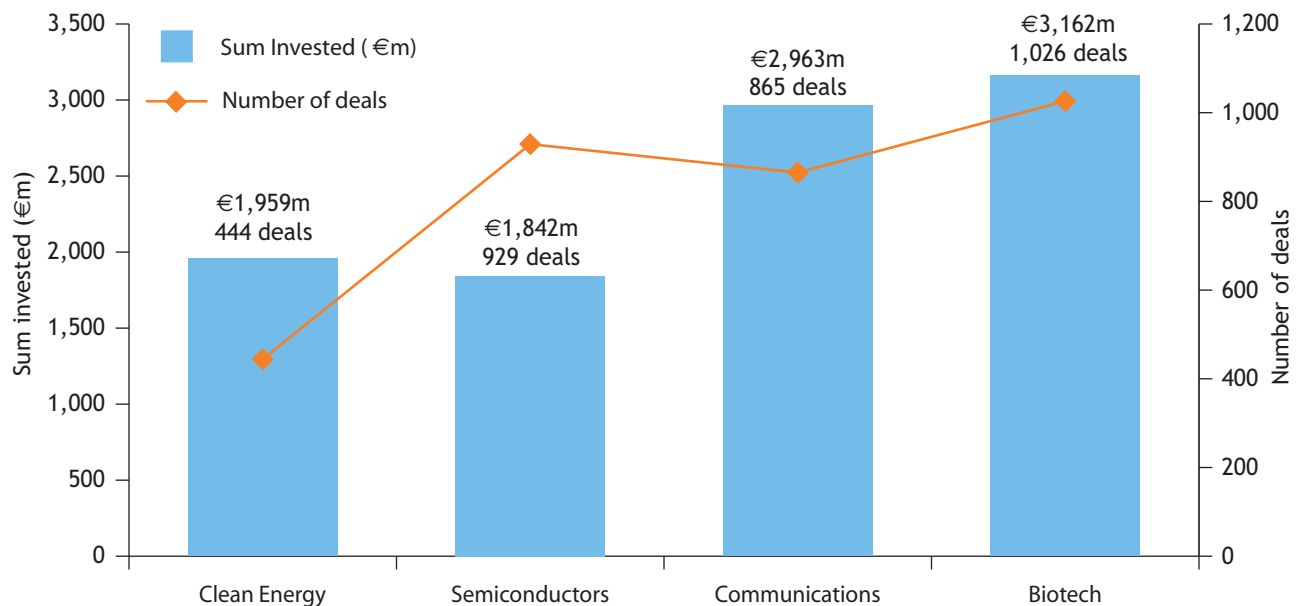


Figure 2 Value of investment into clean energy businesses per year (top) and quarter (bottom)

To put the amount of venture capital investment into the clean energy sector into some perspective, clean energy venture capital deals represent on average 10% of total European venture capital by amount and on average 6% of the total number of rounds being made (total European venture capital investments as tracked by Venture Economics and Tornado Insider). In Q1 2006, clean energy reached a high of 16% of total European venture capital deals by amount and 17% by number of rounds.

In terms of transactions completed, clean energy is starting to become on par with other popular investment sectors in Europe, such as biotech, communications (which includes telecom), and semiconductors. However, clean energy companies seem to be raising higher amounts per round

compared to some of the other sectors, even if the total amounts invested are similar. Clean energy companies in our dataset averaged €4.4m invested per round. One reason is that, as industrial technologies, clean energy companies are often rather capital intensive. This has implications for the financing of later stage clean energy companies when larger sources of capital might be needed to finance the construction of facilities or bring the product to scale. Transitioning to full scale production will be a challenge for many clean energy companies. Although not reported on, markets for later stage private equity, project finance and mergers and acquisitions in clean energy appear to show similar signs of growth.



Source: Cleantech Capital Group and Thompson (VentureXpert), 2006

Figure 3 Comparison on 2006 venture capital investment levels across four broad technology categories

Competing for capital with North America

How does European clean energy venture capital investing compare to North America? We found that the number of European clean energy deals is on average about 60% of North American clean energy deals per quarter and 40% by amount. The broader 'cleantech' category usually attracts about 50% of the number of investments when compared to North America and 70% in Europe. However, North American clean energy venture capital has raced ahead since early 2005 while Europe has dropped slightly in the same period. Three main drivers might explain this divergence:

1) The increased average size of North American investments compared to European

investments may be due to a number of large, sector specific funds having been raised in the US over the last three years;

2) A more conservative European outlook by investors in the venture capital asset class in general; and

3) A number of businesses have looked to the quoted market in Europe to raise funds instead of via venture capital. This fund-raising route appears to be more challenging for North American companies which have higher costs and complexity of public listings in the USA.

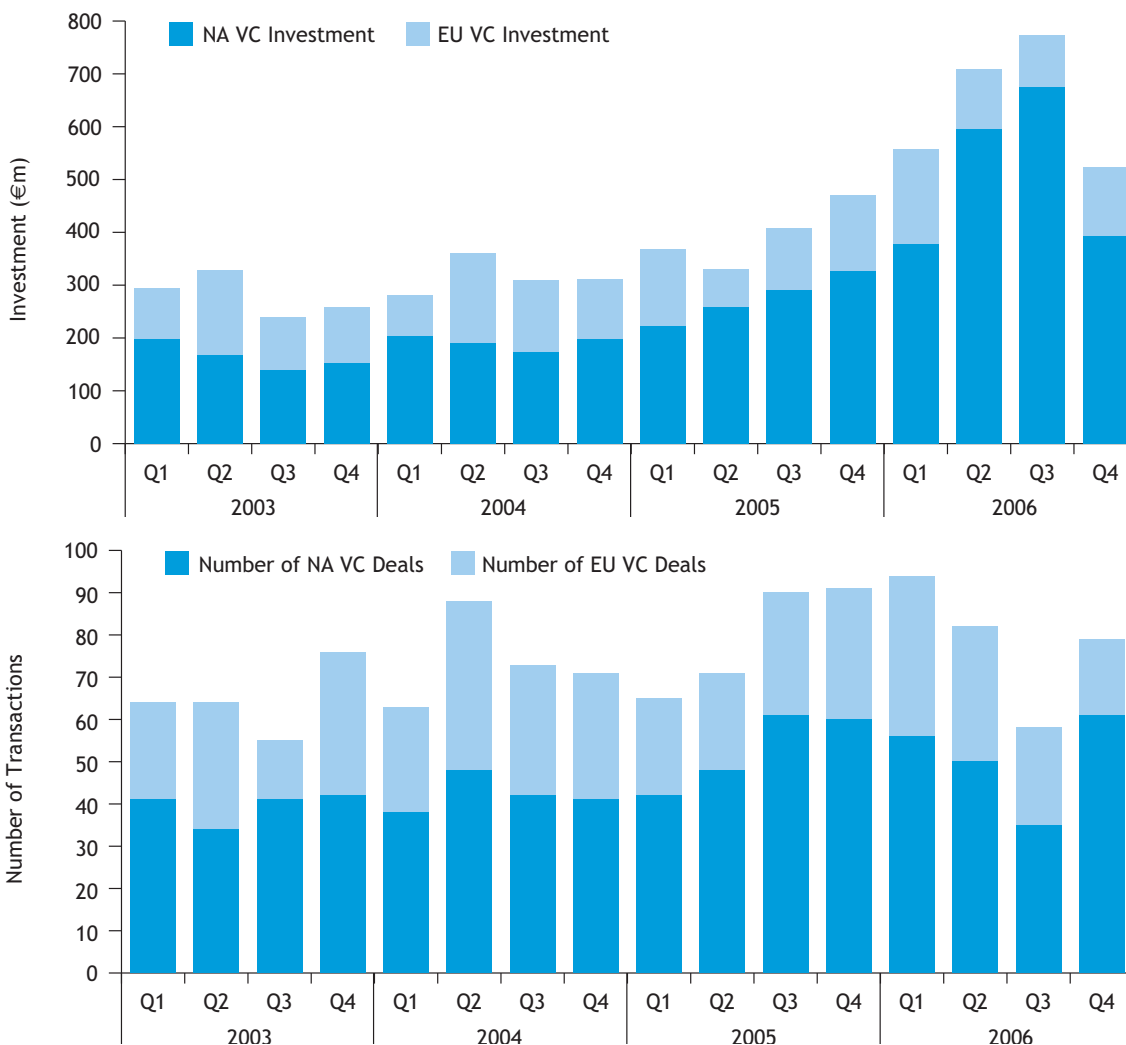


Figure 4 Quarterly US and European venture capital market by investment (top) and deals completed (bottom)

Evidence of regional clustering

Western Europe is leading venture capital investment, accounting for 74% of clean energy venture capital deals, followed by Scandinavia at 15%. The top country, in terms of number of deals, was the UK (with 211 rounds), followed by Germany, France, Sweden and Finland. The densest concentration of companies with clean energy technologies that received venture capital investment is in Greater London, followed by Oxfordshire and Cambridgeshire then the areas around Munich, Berlin and Paris. The other companies were scattered quite widely across the rest of Europe.

An emerging region for clean energy companies and investors is Scandinavia, where we see a significant amount of activity that is spread quite widely across in the region with no obvious central clusters. Angel investing activity in Scandinavia is

significant and consequently investment trends often remain below the radar screen. As some of these companies seek to scale up their operations and internationalise, we may well see more formal venture capital activity occurring.

This regional distribution of clean energy venture capital activity mirrors broader patterns of venture capital investing as a whole. Southern and Eastern Europe is poorly reflected in the dataset, perhaps as a function of the relative scarcity of venture capital funds in those regions, entrepreneurial clean energy companies, or both. We can expect this situation to change as more Southern and Eastern European governments harmonize with EU legislation on climate change and energy policy, as venture capital markets in these regions develop and as talented entrepreneurs gravitate to the clean energy segment.

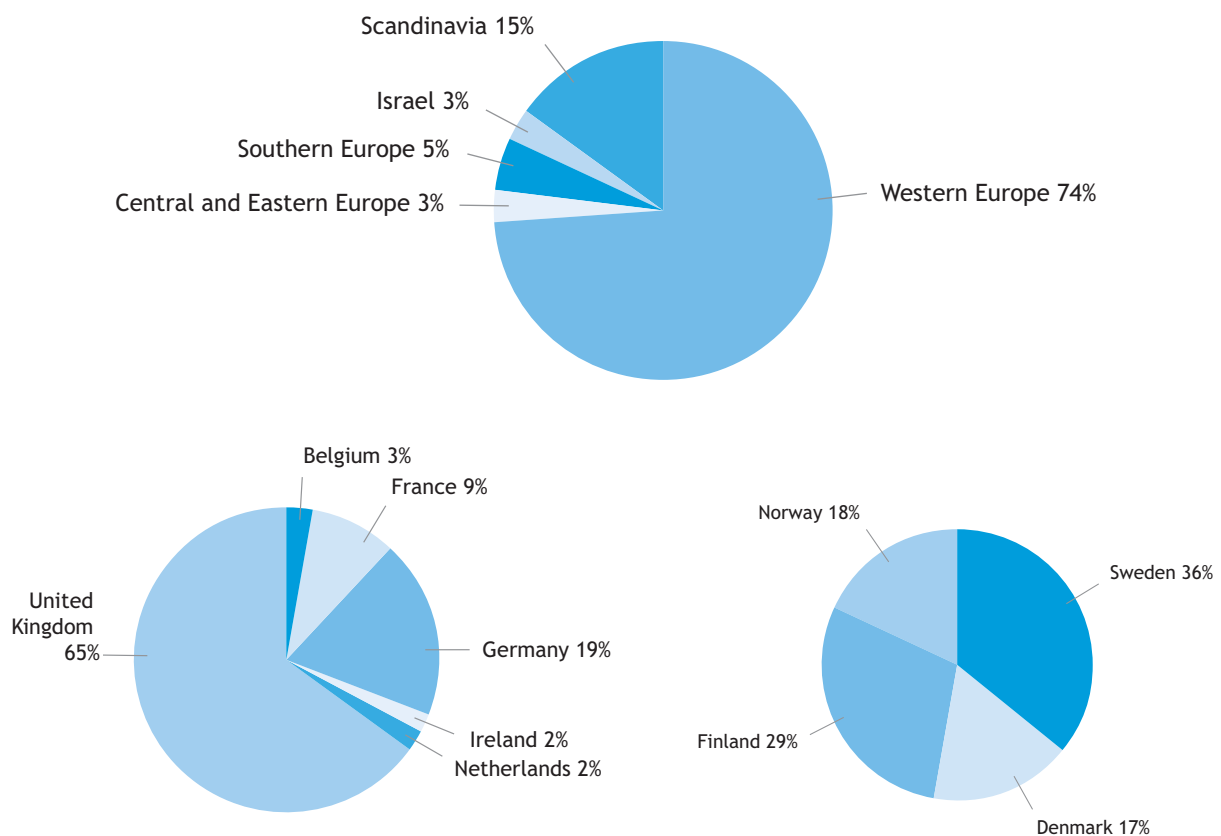


Figure 5 Regional breakdown of investments made by Europe (top), Western Europe (bottom left) and the Nordic Area (bottom right)

Where has the money gone?

Investment activity is heavily concentrated in technologies that generate renewable energy, as well as in those technologies focused on improving the efficiencies in the consumption of energy.

Upstream accounted for a total of 23 rounds, of these:

- The sector was dominated by biofuel production technology. Almost half the total investment, or €29.5m, for this sector was poured into biofuel production.
- Only limited amounts of capital made its way into hydrogen production, waste treatment for energy generation and more efficient hydrocarbon production.

Energy Generation accounted for a total of 165 rounds, of these:

- 48 rounds were focused on solar companies, attracting €292m of investment. This area was dominated by German companies due to the attractive regulatory environment aimed at growing the German solar industry and increasing installations there.
- €149m, across 31, rounds went into hydrogen based generation or fuel cell companies, predominantly in Germany and the UK.
- The third largest generation category was wind, receiving €165m in 34 rounds. Unlike the previous categories, no one country dominated. Wind farms are now usually financed using project finance - the venture capital here is typically employed to back companies with technologies serving the wind power sector such as improved turbine blades or gear-box systems.

Infrastructure accounted for a total of 36 rounds, of these:

- 16 rounds, and the majority of the investment in this category at €68.3m, was invested into energy storage devices.

- Not surprisingly a limited amount of investment, €17m across five investments, made its way into energy transmission, recognising the significant barriers to entry in this predominantly government controlled market space.

Consumption/Energy Efficiency companies saw 203 rounds, which is substantially more than in North America. Of this:

- The largest category, and one of the most diversely defined, was building technology companies (such as energy efficient lighting, office equipment, and appliances). Here €240m was invested across 26 rounds.
- Interestingly for Europe, industrial and manufacturing technologies (such as materials, process intensification and sensors and controls) was a popular source of investment. Unlike North America, €359m in 100 rounds was pumped into this area with novel materials showing the greatest share of this investment.
- The data highlighted that identifying quality investments in the transport sector (such as logistics and traffic management or companies with particle reduction system for diesel engines) is still challenging. It only accounted for €30.5m across 14 rounds.

Services accounted for a total of 17 rounds, of these:

- Consulting and facilities management businesses attracted most of the investment with €45.9m across nine investments.

In the near future, technologies aimed at producing low cost sustainable biofuels will continue to attract investment, though not perhaps at the same scale as in the US where the regulatory and political support is more attractive for the commercialisation of biofuels, particularly ethanol. With the ongoing commercialisation of fuel cells we made see an increase in hydrogen production from biogenic processes.

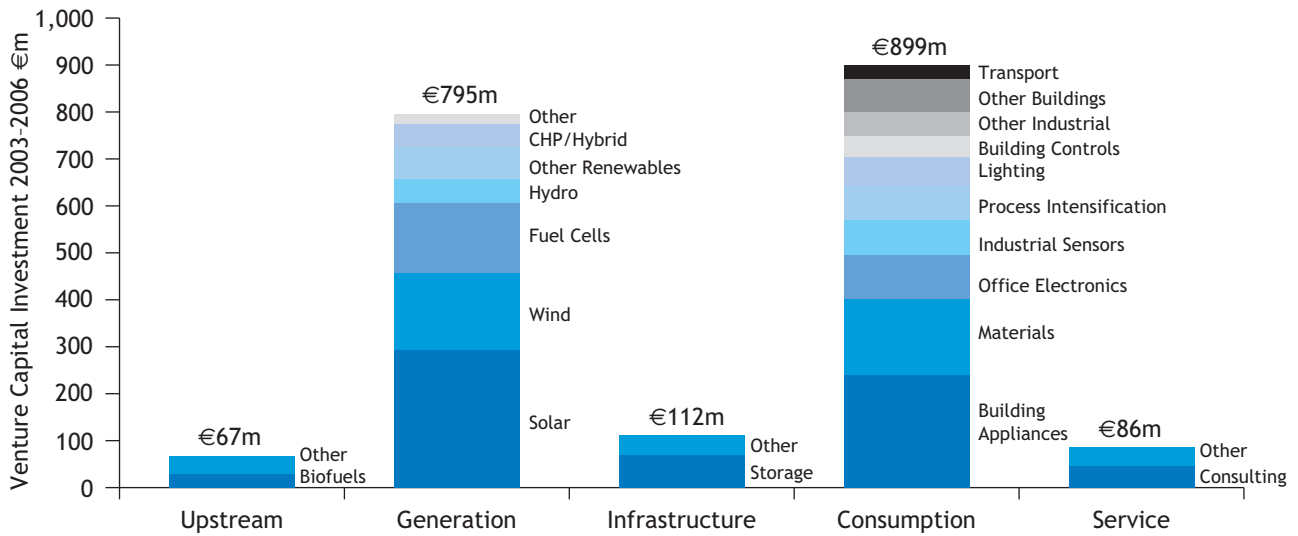


Figure 6 Breakdown of venture capital investment by clean energy sector classification

Wind power has largely shifted out of the venture capital category and into project finance backed installations with some industry consolidation on the horizon. However, in the medium to long term future we anticipate that the technology around the deployment and maintenance of offshore renewables will require more capital investment. These types of technologies may also be applicable to the offshore wave industry which, like the early days of the wind industry, will have a significant venture capital requirement over the next five years.

Due to the regulatory nature of the sector, it is unlikely that energy transmission will ever be a dominant sector. Here most future investment will likely come directly from the state controlled energy transmission industry rather than the venture capital sector.

European companies appear to be leading the world in the development and installation of energy efficiency & consumption technologies. This activity points to an increasing European specialisation for industrial, building and consumer efficiency technologies. We expect further venture capital investment into European industrial/manufacturing and building efficiency technology companies as European Union regulations and performance standards tighten.

Room for growth

Venture capital investors typically make several 'rounds' of investment in a given company as it grows, and each round tends to get larger by amount. Together seed and early stage companies accounted for around 60% of the total number of rounds (and 35% of total amounts invested). This is a healthy proportion, as it is quite typical for early stage companies to attract less capital per round. Europe is leading North America in the provision of seed capital by venture capital partners, a trend on the increase during 2006. This bodes well for the future, as it provides a healthy pipeline of growth stage for follow-on or expansion financing. It also points to the success of many incubators and government-sponsored seed funds in Europe. The clustering of activity around some major research Universities also demonstrates the vitality of those institutions' technology-transfer programmes.

Some questions remain as to how these companies will access further capital as they grow and expand, from whom will they attract capital and at what valuation? In an effort to identify whether there will be sufficient capital available to support the anticipated growth in this sector from 2007 to 2010 we examined three different growth scenarios. Across all three scenarios it was assumed that each company would require two further rounds of investments following the initial seed investment within a three year period, as observed historically. A 60% survival rate on businesses was assumed. Within each of the three growth scenarios the following assumptions were made:

- **Scenario A:** 5% growth in the number of seed deals per year, and a growth of investment of 2% per annum;
- **Scenario B:** An increase in annual growth of seed rounds per year from 5% in year one to 15% in year five, with an average increase in round size of 10% per year; and
- **Scenario C:** An increase in annual growth of seed rounds per year from 10% in year one to 30% in year five with an average increase in round size of 15% per year.

Scenario A can be compared to the flat growth in the venture capital market over the last three years. Also, Scenario C could be likened to the growth experienced in North America over the last three years. Scenario B was chosen to reflect a mid point between the two scenarios and reflects the growth in the UK over the last seven years.

The results indicate that in order to sustain this level of business creation over the period from 2007 to 2010 between €2.5bn (Scenario A) and €4.5bn (Scenario C) of investment is required. If the number of historic clean energy investors remains broadly constant and with the creation of a number of new clean energy themed funds, Scenario A appears achievable. However to achieve the growth rates in Scenario B and Scenario C, significantly more capital will be required to deliver these growth rates. At present it seems then that this sector is still maturing and that there is sufficient room for more new clean energy themed funds over the next five years.

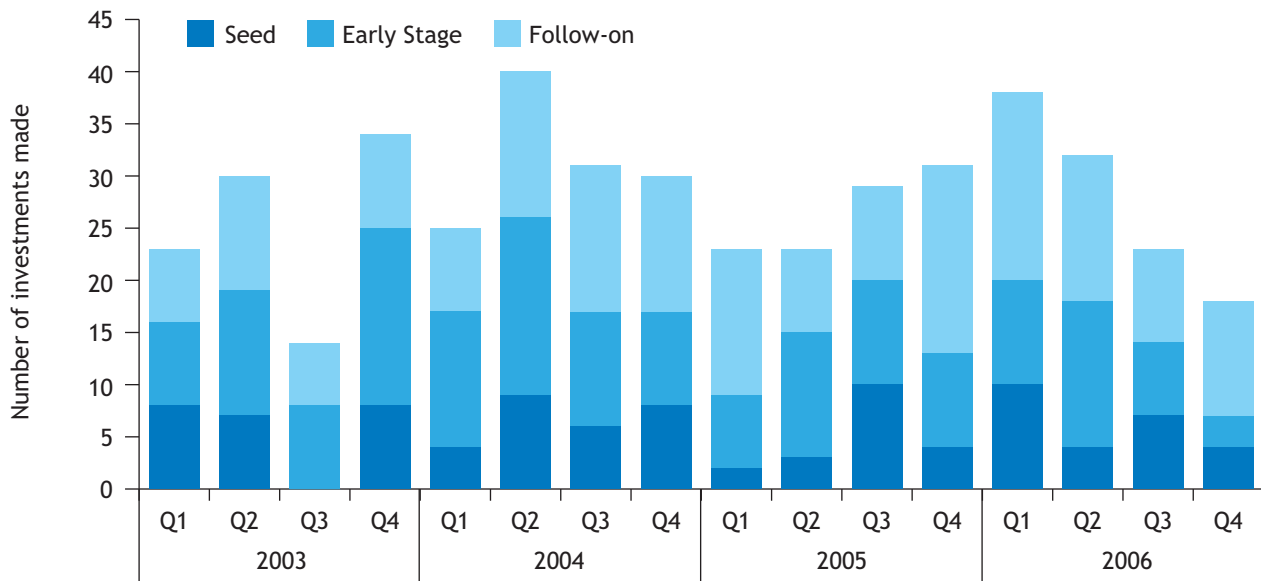


Figure 7a European clean energy venture capital investment by stage and quarter

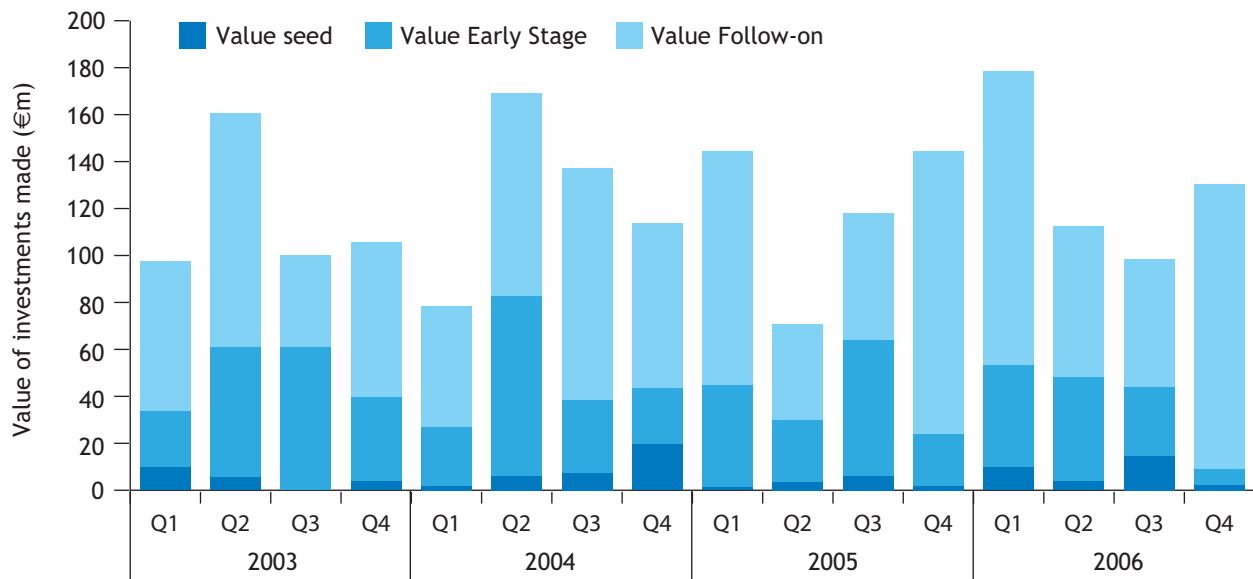


Figure 7b European clean energy venture capital investment by value and quarter

Diversity in numbers

As in our previous UK study (May 2005) a diverse collection of investors have been identified in the clean energy market. At least 389 unique investment houses (VC firms, corporate venture funds, investment banks etc) were identified. Venture capital investors in European clean energy companies were by and large from Europe. However, we identified 40 investors from North America, 9 from Israel/the Middle East and 4 from the Asia/Pacific region. As expected, the largest proportion of investors were from Western Europe with the UK dominating that group - 107 from the UK, 61 from Scandinavia, 48 from Germany, 36 France, 12 from Belgium and nine from the Netherlands.

Few venture capital investors have chosen to specialise in clean energy (or cleantech) for their whole fund. Funds typically identify 'clean energy' or 'cleantech' as one of several themes in which they invest (e.g. alongside IT and/or telecom). However most investment funds do not specialise in clean energy. This is because either they are generalist funds, or specialise in other industry sectors that happen to overlap with clean energy.

Interestingly, the data suggests there are still relatively few funds specialising in the clean energy sector. With the exception of the Carbon Trust, CDC Ixis and Emerald Venture Partners (formerly SAM Private Equity), few clean energy funds have demonstrated a consistent track record in the sector. Unlike the Public SRI funds, only a few historic funds have an explicit 'social responsible' or 'ethical' investment mandate; rather the investment thesis is more focused on generating economic returns for their investors. However, over the last year a number of European clean energy funds have been established, namely Environmental Technologies Fund, Low Carbon Accelerator, Capricorn Ventures and Zouk. Hopefully the continued creation of such funds will change the clean energy investment landscape in the future.

Encouragingly, also present were a number of corporate backed venture capital funds such as BASF Ventures, Danfoss Ventures, Norsk Hydro, Siemens Venture Capital and Volvo Tech Transfer. Finally, the University IP commercialisation houses, such as IP Group and Imperial Innovations, are beginning to identify a range of exciting intellectual property from within their academic institutional partners, with an aim to capitalise on this growing market for investment.

Unsurprisingly, of the investors who had made investments in a European clean energy company within our dataset, we found that the major group was actually comprised of generalist funds. Therefore we are still seeing the trend towards making investments into this sector on a case by case basis rather than developing a sector strategy. That said, a number of leading investment houses are starting to develop a strategy towards this sector as a direct result of building up a portfolio of investments on a case by case basis. Such funds include 3i, Amadeus, Apax, Doughty Hanson and SEP.

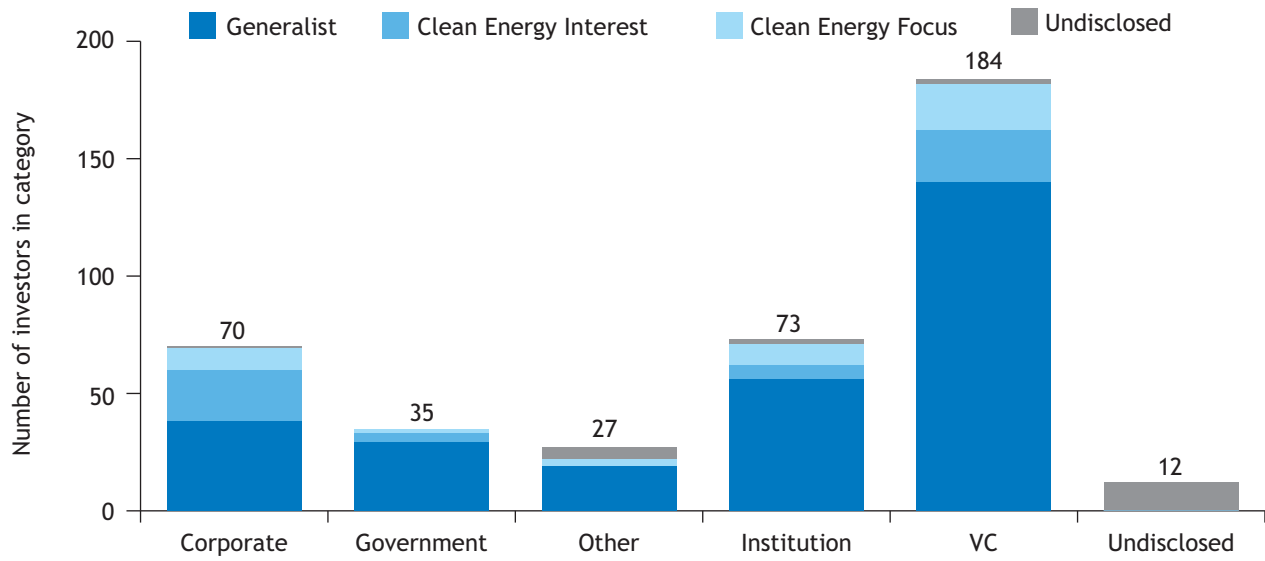


Figure 8 Spread of clean energy venture capital investors across European transactions

Exits and returns

As equity investors, venture capitalists generate returns when they sell those shares - 'exiting' their position either to investors in the public markets (when the company does an initial public offering, or IPO), to a company (a 'trade sale') or to another private investor.

Of the companies in our dataset of European clean energy venture capital rounds, we found that 54 of the 300 companies had already undergone either a trade sale or IPO within the 2003-2006 period. The venue of choice for the majority of the 45 companies that listed during the period was the London Stock Exchange's Alternative Investment Market (or AIM); followed by the Frankfurt Stock Exchange.

At least nine companies within the dataset were acquired in the same period. Some of these were sold to large public companies such as Broadcom or Statkraft, others to large family owned companies like Danfoss, or to privately held clean energy companies making acquisitions. The returns made to venture capital funds on these investments are not publicly reported. However the listing of Q Cells on the Frankfurt Stock Exchange, giving a reported 27 times return to Apax, is an extreme example of the potential for returns that are possible.

In the future, the exit route for venture capitalists in European clean energy companies will be determined by several factors, including:

- Fundraising by venture capitalists: will capital be available for future rounds?
- Access to public markets: will markets such as AIM and Frankfurt remain receptive to clean energy IPOs?
- Corporate profitability and commitment to clean energy: will corporations be active in buying clean energy technologies?
- Clean energy industry consolidation: will leading clean energy companies start to acquire their smaller counterparts?
- New entrants: Will large companies experienced in other industry sectors seek to enter the clean energy space by way of acquisition?

Given the numbers of early and expansion stage investments made in European clean energy companies, we can expect a continuous stream of IPOs and mergers & acquisitions coming in the next 3-5 years from this pipeline.

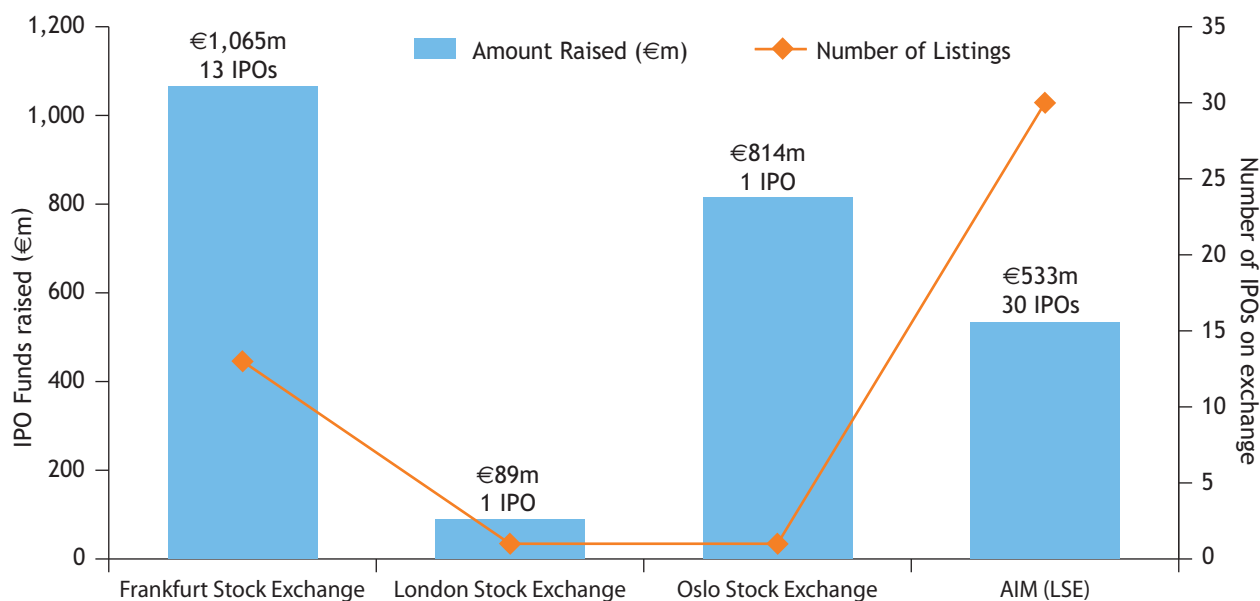


Figure 9 Trend of venture backed IPOs across the main European exchanges

Watt bubble or carbonated fizz?

In our last report (May 2005), we noted that a number of venture backed businesses were starting to list on the London Stock Exchange's Alternative Investment Market (AIM). Since that report was published, we have seen across Europe a significant number of international clean energy businesses, both venture backed and non-venture backed, using the quoted market to raise capital. As a result of a number of very high profile listings the media has speculated whether clean energy, and more broadly the clean technology sector, is in a bubble similar to that seen in the dot com era.

Over the last four years, the AIM market in itself has seen an exceptional growth period. This growth was in the main created by a number of potentially high growth traditional stocks in the energy and mining sectors to a degree driven by energy prices. The resulting net effect, combined with the rising profile of clean energy technology, was that investors had an appetite for the next generation of energy stocks, i.e. clean energy businesses.

At the same time a significant number of socially responsible or environmental funds, focused on publicly quoted businesses, were raised. Over the first half of the period monitored, there were relatively few publicly quoted businesses in this sector compared to the amount of capital to be invested in this assets class. This led to a classic under supply scenario. The combined effect of under supply and active promotion of the sector led to the rise of the clean technology sector stocks as a publicly traded asset class and the resulting surge in IPO activity.

However, when the FSTE AIM Index showed a 17% decline in value during the spring of 2006, both the ability for clean energy businesses to raise capital and the value of those stocks already listed on the market saw a corresponding fall in value. When the AIM market reacted at the end of 2005 to the fall of a number of high profile mining and gaming stocks, there was a direct knock on effect to clean energy businesses' ability to list on the AIM market. It is no surprise that when we

compare the number of UK based businesses listed on AIM over the period and the number of UK based venture capital clean energy businesses listed on AIM, there is almost a direct correlation in the growth of both these sectors.

So the question as to whether the clean energy sector has been a bubble is essentially yes, but unlike the dot com era, it is not necessarily of its own making. In the UK, the general growth dynamics of the AIM market alongside considerable media coverage, regulatory change and a shortage of supply of publicly quoted companies, has led to a growth of interest in the clean technology sector. Unlike the dot com era, the clean energy businesses that have come to the market are mainly proven commercial business. Rather than another dot com bubble bursting, we have seen a period of carbonated fizz generated around this sector which has gradually faded as the market has become more educated and a significant publicly quoted clean technology asset class has emerged.

The next question to be asked then is where will the market go? The AIM market is still digesting the last two years of clean technology listings. Even though there is still significant capital to be deployed, investors appear to be taking stock of their newly acquired portfolios. We are also starting to see the main Investment Banks producing detailed research on this sector, which is assisting investors in evaluating both their historic stocks and any potential new entrants to the market. So, while the market is still open for clean energy businesses, the credibility bar has been raised. Investors understanding of clean energy technologies and the markets they operate in have significantly increased.

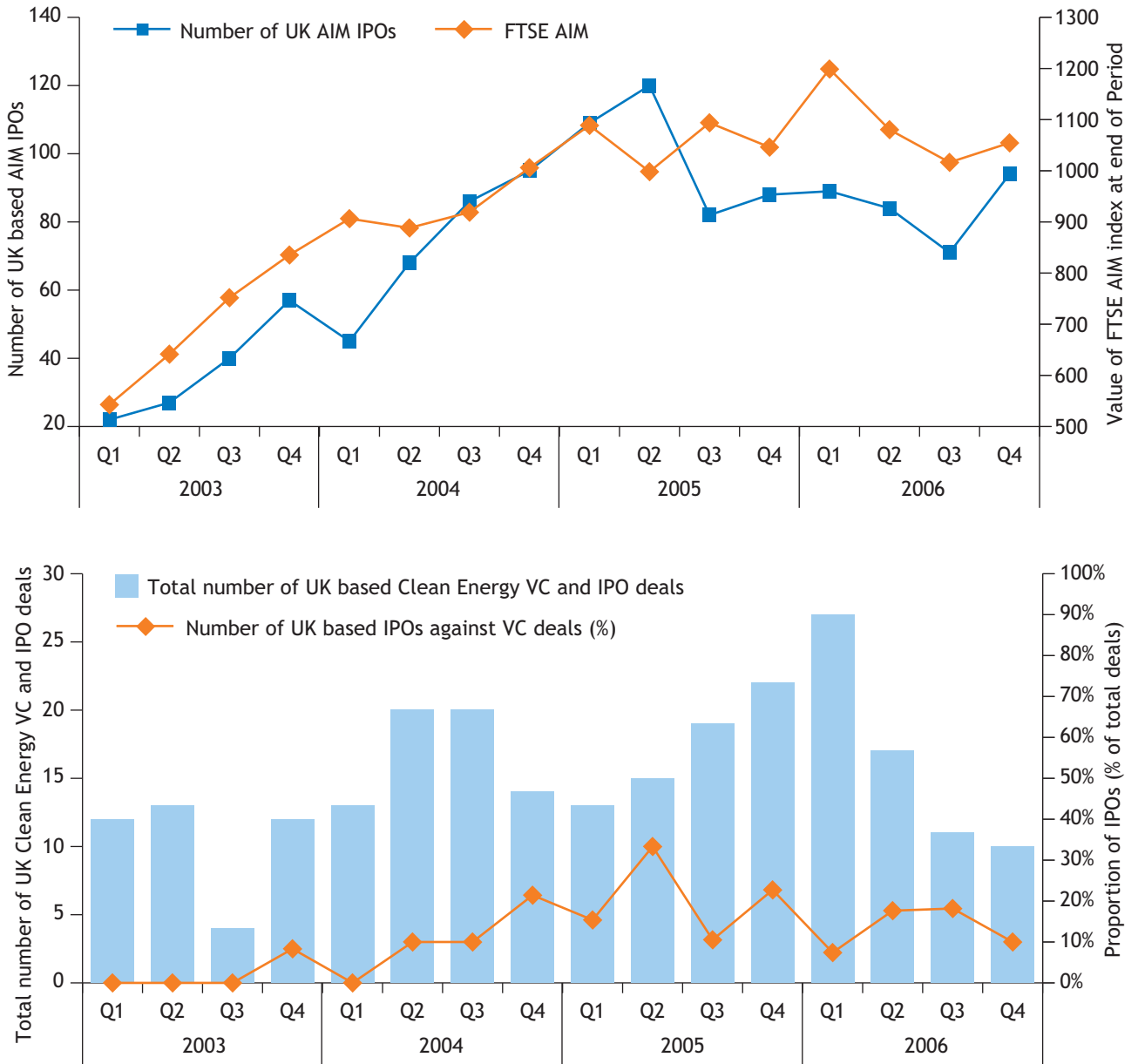


Figure 10 Comparison of AIM market IPOs and index performance (top) against UK clean energy IPOs and funds raised through AIM (bottom)

Concluding remarks

Europe is one of the leading regions for innovation around environmental issues in management, technology and policy arenas. As a result, the market for clean energy technologies is strong in Europe, so much so that many North American and Asian companies often look to Europe for sales and joint ventures. There is appetite for clean energy stocks on the public markets in Europe, with AIM and Frankfurt generating many listings for companies. Investment returns to date in these markets could be described as buoyant, but the market is quickly coming up the learning curve in this emerging segment.

Corporate venturing in clean energy by large European companies such as BASF, Danfoss, Siemens and Volvo is also alive and well. The ability of these firms to help entrepreneurial firms test their products and expand internationally means that these venture funds are highly sought after by companies and other venture capitalists looking for syndicate partners.

While we found significant amounts of capital being invested in European clean energy companies, we still think there is room for substantial growth. Unlike North America, where record amounts of venture capital funds have been raised for investment into clean technology in the past year alone, European venture capital fundraising has lagged behind. Only now are we seeing significant funds being raised that are dedicated to this space. This may mean that existing and future European clean energy companies might face difficulties in gaining access to the capital they need to grow and succeed. We are already seeing some of the leading North American venture cleantech funds pursuing a more assertive European investment strategy. While North America is starting to become deal constrained, at present, Europe appears to be more capital constrained. We therefore anticipate more North American investors exploring European opportunities in the near future.

Regional clustering of clean energy activity was striking and appears to be concentrated around some University powerhouses of innovation and spin-outs in Western Europe and the Nordic region. As more Universities in the EU begin to replicate existing successful tech-transfer offices and as more incubator-type services for very early stage companies come online, activity could well be further concentrated around such hubs. We suspect that there are probably as many technologies and innovations in the rest of Europe that are waiting to be commercialised, if the right supporting structure and capital is available. Eastern European economies are the wild-card in this system. If clean energy follows the same path as IT in expanding their production in Eastern Europe, we could see much more coming from Eastern Europe in clean energy in the mid to longer term.

This is all good news for the future of clean energy venture capital investment in Europe, provided the venture capital funds have the capital to invest. Innovation in the clean energy system, accelerated by venture capital investment, could have some profound effects on the European and global economy, society and the environment at large. We look forward to celebrating their success.

About Carbon Trust Investments

The Carbon Trust works with business and the public sector to help reduce their carbon emissions and so minimise the long-term effects of climate change. We offer a range of services, including a unique grasp of the commercial, legislative and technological impact climate change is likely to have on the business community.

CT Investment Partners LLP is the FSA authorised venture capital subsidiary of the Carbon Trust. A venture capital portfolio has been built up over the last four years, with two companies in this portfolio - Ceres Power Ltd and CMR Fuel Cells Ltd - having listed on AIM. Other portfolio companies include Ocean Power Delivery Ltd, Heliswirl Technologies Ltd, Natural Buildings Technology Ltd, and Whitfield Solar Ltd.

For further information on UK investment activity in the clean technology sector or to submit investment opportunities to Carbon Trust Investments please contact:

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The Carbon Trust works with business and the public sector to cut carbon emissions and capture the commercial potential of low carbon technologies.

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