

The Internationalisation and Growth of Danish Cleantech

- Perspectives on Attracting Venture Capital

VAEKSTFONDEN

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1. INTRODUCTION

"Climate change is 'the' underlying driver for this sector [cleantech] but at the end of the day the most successful cleantech companies are the ones providing economic solutions to tangible business issues." - Scott MacDonald, Emerald Technology Ventures.

In recent years climate changes, population growth and rising energy prices have put environmental and climate issues on the agenda. This has caused an increasing interest in new market opportunities within Cleantech.

Setting off in a model called the ABC model, we take a closer look at whether Danish Cleantech companies encounter challenges similar to other high tech companies when entering the global market. By breaking down into three phases the companies' development from idea to key player on the global market; Ambition - Build - Conquer, this model describes the challenges companies encounter when they try to establish themselves on the global market.

2. CLEANTECH – THE MARKET AND ITS DRIVERS

In our approach, Cleantech consists in general of an array of products, services and processes across industries, that have one common attribute; they all offer better solutions with less negative effects on the environment.

Box 2.1: Definitions of Cleantech

Cleantech includes business models, which:

- Use resources more efficiently
- Replace traditional energy use or production
- Replace the use of environmentally damaging materials
- Reduce pollution problems – e.g. emission control technologies
- Reduce polluted materials – e.g. cleaning of contaminated soil

Source: Vækstfonden and Cleantech Group

We subdivide Cleantech into four sub-segments:

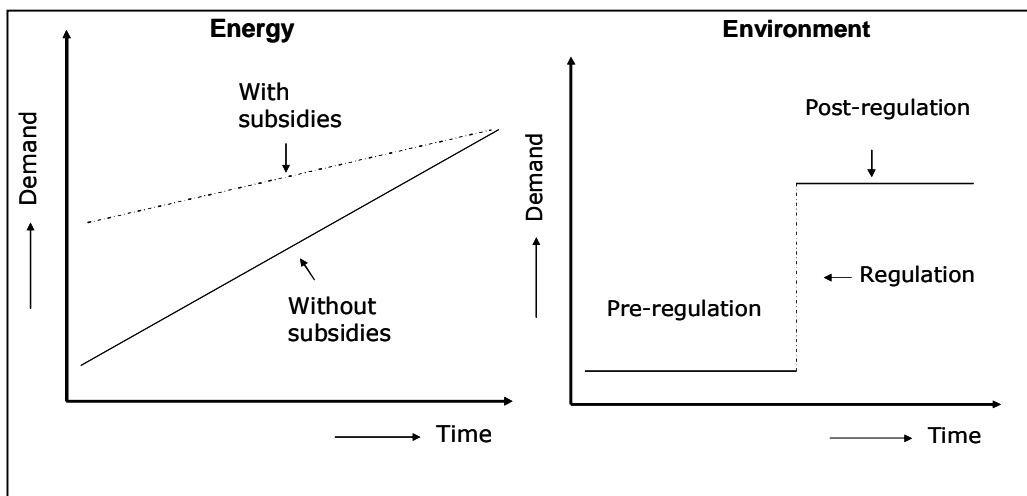
- Energy – production of new forms of energy (e.g. renewable energy), methods of accumulating energy, etc.
- Water – technologies for processing and purification of water (wastewater as well as drinking water)
- Recycling/waste disposal – monitoring, processing and recycling of everything from garbage to industrial or medical waste etc.
- Others – wide group of technologies, e.g. technologies for optimization of energy utilization, materials with better insulation effects, materials/processes that replace environmentally damaging alternatives (e.g. biopolymers, enzymes and particle filters for the cleaning of exhaust

The four sub-segments have different primary demand drivers, with climate changes as the common main driver. The population growth creates an increased pressure on for example water resources, while economic growth increases consumption of natural resources such as fossil fuel and minerals. Furthermore, the increased general consumption, which is a product of the growing economic welfare, plays a significant role in creating more waste.

Enhanced pressure on resources, such as oil and water, has triggered a significant rise in prices over the recent years. The price on a barrel of oil has thus doubled five times in only five years. Other things equal, this will increase the price competitiveness of new energy technologies in development compared to the fossil based alternatives.

Within the energy segment alternative energy sources, such as solar energy or hydrogen, are very often substantially more expensive than fossil fuel. Therefore, in general the demand for new products will be low at market introduction, unless subsidies have been created. Subsidies will gradually be reduced as production costs decline. It is the usual ambition that in the long run alternative energy sources will become cheaper than fossil fuel.

Figure 2.1: Different demand curves for clean technologies



Source: Vækstfonden

As for the environmental segment in cleantech, the situation is a bit different. In this segment the product will not be demanded, regardless of price, as there is no immediate commercial need for the product. However, the situation flips when/if new regulation is implemented, e.g. wastewater to be cleaned more thoroughly than previously or emission control technologies to be used in vehicles.

Market size

The global market for Cleantech has an overall market value of more than 1,300 billion DKK (173 billion EUR). There are, however, large variations among the different sub-segments, both with regard to growth rates and the extent to which growth is created in new companies rather than already established companies.

The Cleantech market value of the global energy market is estimated to approximately 300 billion DKK (40 billion EUR), or 3 % of the total energy market. This is mainly driven by bio fuels, wind and solar energy, with market values of 100, 90 and 80 billion DKK, respectively (approximately 13, 12 and 11 billion EUR). This segment is expected to grow significantly over the next couple of years, and is thus expected to exceed 1,100 billion DKK (147 billion EUR), corresponding to an annual growth rate of 15 %.

The market for water and recycling are the largest areas with market values of 500 billion DKK (67 billion EUR) each. However, the majority of these market values is created by existing rather than new technologies. Also, only a smaller part of the recycling and water sectors are actually defined as Cleantech. The growth rates are not expected to be as high as for energy technologies.

The last segment, other clean technologies, is more difficult to assess both with regard to market size and growth rates, as this is composed of several smaller technology areas. The segment has an estimated size of more than 50 billion DKK (7 billion EUR).

The Danish Cleantech industry

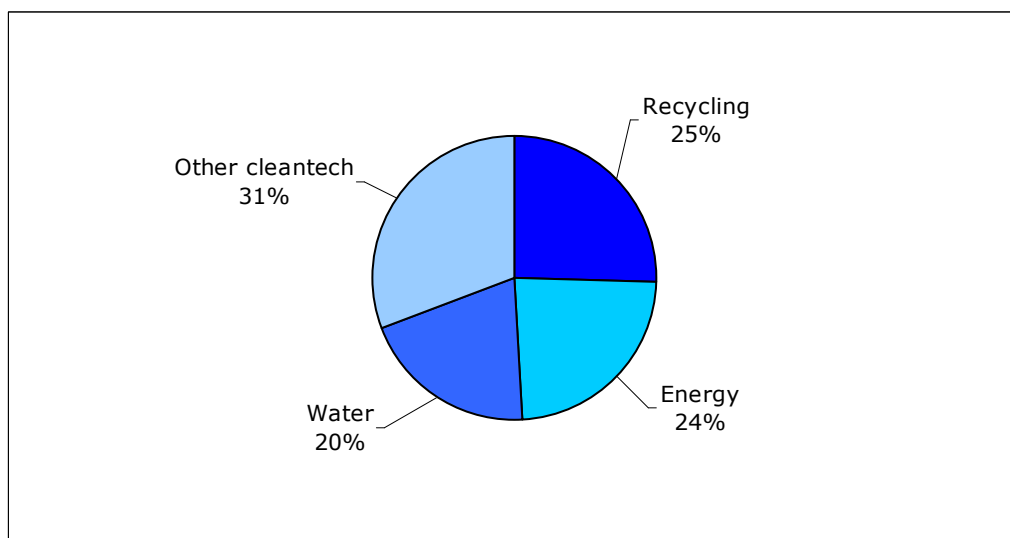
Through early legislative action, Denmark has created a competitive advantage on a number of central environmental areas, e.g. the water environmental plans and regulation on disposal of waste, etc. This is also the main reason for Denmark's world leading position in wind power, created by a high level of subsidies.

The Danish Cleantech industry has a total market value of more than 70 billion DKK (9 billion EUR), or approximately 5 % of the global market. The industry is dominated by a few large players like Vestas and L. M. Glasfiber. Wind is by far the largest segment, with a market value of 50 billion DKK (7 billion EUR), of which most is exports.

Denmark has also created a strong position within water technologies – especially wastewater cleaning. Also in this segment the Danish industry is dominated by a few large companies such as Krüger (Veolia), Danfoss and Grundfos. The waste industry is dominated by a number of municipal companies.

As can be seen from the illustration below, the Danish Cleantech industry has an almost even distribution across the four segments in terms of the number of companies.

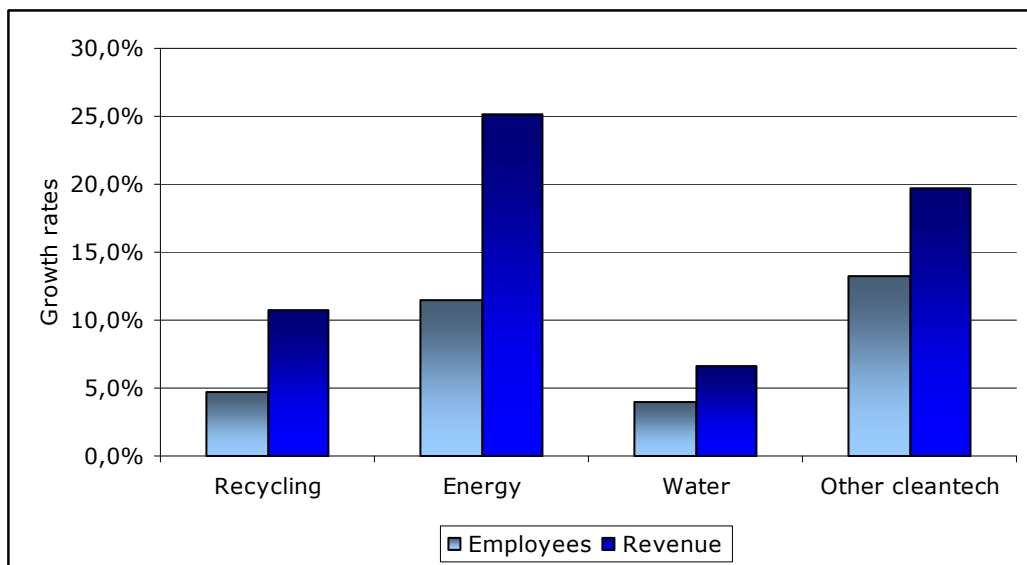
Fig. 2.2: Danish Cleantech



Source: Vækstfonden

As for growth rates, there are some significant differences within the four segments. Energy and other clean technologies boost the highest growth rates, both with regard to revenues and employees.

Figure 2.3: Growth rates in Danish Cleantech companies

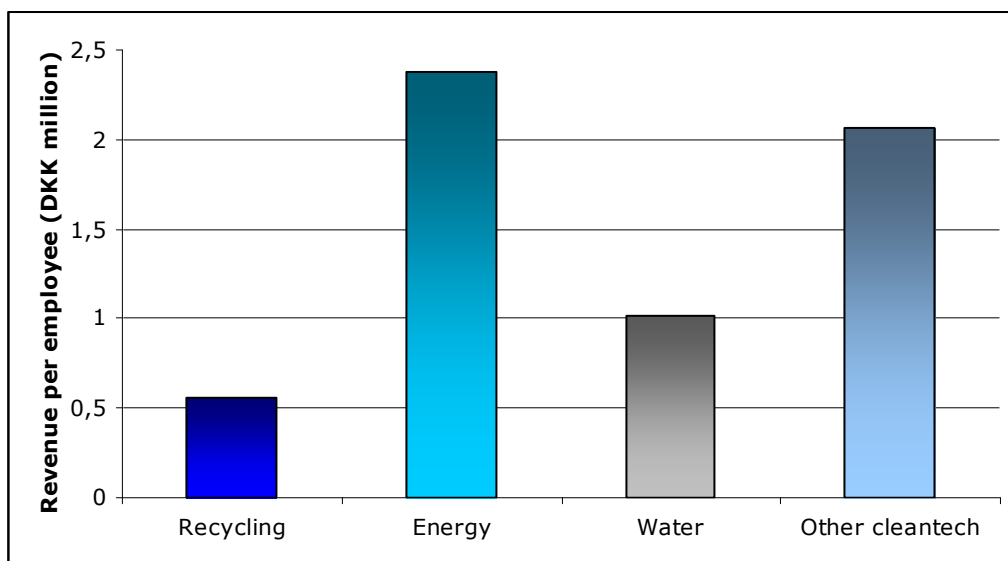


Source: Vækstfonden and BusinessView

Growth rates for Danish companies match the growth rates on the global market. Water and recycling/waste have already established themselves as large industries, where the value to a great extent is created through established technologies. However, the Cleantech dimension of the energy sector is a relatively new industry, where the potential is just starting to be realized.

Furthermore, an interesting feature is revenue per employee which is much greater for energy and other clean technologies than it is in the recycling/waste and water segments. Most of these revenues are created in a few large companies, however.

Figure 2.4: Revenue per employee in Danish Cleantech companies



Source: Vækstfonden and BusinessView

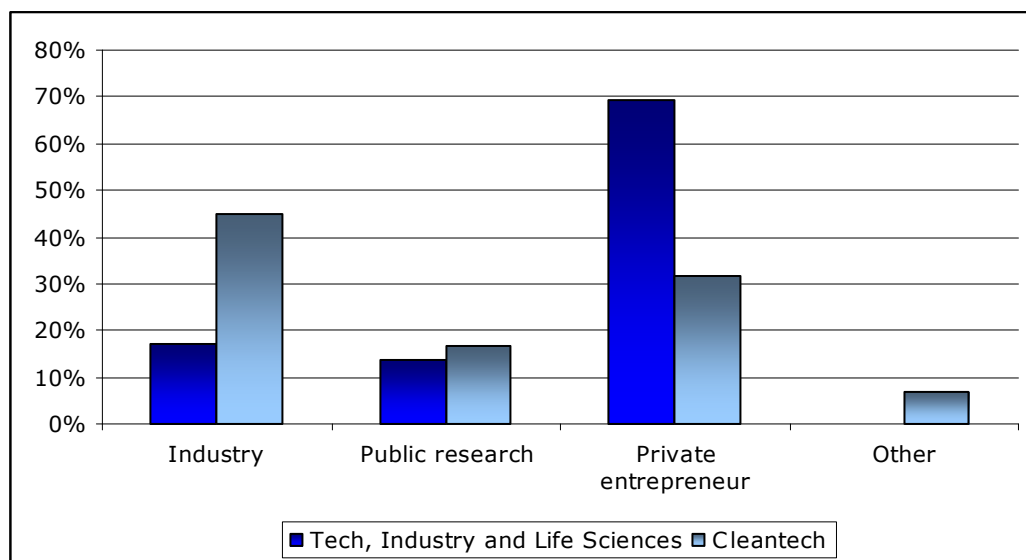
As can be seen from the figure above, the revenues per employee created in energy are almost five times higher than within recycling/waste. The difference is most likely caused by the fact that the recycling/waste sector in general is much less capital intensive than the energy sector, and therefore the value creation per employee is lower.

Start-up origins

A little more than half of the Danish Cleantech companies have been established within the last couple of years. In previous reports we have divided start-up companies into three groups based on the background of the entrepreneurs; industrial spin offs, public research spin outs and private entrepreneurs. Private entrepreneurs start their companies without direct association with a company or research institute, but usually have their experience from the industry in which they build their company.

Previous reports on the origins of venture financed companies in IT, Life Sciences and Industry show that 70% of companies are established by private entrepreneurs while only 18% and 14% are established as spinouts from the industry and public research, respectively.

Figure 2.5: Start-up origins



Source: Vækstfonden (2006 and 2008).

In Cleantech, however, the situation is quite different. Here 45% of the companies are established with a background in the industry, while only 30% are private entrepreneurs. The primary difference is that projects established with an industrial background very often have had better opportunities to develop and have been commercially tested within the framework of an established company.

3. THE ABC OF INTERNATIONALISATION

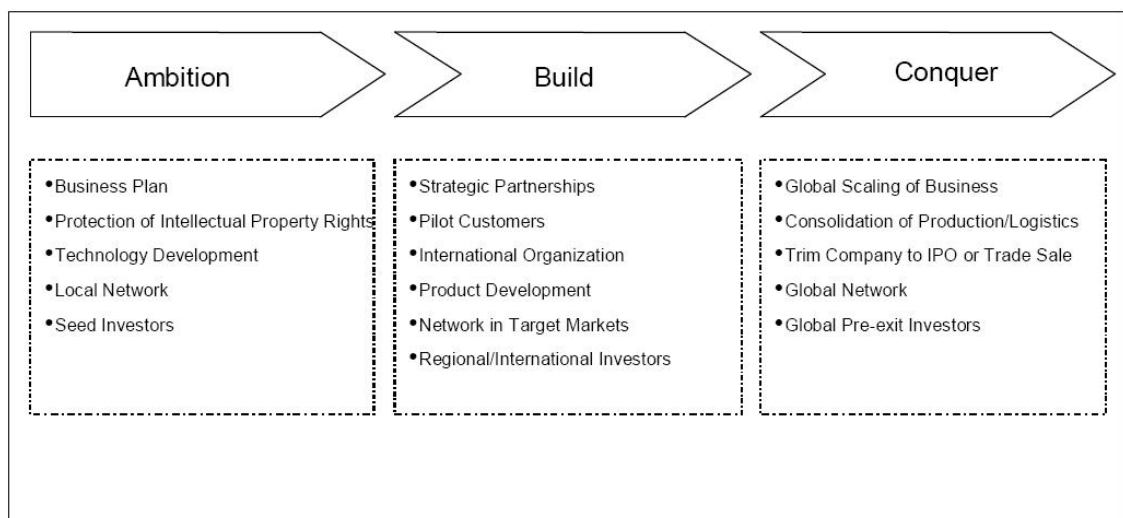
It is possible to view the passage from inception to exit for a venture capital backed company as one that takes it through three distinct stages, which we call:

- Ambition
- Build
- Conquer

For each stage, the goal in the report is to zone in on those key focus areas that are needed in order to optimize the use of development resources and increase the probability of success. The Ambition-Build-Conquer model, ABC for short, thus provides a convenient framework for assessing what are the most important factors to drive a company forward along three crucial dimensions – business development, network partners and investors.

Figure 3.1: The ABC of Internationalization

-Strategic success factors in the internationalization of high-tech venture backed firms.



Source: Vaekstfonden

In the Ambition stage, the high-tech venture backed firm is based on a product idea which is not already in the marketplace, or which represents a new and radically improved version of an existing product. Developing and validating the technology is at the center of attention as there can be no business unless the technology works. The founding team often consists of people with technical backgrounds and the initial funding for the company is spent mostly on R&D. Additional staff is limited as resources are scarce, but the provision of seed capital typically allows the company to attract key personnel in R&D. Although, much emphasis is on R&D and technology development in the Ambition stage, it is absolutely essential that management, in conjunction with seed investors, determine what is required to move the company to the next stage. The business plan is pivotal in this regard. In particular, it should explicitly lay out how the company will attract the commercial competencies needed to move the product, once fully developed, into the marketplace.

Once in the Build stage, the main focus is changed from inward development to outward performance. The technology is generally transformed into a real product, which can be tested and refined by interfacing with pilot customers. The company starts focusing on developing strategic partnerships with suppliers, manufacturers, and, especially, with reference customers. When engaging in these partnerships, the company is able to gather feedback about the feasibility and attractiveness of the final product. Doing this minimizes the risk of missing what customers want when the product is ready for large-scale launch. As a corollary, the most significant value-creating impact typically occurs in the Build stage, where the final product is defined. For venture capitalists (VCs), both original seed investors and the regional/international VCs that typically join at this point, the objective therefore is to push the company through the Build-stage as fast as possible, spending as little funding as possible. However, as alluded to above, the Build stage may be rather protracted for drug development companies, which have to take their products through expensive clinical trials across multiple years.

By the Conquer stage, the foundation of the company should be firmly established, thus it becomes a question of rolling out the company's products globally. Scalability is at the core of the business operations in the Conquer stage, which is typically reflected in the continual recruitment of internationally experienced management and staff, who can execute the "go-to-market" strategy. VC involvement at this stage centers on bringing in investors with substantial exit experience from having done multiple IPOs and trade sales in the past. Fine-tuning the exit strategy thus becomes a central subject of business development. The network should further expand globally to include more suppliers, distribution partners, and key customers.

It is important to point out that the three stages – Ambition, Build, Conquer – are not equivalent to the "seed, start-up and expansion"-nomenclature, which is commonly used to categorize venture capital investment stages. Although the progression across stages has many similarities, the ABC-model better captures the internationalization aspect of the commercialization process, which takes the company from R&D to exit. Whenever relevant, the seed, start-up, expansion-definition will however be used throughout the report.

The ABC model for internationalization in Cleantech

When looking at the Cleantech companies through the eyes of the investors, it is interesting to benchmark these against those of the IT and Life Science industries. IT and Life Sciences are well-known industries for the investors, while Cleantech did not attract much attention from risk capital investors until recently. The question is whether Cleantech companies' needs are different than other high tech companies'. We will therefore use the ABC-model to analyze the internationalization strategies for new Danish Cleantech companies.

Our interviews with 20 Danish Cleantech startups show that the companies are faced with the same challenges of growing from the entrepreneurial stage to a company with world wide sales, as other high tech companies. The companies need proof-of-concept of the technology to demonstrate that the technology actually has the ability

to solve the problem they were intended for, and that there is a large global market for the product. Subsequently, the technology has to be tested by customers, who act as reference customers for the future sales, and the production needs to be built. Thereby the company has created a strong reference point for launching and selling the product.

There are five main areas which have proven valuable for the companies across the development phases; technology development, management & HR, business development, marketing & sales, network and investors.

In the Ambition-phase, Cleantech companies benefit from the fact that many of them are established with a starting point in the industry. This is a strong foundation for growing the companies for two main reasons: First of all, the development process is more inclined to be market driven, rather than technology driven. And secondly, the companies' commercial reference points tend to be stronger when conceived within an existing company. In addition, Cleantech products often integrate elements of known technologies, which contribute to a faster proof-of-concept compared to technologies that have to be developed from scratch. Local people networks are most important to Cleantech companies as they can be involved frequently and fast, which may bring the companies more effectively into the Build-phase.

In the Build-phase there is one crucial challenge for the Cleantech companies; to get the product tested and adjusted to optimize its functionality for the large scale launch. It is particularly important for a sector like Cleantech, where it will cause significant costs if the product does not work as intended. It is expensive to repair or replace products, but also in terms of eventual loss of reputation and market shares. In the Build-phase the companies also have to adjust their focus from a strong technological focus to a more strategic focus on the market.

The Conquer-phase means that the Cleantech companies have to focus on executing the go-to-market strategy that was prepared in the Ambition-phase. This often means that the companies need to recruit management competencies with international experience, network and expertise in sales and marketing. This means that the often technically focused founders have to take on new positions and leave the "steering wheel" to a new, commercial CEO. Network is crucial if the companies are to roll out their activities with high speed, especially because the Cleantech companies often sell their solutions on the B2B market. This puts a demand on the composition of the management and board, which need to supply the companies with strong networks both with respect to potential markets and building distribution, production and subcontractors.

Cleantech companies operate in a market often driven by regulation. There seems to be great opportunities for clean technologies, due to the increasing political focus on the matter. Tools like legislation and subsidies are becoming more conducive for Cleantech. Thus, regulation can be a decisive driving force for whether there is an opening in the market, and therefore is of great significance to the companies' chances of penetrating the market.

However, it is often financially demanding for the companies to grow and become internationalized. It takes capital to develop the technology, but in particular, it also takes even more capital to enter the global market. However, compared to industries like Life Science and IT, the finance structure of the Cleantech companies has a different look.

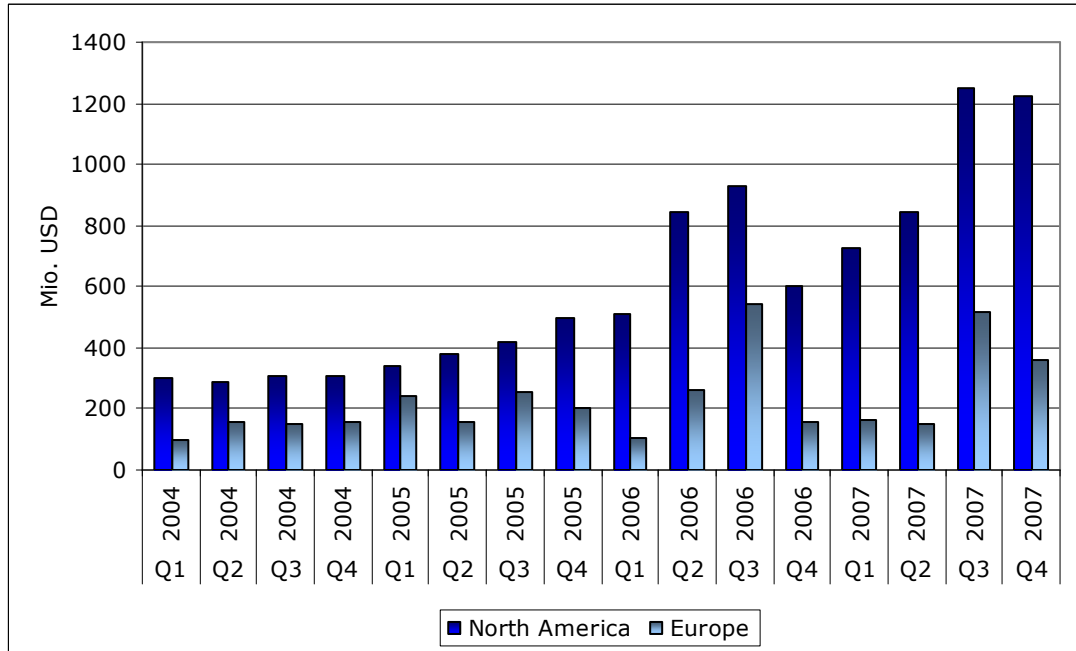
Many of the Cleantech companies, notably in the energy segment, have been significantly dependent on public research programs to raise capital for development. On the other hand, Cleantech has not received much attention from risk capital investors until recently, and the companies have had difficulties in raising risk capital.

Consequently, the companies have financed their activities through grants from research programs supplemented by capital from business angels and industrial partners. This implies that the Cleantech companies have not been supplied with the competencies and network from venture investors like other high tech companies usually are. The lack of dedicated venture capital investors in Cleantech implies that the companies cannot to the same extent as other sectors draw on risk capital to accelerate growth. If at the same time the companies have to use a large amount of their resources on raising capital, it removes focus from business development, which may impede the companies' growth.

4. VENTURE CAPITAL FOR CLEANTECH

Growing political awareness and skyrocketing oil prices have made Cleantech a highly popular area for venture investors in recent years. In the period 2004 to 2007, the level of investment in Europe and North America has overall tripled, cf. fig. 4.1.

Figure 4.1 Cleantech investments in North America and EU, 2004-2007



Source: Cleantech Network

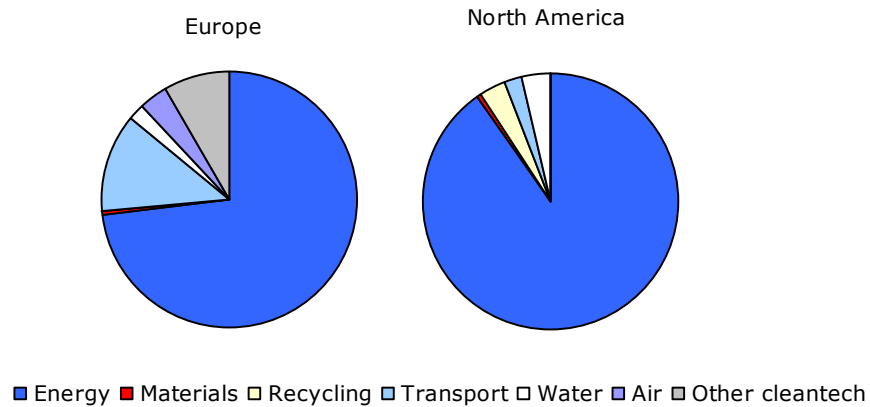
As figure 4.1 shows, the development has really intensified since the second quarter of 2006. This is most likely primarily caused by the rise in oil prices, which implies that alternative energy sources have become more attractive, in part because they reduce the dependence of the expensive fossil fuels, and in part because they become competitive vis-à-vis the traditional energy sources.

The development has been most pronounced in the US, where Cleantech companies have drawn in two and a half times as much capital as in Europe. In the US, Cleantech investments have by and large shown an increasing tendency since the beginning of 2004, while for Europe it has been a more fluctuating trend.

In 2007, North American venture capital investors invested more than 4 billion USD in Cleantech, while European venture capital investors only invested 1.2 billion USD.

Venture capital investors in both Europe and North America have invested the lions share of their capital in energy technologies, cf. fig. 4.2.

Figure 4.2: Investments in Cleantech in North America and Europe, 2007.



Source: Vækstfonden and VentureXpert

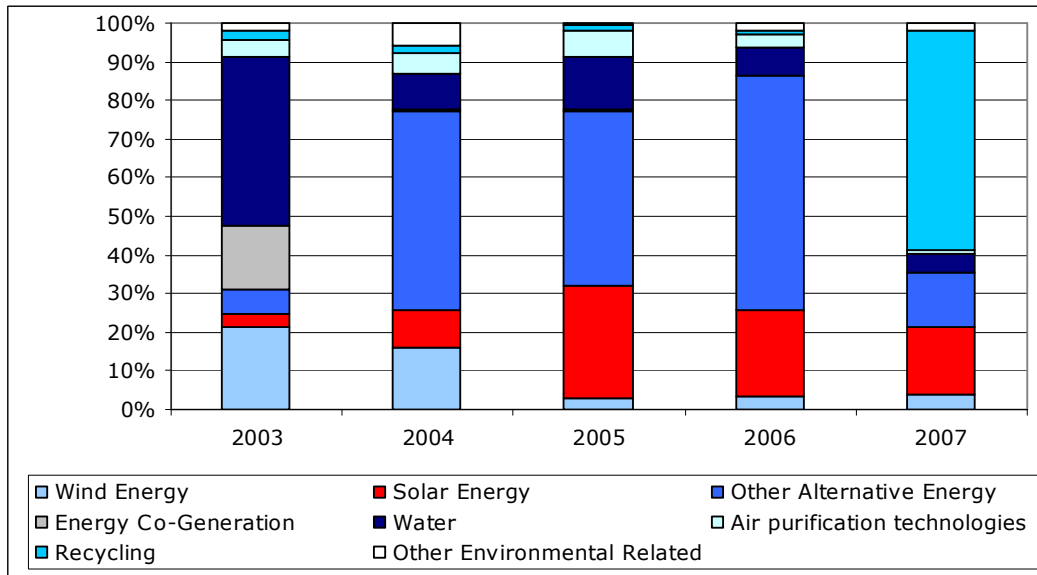
The high focus on energy technologies is primarily caused by the fact that the driving forces have been strongest in this segment due to the high energy prices and subsidies.

In general there has been a wider industry focus among the European venture capital investors as the segments other than energy count for more than 25 %. It is particularly companies within transport, water, air, materials and other Cleantech that have attracted capital in Europe apart from the energy segment. In North America only 10 % of the investments are placed in other segments than energy.

If we take a closer look at the technology spaces that global venture investors have invested in, we see variations over the years from 2003 to 2007. In 2003 environmental and energy companies received similar amounts of the capital invested, while from 2004 to 2006, energy companies received the majority of the capital, with solar energy and other alternative energy as the main areas. The environmental area was dominated by investments in water and air.

In 2007, it seems as if the trend changes so that environment once again gets the most capital, primarily drawn by companies within recycling, cf. figure 4.3.

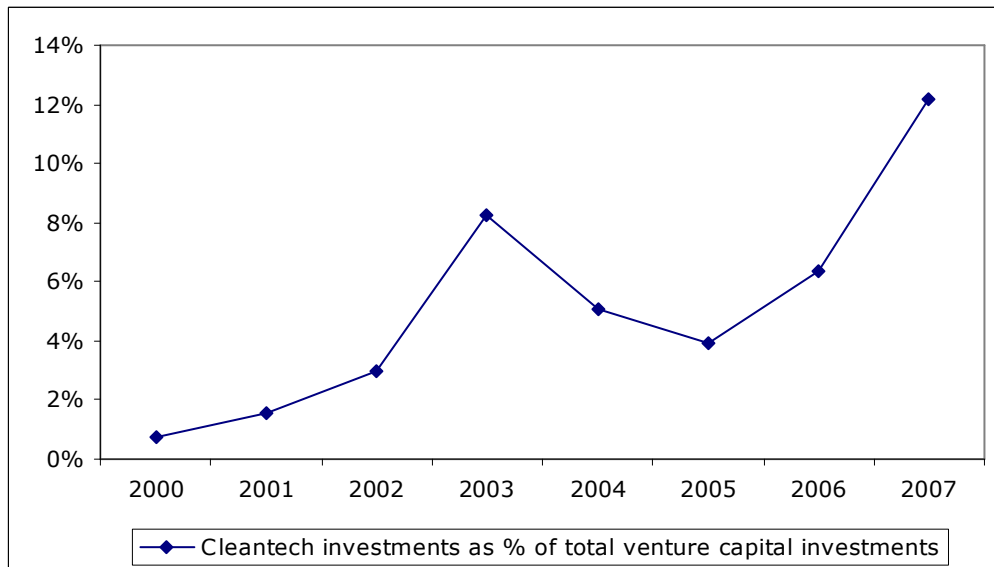
Figure 4.3 Global venture investments in Cleantech segments 2003-2007



Source: Vækstfonden and VentureXpert

But how does it look for Danish Cleantech companies? Actually, Denmark follows the international trend, as Danish venture capital investors have increased their investments in Cleantech in recent years. 2007 became the year where Danish venture investors invested the largest proportion of capital in Cleantech, about 12 % of the total capital invested.

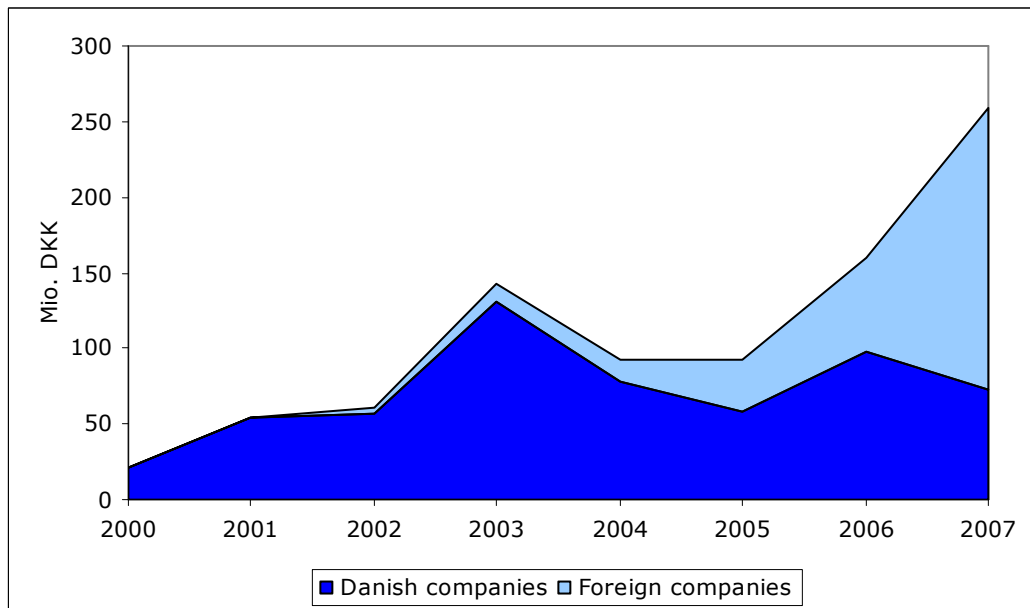
Figure 4.4 Danish venture investments in Cleantech, % of all investments



Source: Vækstfonden

By examining the investment pattern more closely, it is evident that Danish venture capital investors' increased attention on Cleantech has primarily benefited foreign Cleantech companies. Thus, the Danish Cleantech industry still faces a challenge when it comes to attracting risk capital from local investors.

Figure 4.5 Danish investments in Cleantech companies



Source: Vækstfonden

Note: Data from 2000-2006 is based on annual reports from 2001-2006 "Det danske marked for venturekapital og buy-out", while data from 2007 is based on quarterly reports of the Danish venture market.

It does not, however, mean that Danish venture capital investors have stayed out of the Danish Cleantech market. Actually, about 60 Cleantech companies in Denmark have drawn in venture capital in the period 2000-2006. But the accumulated investments only account for ½ billion DKK (67 million EUR) or 4 % of the total venture investments in the entire period.

The Danish venture capital for Cleantech mostly went to companies within solar cells and biomass. The investments in the environmental space previously went to mature companies within the waste segment, but in recent years focus has been shifted to younger companies within water space, cf. Vækstfonden 2006.

It is thus interesting to take a closer look at what characterizes the companies capable of ensuring capital and competencies from venture investors? And what separates Cleantech from other parts of the venture area, such as IT and Life Science?

4.1 How to Make it to the Investment Radar

When venture capital investors look at potential portfolio companies, they look at a number of criteria to assess whether it is an interesting investment case. The criteria are dependent on the different investors' investment focus, but some technology areas are more interesting to investors than others. For Danish investors it plays an important role whether Denmark has a stronghold in the given technology space.

If Cleantech companies are to become interesting investment cases, it is first and foremost important that the companies have attractive sales potential. There has to be an actual need for the technology which is likely to create an international demand with limited price elasticity.

When the sales potential is estimated, it is important to look at the infrastructural possibilities. In Cleantech it is essential whether there is local political endorsement which can contribute to creating a home market for the Danish Cleantech companies. Good home markets will, other things equal, make the global penetration easier. It is also of importance to look at whether the framework conditions support growth opportunities. It is a significant advantage if the company is established in an area where there are local innovative companies and a local industry that can support the development and last but not least that there is a local cluster.

Furthermore, companies drawing in venture capital are characterized by being close to the market. If an entrepreneurial company does not have sales, it is crucial that the company can render probable a near future sale. Time-to-market is therefore also a valid screening criterion for venture capital investors. Thus, it is harder for companies with long development horizon to attract capital from venture investors than short horizon companies, even if the potential is greater in the long horizon companies.

4.2 Funding Scenarios for Danish Cleantech

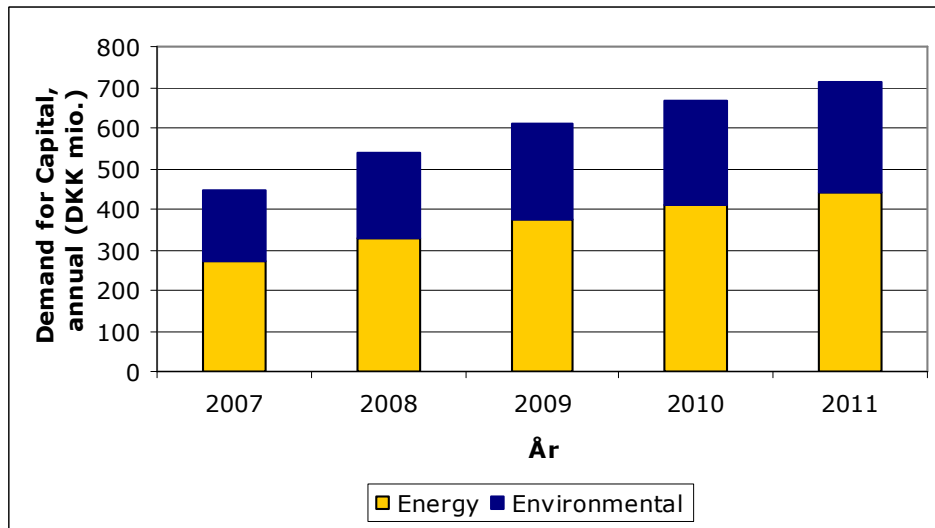
Denmark has a large potential to generate an increasing deal flow for venture capital investors within Cleantech. Denmark already has national strongholds within Cleantech, but also within related technologies such as life sciences and IT, all of which present a technological and research platform to build upon in the years to come.

An increasing deal flow will cause a corresponding increase in the demand for risk capital from start-ups, and it will increase the need for follow-on investments. Thus, the question is what fundraising requirements venture capital investors in the Cleantech space will have, if they are to meet the demand for capital in the market. Historically, the annual venture capital investments in Danish cleantech have ranged from 2-3 investments within the energy space and 4-5 investments in environmental technologies.

If the number of annual start-ups remains at the current level, the scenario for the capital need of cleantech companies is estimated at an annual DKK 300 million (EUR 40 million), including investment requirements for start-ups as well as investments in the existing portfolio companies.

However, looking a few years ahead, experts are confident that the start up activity within cleantech in Denmark will increase. A conservative estimate points to a start-up activity stabilizing around an annual number of 10-20 start-ups. This will increase the need for capital to a level of DKK 400 million (EUR 53 million) in 2007 rising to DKK 700 millions (EUR 94 million) in 2011, cf. figure 4.6.

Figure 4.6. Demand for Capital



Source: Vækstfonden

In this scenario Cleantech investments will make up 20 % of the total venture capital investments in 2011, which is not at all unrealistic looking at the current trends in Europe and the US.

In conclusion, no doubt venture capital investors have a unique opportunity to bring Danish Cleantech to the international markets by bringing in the necessary competencies together with the capital to finance growth. In this way, venture capital investors may contribute to the breakthrough of an increasing number of Danish Cleantech companies on the fast growing global market for clean technologies. However, it is imperative for the success of Danish cleantech that the investment capacity of venture investors looking at Danish Cleantech improve significantly compared to today's investment levels.

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