Financing Eco-innovation

Final Report

EIM and Oxford Research for the European Commission,
DG Environment

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OXFORD RESEARCH

Contents

1. Executive summary

This report presents the findings of a major study into access to financing for eco-innovative SMEs, carried out by EIM and Oxford Research for DG Environment. The report draws on the available evidence to reach conclusions on how to improve access to financing for eco-innovative SMEs.

In January 2004, the European Commission produced an action plan to improve the development, dissemination and promotion of environmental technologies and eco-innovation in Europe. The Commission is currently considering options to step up efforts to increase eco-innovation uptake and has commissioned the current study on financing eco-innovation. The study examines specific problems and opportunities related to financing eco-innovative SMEs.

The objective of the study is to gain a better understanding of financing issues faced by eco-innovative SMEs in their early stages, as well as those faced by their investors, in order to allow an improved design of instruments in support for eco-innovation at the European and national levels (particularly in light of the new financial framework after 2013).

The study builds on four central elements: A literature review, a survey of 450 eco-innovative SMEs, interviews with 40 financial actors and 10 case studies of eco-innovative SMEs and financial actors.

The expectations for future growth in eco-innovation are huge and eco-innovation currently receives significant attention. In spite of this, it remains a difficult sector to invest in. Specific challenges pointed out in the literature and by providers of finance to eco-innovation include:

- The double externality problem. Eco-innovation produces positive externalities both in terms of innovation and environmental effects. There are also market distortions caused by high-carbon fuel pricing that does not reflect the environmental and social costs they impose.
- Dependence on regulation and subsidies. Regulation creates opportunities but is also a risk if the profitability of solutions is dependent on regulation, which adds an element of uncertainty as regulations can change quickly.
- Eco-innovation is not focused around a common technological platform. Instead of a sector in conventional terms, it is rather a theme or an umbrella term covering a wide variety of different technologies, products, services and markets. This makes it more difficult for potential investors to evaluate funding opportunities.
- This is combined with sub sectors, mainly non-energy, of eco-innovation that remain immature. Often technologies and business models are unproven, markets are unknown and many investments have not yet been exited, leaving investors with high levels of uncertainty.
- Some target markets for eco-innovative SMEs have difficult market conditions or low levels of competition. In some cases, the industry or market is highly regulated because there is a high degree of public sector involvement. In other cases, the entry barriers are high because the market is dominated by a few large companies and because the established players prioritise supply security as opposed to adopting innovation.

At the same time, providers of finance look for traditional return on investments and apply the same criteria for making investments. No evidence emerged that investors have a unique approach to eco-innovation in terms of decision-making process. However, the survey and the interviews pointed to specific sector characteristics of eco-innovation that cause the investment conditions to be sub-optimal from an investment perspective. In other words, the investment rationale is generic but the variables that are contained within the decision-making criteria are sector-specific. The market analysis that investors use is shaped by the industry in which SMEs operate and, according to the survey and interviews, eco-innovation has a particular set of characteristics that constrain investment.

Turning to the companies themselves, SMEs point to lack of small scale financing, lack of engagement with financial community and uncertainty of government regulation as the most significant barriers.

Thus, there are clear market failures which makes access to finance difficult and which justifies public intervention. Several instruments can be used to correct the market failures including regulation, subsidies and taxes. Notwithstanding the range of available policy tools, the focus in this report is how risk-sharing financing instruments can be used to improve access to finance.

When discussing eco-innovative SMEs and access to finance, the debate tends to focus on venture capital. However, only a limited number of eco-innovative SMEs fit the venture capital model. Further, most venture capital is directed toward energy generation and energy efficiency. Indeed, a much larger share of the eco-innovative SMEs in the present study receive debt financing. Even for the early stage eco-innovative SMEs, around half of the companies in our survey have received debt financing. Moreover, small-scale financing is the second most significant barrier for access to finance. Recommendations for how to improve access to finance has therefore focused on how to improve access to small scale financing in the form of debt financing and business angel financing. The central recommendations regarding debt financing are:

- A number of EU risk sharing instruments already exist in this field but there is at the same time still a need to improve access to debt financing. A strategy is needed that includes a wide range of flexible debt risk sharing instruments to overcome market failures, lower barriers to finance, and fulfills the policy goals of creating a thriving eco-innovation industry in Europe.
- There are a number of general guarantee programmes that are open to eco-innovative SMEs. In order to facilitate a larger uptake of loans by eco-innovative SMEs from the guarantee programme, the EU could consider allowing for more flexible conditions for eco-innovative SMEs. This is currently not the policy of all existing financial instruments. More flexible conditions would be in line with the current High Growth and Innovative SME Facility (GIF) which has added flexibility for co-investments in cleantech funds.
- The EU could also consider designing instruments to ensure that benefits accrue to all sub sectors of eco-innovation. Today, energy is the subsector which is most mature, which banks are most familiar with, and which receives the largest share of eco-innovation venture capital. Financial instruments can – unlike grants - be difficult to target at certain sectors or subsectors because they are dependent on financial intermediaries and SMEs applying for them. In short, they are market-driven and have less precision when trying to adjust the focus of the market. But flexible conditions could help target instruments better at a high priority sector like eco-innovation.
- Through risk sharing instruments targeted at eco-innovation, banks will also be more engaged in the sector and encouraged to build solid knowledge and statistical registers of eco-innovation which in the long run will improve their competencies and allow them to assess risks better. Statistical information about eco-innovative SMEs is in general difficult to obtain because eco-innovative SMEs span a wide range of traditional industry classifications.

While focus should be on how to assume part of the risk for the banks and the eco-innovative SMEs, it is important to avoid assuming too large a share of the risk. The intermediary banks must still have a strong incentive to evaluate loan applications thoroughly. The risk assumed by the private bank must not be so high that the bank avoids approving loan applications, and not be so low that the bank takes on every project regardless of whether it is promising or not. The risk balance between must be tailored to the target group. However, the need to protect the environment can justify higher risk assumption than in other sectors.

Business angels are more difficult to co-finance than venture funds. Therefore the instruments in place at the EU-level to co-finance venture funds are more frequently used. For example, the European Investment Fund plays an active role as co-financing instrument at the venture capital market and has invested in several cleantech venture funds. While the role of EIF is highlighted for its positive effect for venture funds, its role is significantly less defined in the business angel market. The High Growth and Innovative SME Facility (GIF) has an envelope for co-investing in investment vehicles promoted by business angel networks. However, despite the demand voiced by business angels for such an instrument, the uptake has been very lim-

ited. This is consistent with the findings of the present research, which shows that various sources at regional and national levels have provided the funding for co-financing instruments. The central recommendations regarding business angels are:

- Few, if any, of the business angel risk-sharing instruments have been evaluated and it is therefore difficult to point to one instrument as being good practice. However, it is clear that there is a need for a wider range of co-financing instruments for business angels at the EU level. As was made clear in the interviews, instruments to support business angles are clearly in demand.
- The interviews suggest that increased support for business angel networks is needed. Without networks to encourage formalized business angel collaboration, it is very difficult to establish co-financing mechanisms.
- To support the business angel segment, the EU could play a larger role as co-financer. The instruments examined illustrate that there is no established pattern regarding co-funding of business angels and that the co-financing that is provided is derived from various sources at regional and national levels. A highly visible European player providing co-financing to competent business angel networks would represent a large improvement and a clear opportunity for European added value.
- In order to take on a more prominent role in co-financing business angels and improve funding to eco-innovative SMEs from European business angels, the EU could consider:
    - How the EIF, or other International Financial Intermediaries, can build an understanding and position of co-financing business angel instruments that corresponds to the position the Fund has in the formal venture capital market
    - How business angel networks focused specifically on eco-innovation, such as the ones established in France and Italy, can be supported in order to secure finance to eco-innovative SMEs and encourage business angels to invest in eco-innovative SMEs.
    - How more information about well-functioning business angel networks and co-financing instruments can be collected in order to build evidence-based co-financing instruments at the EU level, which has a fair distribution of risk between the SME, the business angel and EU institutions. This could only be achieved to a limited extent in the current study
- In terms of incentivising business angels to invest more in eco-innovation the business angels themselves mention fiscal incentives as a very strong influence on their behaviour. Favourable tax treatment will increase the return on investments for business angels investing in eco-innovation and since potential investors compare their likely return from different assets classes such arrangements make equity investments in eco-innovation more attractive. Such incentives can motivate more high net worth individuals to invest in eco-innovation, either as active business angels or as passive investors allowing more experienced business angels or fund managers to invest on their behalf. Fiscal incentives are regulated by member states and not by the EU. It is therefore an instrument member states which wish to strengthen investments from business angels in eco-innovation can consider.

2. Introduction

Over the last decade, the focus on environmental technologies and eco-innovation has increased markedly. Fear of climate change, increasing demand for energy, the need to decrease emission of greenhouse gases, depletion of natural resources, rising oil-prices, and security concerns related to dependence on energy from unstable regimes has created a huge need and market potential for eco-innovative solutions. Many of the most innovative solutions are developed by small and medium sized enterprises (SMEs).

In order to realise the potential in eco-innovation, as well as develop new technologies and solutions to help shift to a resource-efficient economy, it is important that SMEs have access to financing. Therefore, the European Commission has commissioned a consortium led by EIM and Oxford Research to conduct the present study, an analysis of "financing eco-innovation". Mr. Aurelio Politano from DG Environment unit E4 Life Environment and Eco-innovation has been project manager for the client and has contributed to the finalisation of the study.

2.1 Financing eco innovation

The ultimate objective of the study is to gain a better understanding of financing issues faced by eco-innovative SMEs in their early stages, as well as those faced by their investors, in order to allow an improved design of instruments in support for eco-innovation at the European and national levels. Thus, the analysis will focus on financing eco-innovative firms at the early stage.

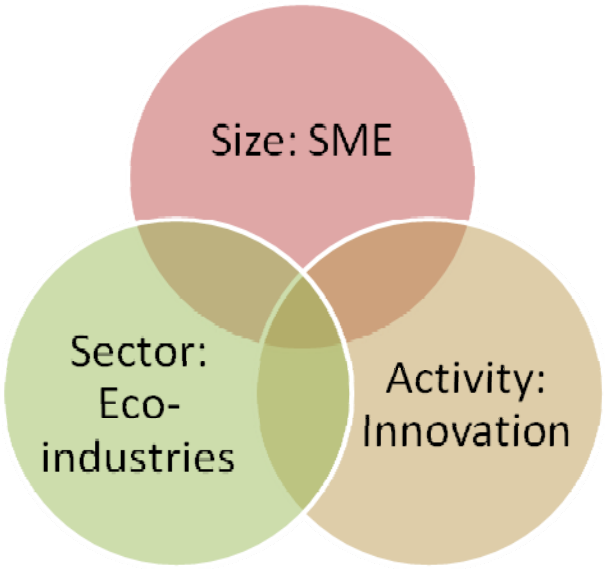
2.2 Terms and definitions

The central terms and definitions in the study are explained in the following sections.

2.2.1 Eco-innovative companies

The central object of the study is eco-innovative SMEs. The definitional sub-components "eco", "innovative" and "SMEs" are summed up by the intersection of the three characteristics: activity, sector, and size:

- Activity: Developing or implementing innovations
- Sector: Target markets are 'eco' industries
- Size: Small and medium size (under 250 employees)



Eco-innovation comprises all forms of innovation activities resulting in or aimed at significantly improving environmental protection. Eco-innovation includes new production processes, new products or services, and new management and business methods whose use or implementation is likely to prevent or substantially reduce the risks for the environment, pollution and other negative impacts of resources use throughout the life cycle of related activities.

As a consequence, **eco-innovative SMEs** are those that have a strong focus on innovation aiming at environmental protection as opposed to "other innovative" SMEs whose main focus is not the environment.

2.2.2 Stages of development

The study distinguishes between different stages of development of the SMEs. They are defined in this way:

Seed stage: Main activities include research, assessment and development of an initial concept before a business has reached the start-up phase.

Start up: Main activities include product development and initial marketing. Businesses may be in the process of being set up or may have been in business for a short time, but have not sold their innovation commercially.

Expansion: An innovation has been launched or implemented and the main focus is on growth and expansion of the business, which may or may not break even or trade profitably.

Later: Business is established and the main focus areas include replacing capital or preparing for exit, such as by preparing to be bought out.

Further, early stage describes seed and start-up stages of a business. The definitions are inspired by the definitions used by the European Venture Capital Association (EVCA).[1]

2.2.3 Eco-innovative sub sectors

The study distinguishes between different eco-innovative sub sectors. The distinction used in the study is listed below.

[1] http://www.evca.eu/toolbox/glossary.aspx?id=982

1. Energy generation (including renewable energy)
2. Energy storage (including batteries and fuel cells)
3. Energy infrastructure (including power systems, transmission technologies and transformers)
4. Energy efficiency (including various solutions that use less energy than conventional solutions)
5. Transport (including vehicles design and technology, fuels and logistics)
6. Water and wastewater (including filtration, purification, water conservation and wastewater treatment)
7. Air and environment (remediation, emission control, trading and offsets)
8. Materials (nanotech, biotech and chemical materials)
9. Agriculture (land management, natural pesticides, natural fertilizers, irrigation)
10. Recycling and waste (various recycling services and waste treatment services)
11. Building/construction (including various forms of energy efficient houses and buildings)
12. Food and drink manufacturing (including energy management systems and use of by-products for renewable energy)
13. Other manufacturing (monitoring/control appliance and smart production industries)

These distinctions are primarily based on the distinctions used by the Cleantech Group, which has delivered the venture capital data for the study.[2]

2.3 Structure of Report

The report is structured as follows:

Chapter 3: Provides an overview of the study methodology

Chapter 4: Presents data on financing of eco-innovative SMEs, including venture capital, business angels, and banks

Chapter 5: Presents the perspectives of SMEs and financial actors on access to finance, derived from extensive field research

Chapter 6: Provides an account of the rationale behind investment in eco-innovation, and outlines the decision-making process that underpins the provision of finance to eco-innovative SMEs

Chapter 7: Presents conclusions based on the evidence yielded from the field research and offers recommendations on improving access to financing for eco-innovative SMEs.

Appendix A: Presents and overview of good practice instruments, focusing on debt financing and co-financing instruments targeted at business angel

Appendix B: Provides an overview of existing EU instruments of relevance to this study

Appendix C: Lists the financial actors interviewed for the field research

Appendix D: Lists the case studies developed as part of the field research

Appendix E: Contains the questionnaire used for the survey of SMEs

Appendix F: Contains the interview guide used as part of the field research

[2] For further information please refer to http://cleantech.com/

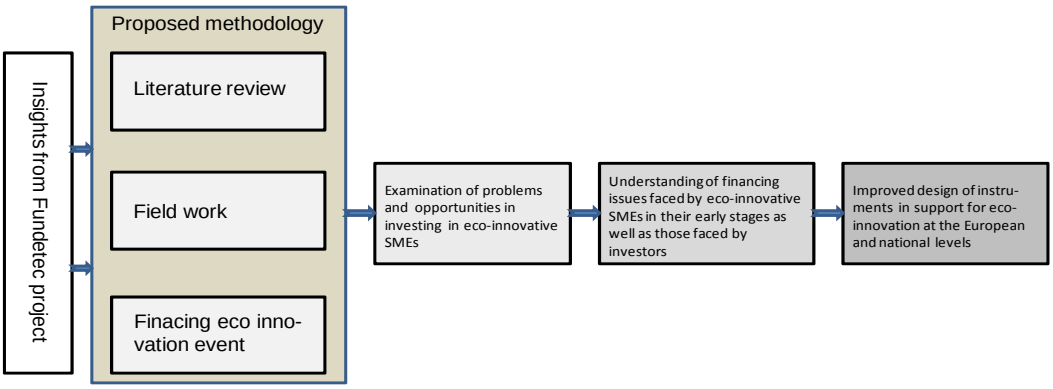
3. Methodology

As mentioned, the present study builds on the insights of the FUNDETEC report, which had a broader scope of focus than the present study. The outcomes of the FUNDETEC report informed the design of the study by framing the pertinent topics to be explored. To provide broad coverage of Europe while examining the questions in-depth, the analysis concentrated on 12 reference countries. These countries have been selected to represent a broad range of EU member states while allowing for a deeper analysis of issues that could potentially vary across member states. The countries selected include Austria, Czech Republic, Denmark, Finland, France, Germany, Poland, Spain, Slovenia, the Netherlands, Italy and the UK. The countries have been selected to cover:

- Large and small countries
- Old and new EU members
- North, South, Western and Eastern European countries
- Countries with a highly developed financial market and countries with a less developed financial market
- Countries with a relatively high and less high GDP

The study draws on two major reports undertaken as precursors to the present report. The first element is a **Literature Review,** which has provided the foundation for the empirical **Field Work Report**. Building on the two foundational reports, the present **Final Report** presents an overview of the research findings and contains a set of recommendations to improve access to finance for eco-innovative SMEs. Both the literature review and the field research supported the drafting of the Final Report. The preliminary conclusions of the final report were presented at the 9th ETAP Forum in November, 2010. Dialogue from the Forum was used to inform the present version of the Final Report.

Overview of the analysis



3.1.1 Literature review

The purpose of the literature review was to summarise the knowledge that is available on eco-innovation. The review includes both the perspective of eco-innovative SMEs (demand side) and the perspective of early stage financial actors (supply side). The literature review is based on the review of approximately 200 academic articles, reports by governments and international organisations, private-sector studies, and other documents related to the financing of eco-innovation.

In order to avoid language bias, the search strategy included literature in both English and national languages, national researchers in the 12 countries mentioned above have contributed to the study. They have delivered a list of literature in English as well as a summary of relevant literature in national languages to Oxford Research. The findings of the literature review were synthesised by Oxford Research.

3.1.2 Field work

The purpose of the field work report was to present an overview of the evidence derived from the field research, which consisted of three streams of activity. The first stream was a large **survey** of eco-innovative SMEs that yielded 450 respondents across Europe. The second stream consisted of a **series of interviews** with providers of financing for eco-innovative SMEs. The third stream consisted of a combination of desk research and interviews to create **a set of case studies** of early-stage SMEs and financial actors.

3.1.2.1. Survey

The first part of the field work consisted of a survey among eco-innovative SMEs in the EU. Two complementary methods have been used:

1) A telephone survey was conducted based on a list of more than 3,000 eco-innovative businesses compiled by the consortium and partners predominantly in the 12 EU member states (MS).
2) A web-based survey has been conducted among more than 2,000 EU-based cleantech businesses in the Cleantech Group's database.[3]

The questionnaires used in the two surveys are identical. Altogether 450 answers from SMEs have been obtained of which 122 are early stage. One of the conclusions to emerge from the literature review was that there is generally a lack of information concerning differences between sub-sectors within eco-innovation. Therefore, this is one of the questions which has been addressed in the survey.

The list of eco-innovative SMEs in the 12 countries that have been contacted for the **telephone survey** has been compiled by partners of EIM and Oxford Research. The SMEs have been identified through cluster organisations, industry and/or network organizations, previous research, lists of participants of relevant conferences, award events, as well as investors and incubators involved in the eco-innovation sector. The lists provided by researchers included names of SMEs, telephone numbers and if possible, additional information such as a contact person.

In addition to this, eco-innovative SMEs have been identified using various sources provided by DG Environment; mainly lists of beneficiaries of EU programmes. The telephone survey has been conducted by the Global Data Collection Company (GDCC) in the Netherlands in the national languages of the 12 selected MS.

In addition to the telephone survey, the consortium has also made arrangements with the Cleantech Group to conduct a simultaneous **web survey** using the Cleantech Group's database of cleantech start-ups. The web-based questionnaire was only available in English. An invitation to participate in the survey was sent out to the cleantech businesses in the database in all EU countries. The Cleantech Group also sent a reminder e-mail to those who had not answered the survey within the first week in order to increase the response rate.

The survey is included as appendix E.

[3] For further information please refer to http://cleantech.com/research/databases.cfm

3.1.2.2 Interviews

The field work included 40 personal in-depth interviews with early stage financial actors. The interviews were conducted face-to-face by members of the core team, based in Austria, Denmark, Finland, The Netherlands, and the UK. The informants represent all 12 member states mentioned above.

An interview guide for investors and for loan providers has been developed. The majority of the interviews took place from mid-September to early December. Informants have been selected in order to provide a meaningful coverage of different countries and different types of financial actors. The interviews focused on the early stage SMEs have been conducted with key representatives from:

- Public venture capital funds with a focus on eco-innovation (operating on market conditions).
- Private venture capital funds with a focus on eco-innovation.
- Eco-innovation business angels.
- Key representatives of national public eco-innovation funding schemes (e.g. loan guarantee programmes).
- Established companies with eco-innovation corporate venture activities.
- Banks with an eco-innovation focus.

The interview guide is included in appendix G

3.1.2.3 Case Studies

A series of ten case studies was developed to illustrate the dynamics of financing eco-innovative SMEs from the perspective of the financial actors and the SMEs. In total, the financing process of four financial actors and six SMEs were outlined and included the following elements:

- Brief background on the financial actors or SME (e.g.: the technical eco-innovation developed, the portfolio of the financial actor)
- Funding "history" of the company or financial actor (including details about the public funding) and current financial needs
- Detailed analysis of the problems being faced by the companies or financial actor in accessing or providing further financing and describes the background conditions for successful financing arrangements
- Main conclusions arising from the case study and lessons learned

The information for the case studies consists of iterative dialogue with the management, in-depth interviews, desk research, and reference to the economic and financing context in each respective market. Case studies were chosen to highlight the range of financial actors (corporate venture, venture capital, business angel, public funding scheme) and a variety of industries (building, materials, transportation).

Case studies are included in appendix D.

3.2 Financing structure of eco-innovative SMEs

This section presents an overview of the survey population. The focus of the survey is non-energy eco-innovative SMEs. However, a limited number of companies from the energy sector have been included in the survey in order to provide the possibility to compare energy-related SMEs to other eco-innovative sectors. Altogether, the survey included 450 eco-innovative SMEs from across Europe, 122 of which were early stage SMEs.

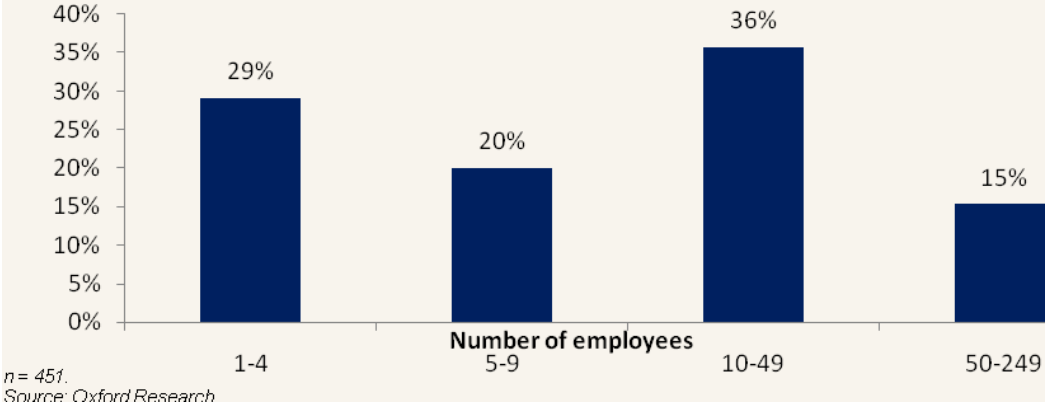
The chapter begins by describing the types of eco-innovative subsectors to which the companies in the survey belong. The chapter then outlines the stages of development of the companies, measured both in terms of a generic model of innovative development and by their experience in eco-innovation.

3.2.1 Description of the sample

The survey targets SMEs, which are defined in Europe as companies that have less than 250 employees. A significant majority of the companies are small, with 85 percent employing less than 50 employees.

Nearly half the sample surveyed for the present study, 49 percent, report that they employ less than ten employees. Only 15 percent of the sample is made up of medium sized SMEs that have between 50 and 249 employees.

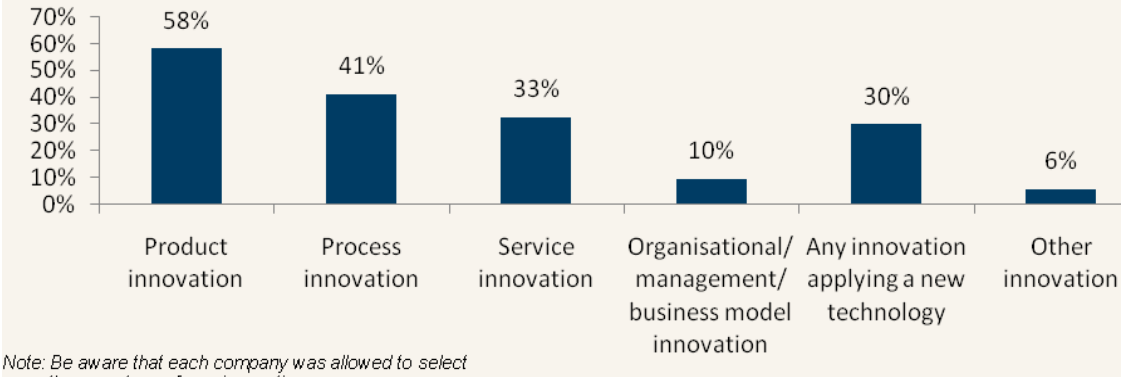
Figure 3.1: Number of employees of the business



n = 451.
Source: Oxford Research

The sample is relatively balanced across types of eco-innovation. Figure 3.2 presents the range of eco-innovative activities used to categorise the companies in the survey. Product innovation is the most common type of eco-innovation in the study, with 58 percent of the companies in the sample involved in producing product innovations. Process innovation is also the focus of many companies, with 41 percent of the companies focusing on this type of activity. Process innovation is an attractive market for companies that are involved in 'greening' established industries. There are relatively few companies in the sample that focus primarily on organisational or management aspects of eco-innovation. The application of new technology also figures prominently in the survey, with nearly one-third (30 percent) of the companies in the survey reporting that their innovative activity involves the application of new technologies.

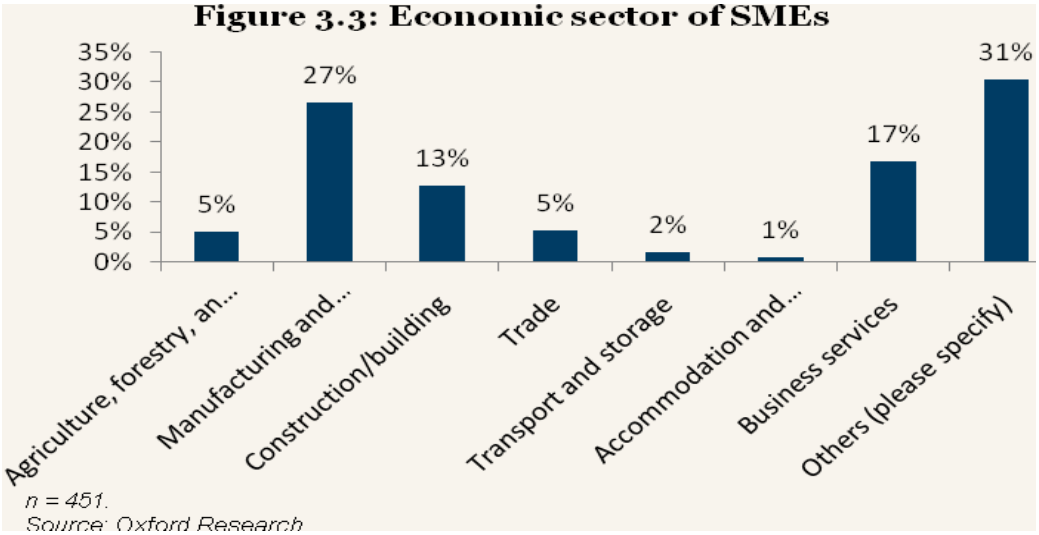
Figure 3.2: Types of eco-innovations that the business' are developing



Note: Be aware that each company was allowed to select more than one type of eco-innovation.
n = 451.
Source: Oxford Research

Figure 3.3 gives an overview of the different industrial sectors to which the companies belong, based on NACE codes used to analyse industrial trends in Europe, expressed as percentages. The most common sectors are "manufacturing and mining", and "others", with 27 percent and 31 percent respectively. This high incidence of companies self identifying as 'other' could be due to the innovative nature of the field, as the established industrial codes used to categorise industries might be less relevant or of less value in innovative domains. It is of particular note that few companies in the sample self-identified as transport, as one of the key fields on interest in recent policy-making is sustainable transport. It is likely that fewer SMEs are in the field of transport, as the established transport industries (vehicles, freight, air travel) are dominated by large corporations.

Figure 3.3: Economic sector of SMEs



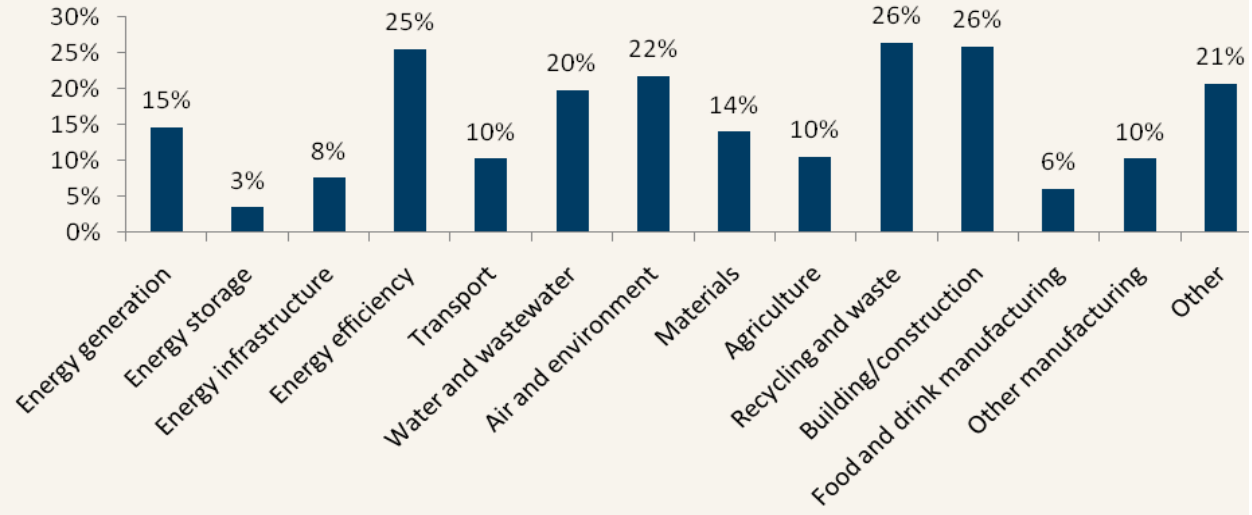
n = 451.
Source: Oxford Research

Figure 3.4 presents an overview of the sector to which the companies' products primarily belong, expressed as percentages. While figure 3.3 refers to the industrial sector to which the company belongs, figure 3.4 refers primarily to the target sector. Thus, a company in the manufacturing sector could target primarily the agricultural sector. This distinction provides an indication of the markets or demand for eco-innovation.

Our target population was deliberately skewed to include fewer companies in renewable energy. However, as is clear by the sample, some eco-innovative SMEs that target other sectors might also have a secondary market in renewable energies. The sample is thus designed to capture the realities of the market rather than clear primary target sectors. It is important to note further that respondents were allowed the option of selecting more than one target market. Thus, as manufacturer of an innovative polymer used as insulation could target such sectors as materials, energy efficiency, and building/construction.

The recruitment strategy for the survey produced a relatively balanced distribution across industries, with no single category making up more than 26 percent. The majority of the products are spread between the sectors of recycling and waste (26%), building/construction (26%), air and environment (22%), energy efficiency (25%), water and waste (20%) and 'others' (21%). As described earlier, highly innovative SMEs are unlikely to fit into a single category and are also likely to develop products or be based on business models that do not fit easily into established understandings of target markets or industries.

Figure 3.4: Main taget industries



Note: Be aware that each company was allowed to select more than one type of eco-innovation.
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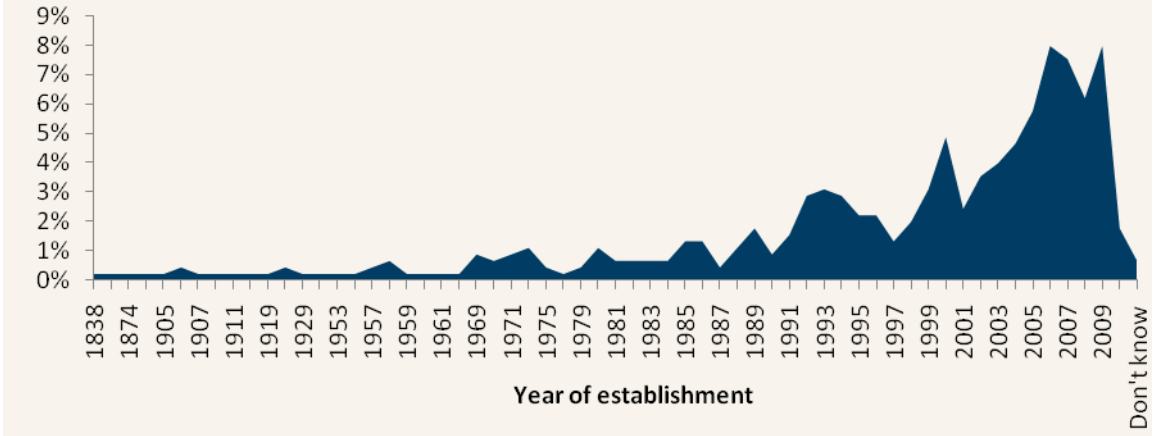
Figure 3.5 shows the percentage of companies that were established in each year. The sample extends over a long time period, covering the establishment of companies between 1838 and 2010. Nevertheless, the sample reflects the fact that the target population of the survey is early stage companies. While there are a few outliers in the sample that were founded in the last century, the bulk of the companies are from the past decade, one third of all (33 percent) companies formed since 2005.

Figure 3.5: The establish year of the business

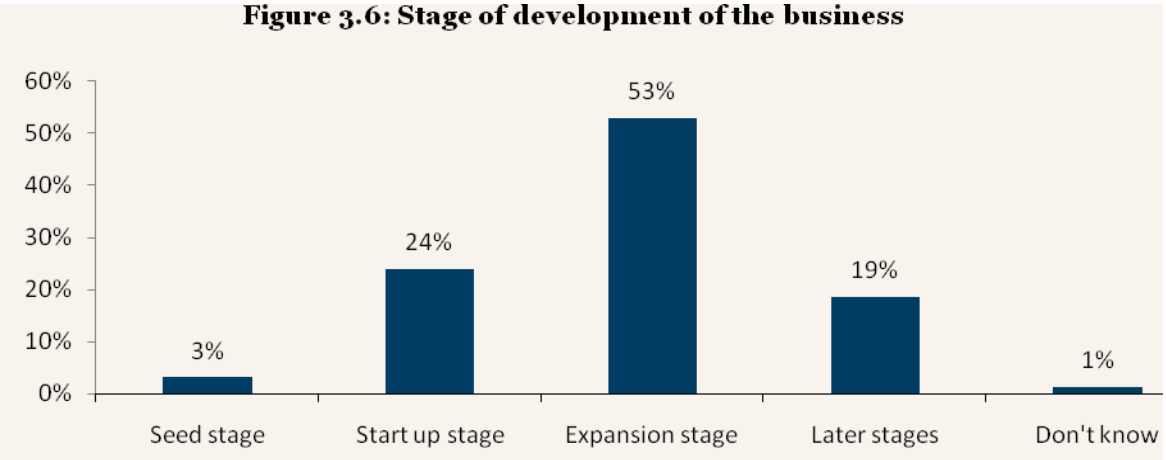


n = 451.
Source: Oxford Research

In spite of the bulk of the companies being formed in the past decade, figure 3.6 demonstrates that over half of the companies (53 percent) consider themselves to be in the expansion stage. The start up stage and the later stages are well represented in the figure, with each stage respectively comprising 24 and 19 percent of the companies surveyed.

Very few of the companies considered themselves to be seed-stage companies is spite of the target sample adopted by the research team. This low representation is likely a result of the difficulty in identifying and linking to seed-stage companies as well as a general constraint to participation in research due to the higher burden on small companies when solicited for information. Indeed, anecdotally at least, there was some evidence that smallest companies were unable to participate due to the time constraints of running micro-scale companies.

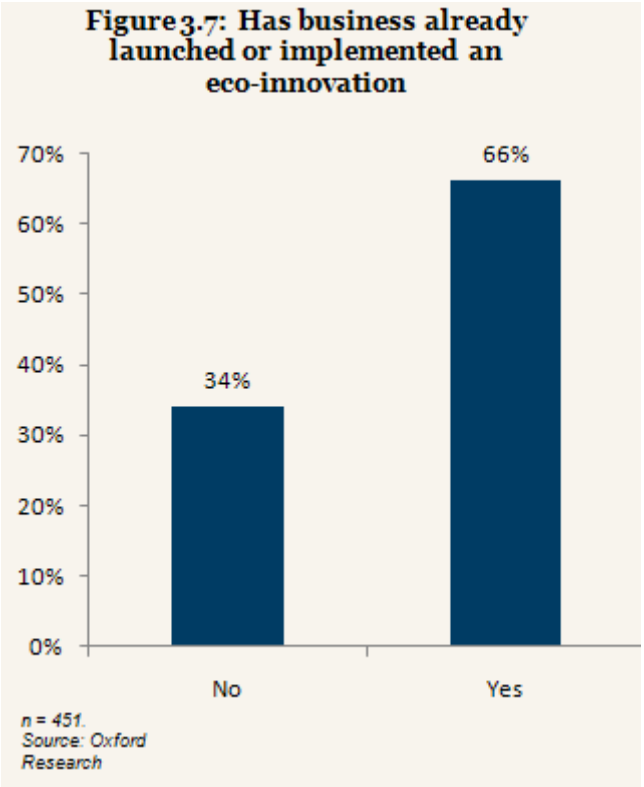
Figure 3.6: Stage of development of the business



n = 451.
Source: Oxford Research

Figure 3.7 shows the percentage of companies that have launched or already implemented an eco-innovation. Roughly two-thirds (66 percent) of the companies surveyed have already implemented or launched an eco-innovation on the market. This finding is consistent with the previous figure (3.6) which explained that most companies consider themselves to be in the expansion stage of development. In fact, according to the generic innovation models common in the literature, the expansion stage occurs shortly

after launching a product, once the market has been identified. Thus, the high number of expansion stage companies and the high number of companies reporting having launched a product is expected.



Eco-innovation is a relatively recent sector and thus a majority of the companies in the survey do not have experience with other types of products. Figure 3.8 shows whether or not the companies have commercialized an innovation not focused on eco-innovation. 39 percent of the companies have commercialized another innovation. This could indicate that a company has undergone a 'greening' of their established products and have re-launched an existing product that is more sustainable than the previous version. Similarly, as company might have simply expanded their market to offer a more sustainable version of an existing product.

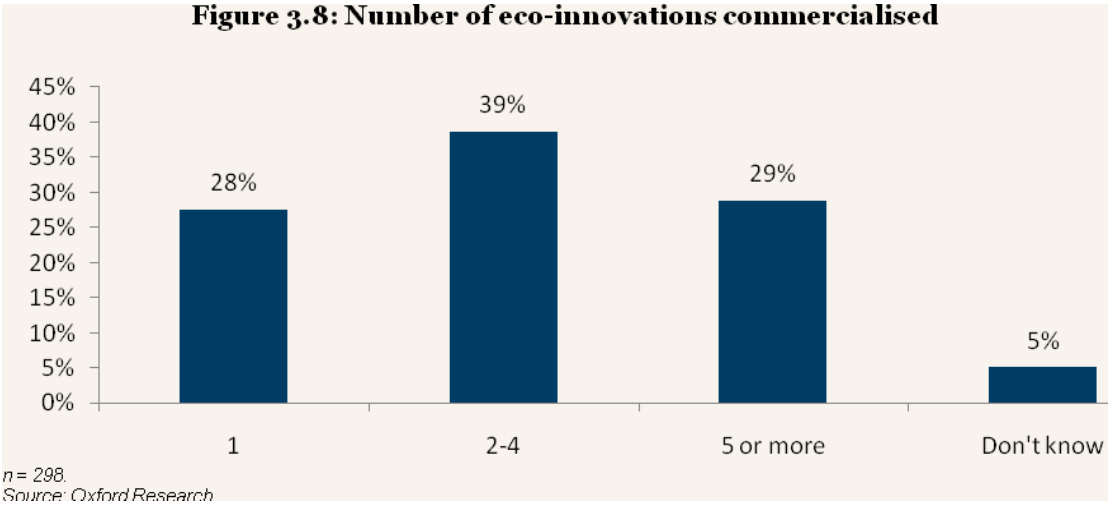
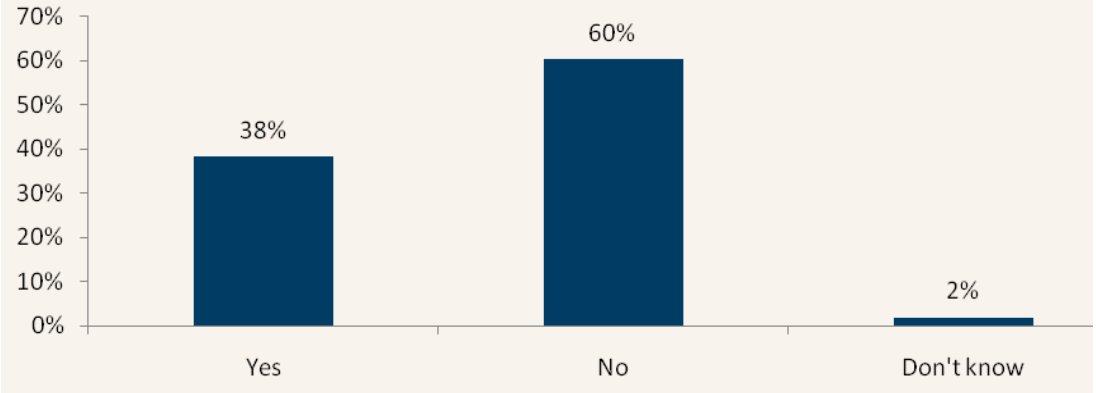


Figure 3.9 gives an overview of the number of eco-innovations the companies surveyed have commercialized. There is relative balance between the single-product SMEs (28 percent), those that have a limited range (39 percent), and those that have launched five or more innovations on the market (29 percent). It is important to note, however, that a majority (60 percent) of the SMEs in the survey report that they have never launched another product, meaning that more than half of the companies in the survey are based exclusively around their eco-innovative product, service, or other business activity.

Figure 3.9: Has your business ever commercialised another innovation (not focused on eco-innovation)?



n = 451.
Source: Oxford Research

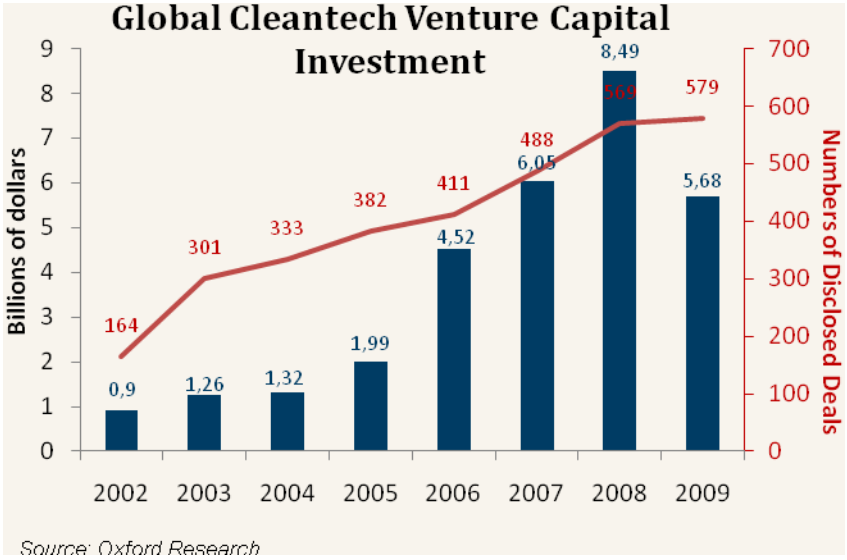
4. Access to finance for eco-innovative SMEs in Europe

This chapter provides an overview on the financing situation for eco-innovation in Europe, with a specific focus on early-stage financing. Since the most widely-available data source relates to the venture capital market, this type of financing features prominently in the overview. As a matter of fact, it is only a small fraction of SMEs that are appropriate for VC financing. These firms are, however, companies regarded as high-potential firms. Information on bank financing and business angel financing is less developed than the information on venture capital. Nevertheless, the business angel market in Europe is receiving increased attention, and the valuable role it plays in the financing system is becoming clearer.

4.1 Venture capital

According to Dow Jones Venture Sources, one of the leading providers of data on venture capital, the total global venture investments worldwide amounted to an estimated 29.6 billion dollars in 2009.[4] According to Cleantech Group, a company specialised in providing data on cleantech, total global[5] venture investments in cleantech amounted to 5.68 billion, dollars in 2009 down from 8.49 billion dollars in 2008.[6] The 5.68 billion dollars invested in 2009 were spread across 579 investments.

Figure 4.1. Global Cleantech Venture Capital Investments



Source: Cleantech Group, 2010

[4] www.venturesource.com

[5] North America, Europe, Israel, India and China

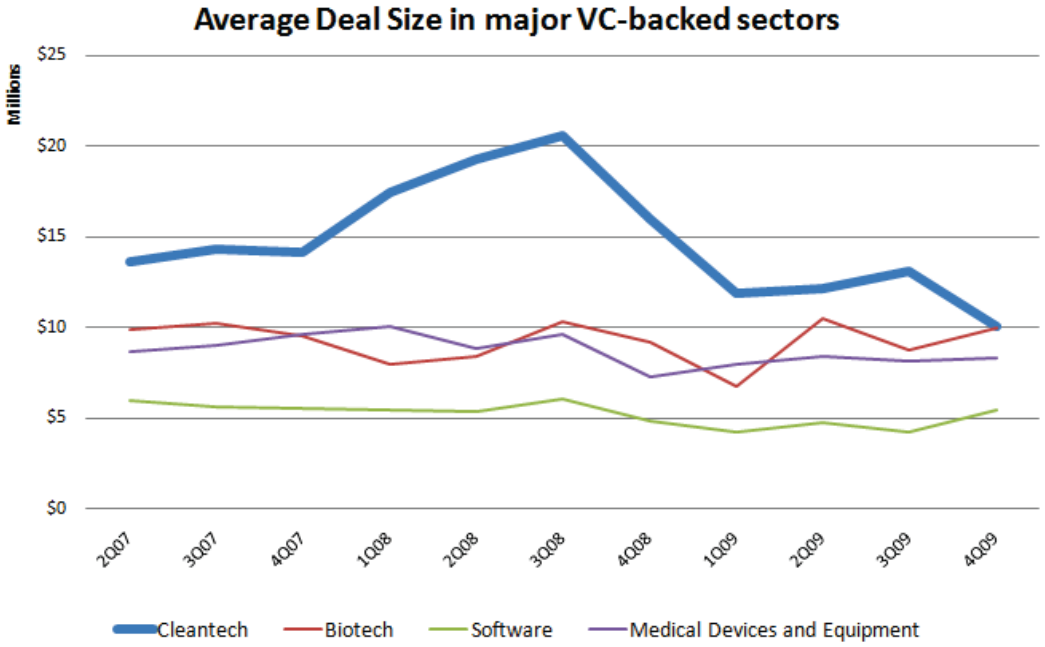
[6] Cleantech Group, 2010. Data providers use different definitions of cleantech, operationalise definitions differently and gather data from different sources. Therefore data might vary from one data provider to another due to methodological differences. To avoid this to the extent possible the section is mainly based on data from Cleantech Group..

The decline in investments of about one third from 2008 and 2009 is primarily due to the impact of the financial crisis. However, it is worth nothing that investments in 2009 were almost at the same level as in 2007 and that the drop was much less severe than what was the case for the wider VC market.[7] The implications of a drop in venture capital investments in cleantech are serious. In terms of employment, the Cleantech Group estimates that 2700 direct jobs are created for every $100 million cleantech venture investments.[8]

Deal size in Eco-innovation is no longer larger than other VC-backed sectors

Eco-innovation has previously been characterized by a very large average deal size compared to other major VC sectors, such as biotech and ICT. However, recently the average deal size in cleantech has shrunk and is today on the same level as biotech. However, average deal size is still larger than for example medical devices and equipment and software.

Figure 4.2 Average deal size in major VC-backed sectors



Source: Cleantech Group, 2010

While deal size was previously one of the defining traits that set cleantech apart from other sectors, the difference seems to have disappeared by the end of 2009. However, it remains to be seen if this is a quarterly fluctuation or whether it will be permanent feature of the cleantech investment landscape.

According to Cleantech Group and PricewaterhouseCoopers[9] the development is mainly explained by the drop in fundraising for cleantech and thereby investors' increasing interest in capital-efficient companies, such as those often found operating in energy efficiency. This shift in attention has been at the expense of capital intensive investments such as renewable energy and smart grid projects. As such, investors are committing less to each deal. The effects of the tightened financial markets have been less prominent in other VC industries where deal sizes are smaller.

[7] Cleantech Group, 2010

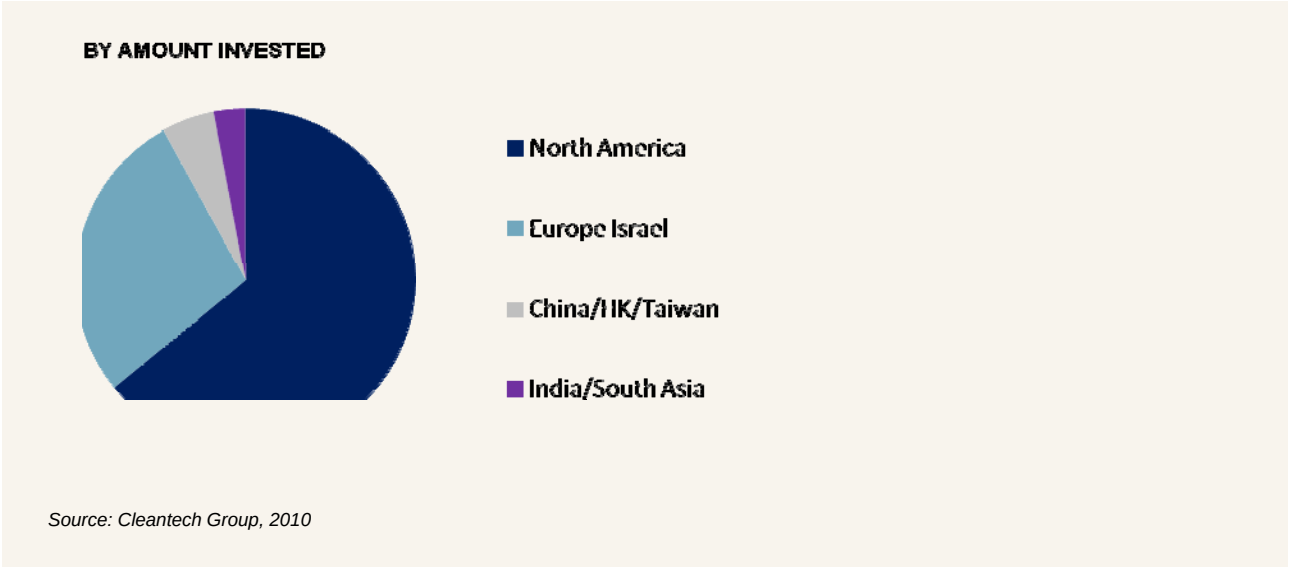
[8] Cleantech Group and Environmental Entrepreneurs (2006).

[9] PricewaterhouseCoopers (2009).

EU has smaller cleantech venture capital market but larger share of total market is invested in cleantech

The total VC cleantech market is significantly larger in North America than in the EU. North America accounted for $3.6 billion, or 64%, of the VC funding raised in 2009. Europe and Israel accounted for $1.6 billion, or 28%, while China and India accounted for 5% ($276 million) and 3% ($167 million) respectively.

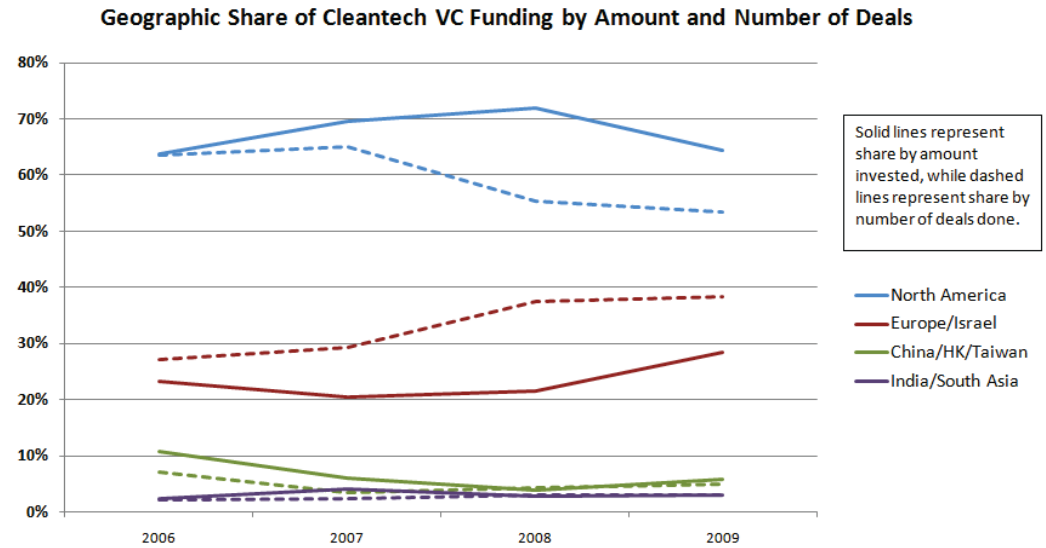
Figure 4.3. Geographic distribution of venture capital cleantech funding, 2009



Source: Cleantech Group, 2010

However, looking at the historical development of the venture capital market, it appears that the EU is slowly catching up to North America and increasing its share of the cleantech venture capital market. In 2007 and 2008, around 20 percent of cleantech investments where made in Europe and more than 70 percent in the North America. In 2009, almost 30 percent of investments were made in Europe while in North America the volume has dropped to an amount approaching 60 percent.

Figure 4.4. Geographic distribution of clentech venture capiatl funding



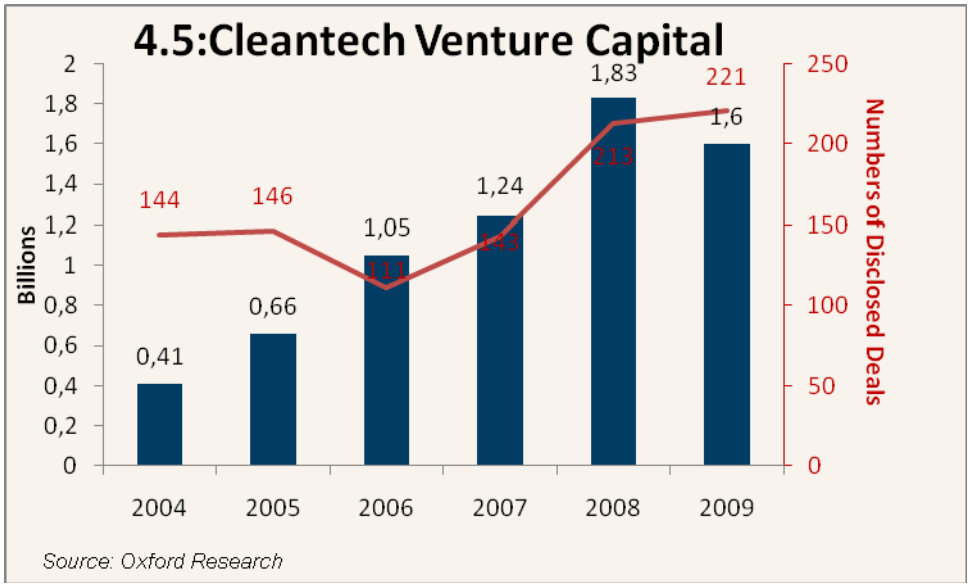
Source: Cleantech Group, 2010

Given that the total market for venture capital in the US is significantly larger in the EU, it is perhaps not surprising that the total cleantech venture capital market is bigger in North America than in the EU. However, according to a comparison of different sources conducted by Cleantech Group, a larger share of venture capital in Europe is going to cleantech than is the case in North America. [10]

The large share of venture capital going into cleantech in Europe illustrates the strong position Europe has within the cleantech sector.

Zooming in on Europe - Investments have quadrupled since 2004

Europe shows an explosive increase in venture capital investments in cleantech, according to Cleantech Group data.[11] Investments in 2009 within the EU amounted to USD 1.6 billion spread over 221 deals.[12] By contrast, only USD 0.4 billion were invested in 144 deals in 2004.



UK has the largest market - large differences exist within Europe

In 2009, the cleantech venture market in the UK overtook Germany as Europe's largest, with UK-based cleantech companies raising 297.5 million dollars.[13]

In 2010, the positive trend in UK and France has continued and they now have the biggest markets followed by Switzerland and Norway. The market in Germany has continued to shrink. Spain, Israel, and Finland have seen a dramatic decrease in investments compared to the best years. Italy, Austria, Spain and Finland are found at the lower end of the scale.

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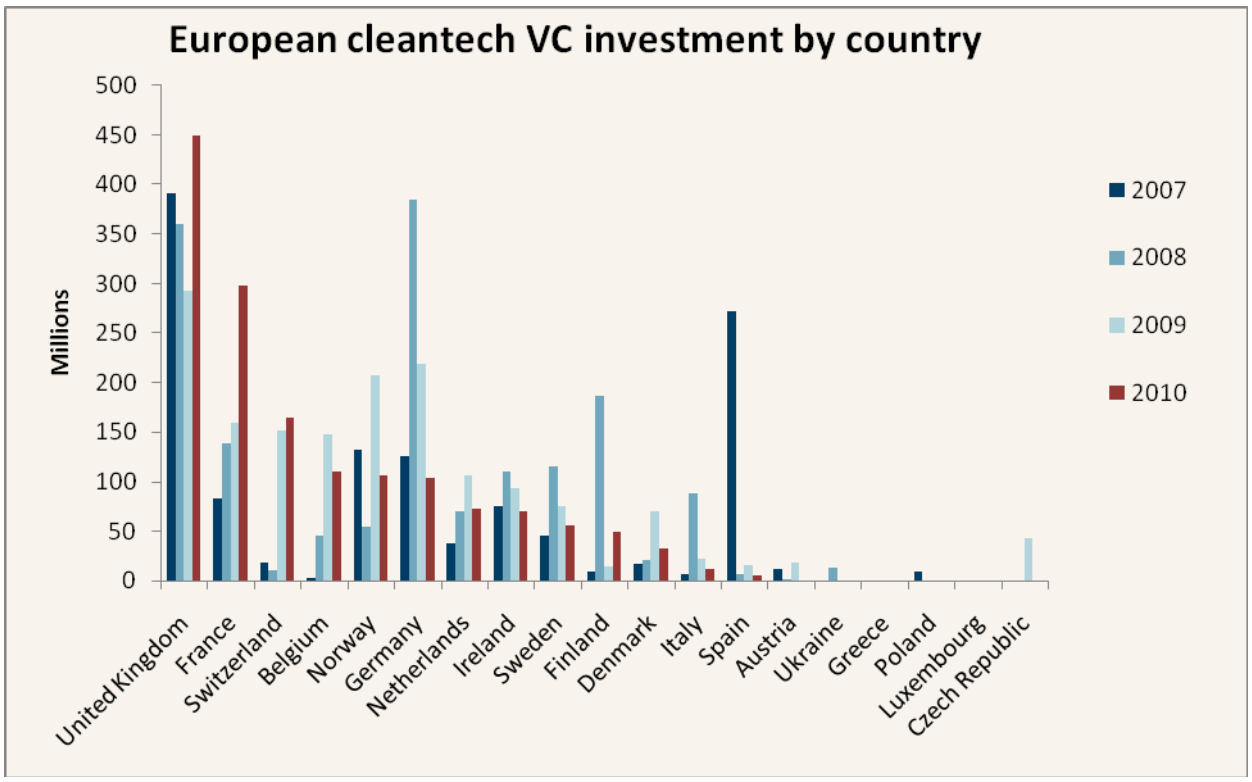
[10] The share of total venture capital investments in cleantech is estimated to be around 20-25% globally, and historically Europe has been a bit higher than the overall global average according to estimates from Cleantech Group. However, it is difficult to do precise comparisons because methodology and definitions are slightly different between those who track venture capital deals.

[11] Cleantech Group, 2010. The data also includes Israel.

[12] In a recent study EVCA (2010) finds that 1,280 million euros (around USD 1,700 millions) have been invested through 330 deals. The difference is due to different market surveillance approaches. See also appendix A.

[13] EVCA also finds the market in UK, France and Germany to be of significant size but the market in Norway is estimated to be smaller. The Czech Republic is estimated to have the largest market in 2009 due to a couple of very large investments in the energy related sector.

Figure 4.6. Cleantech venture capital investments in European Countries, 2007-2010 (1Q-3Q)



Source: Cleantech Group, 2010

As can be seen from the figure above, the fluctuations are significant from one year to the next. This is due to the relative small number of deals. For example, this means that the amount invested can fluctuate significantly from one year to another depending on whether a couple of large deals are closed in December instead of in January of the following year. One should therefore not put too much emphasis on year to year fluctuations.

The fact that the UK is leading the market is most likely due to the fact that they in general have a large venture capital market, which makes it easier to attract funding to a new area like cleantech compared to countries that do not have the same tradition of venture capital funding. Moreover, the UK has a diversified range of companies across many sectors which make it less reliant on one sector and changing interest from investors.

The strong development in France can be linked to favourable wealth tax incentives to encourage private investments. France has introduced a 75% tax deduction on wealth tax for wealthy individuals who invest in SMEs. This has generated a large inflow of capital to the early stages of the venture capital markets.

The most significant negative developments are found in Germany and Spain. This is mainly because these countries are strong in solar energy, which has gone out of favour in 2009 and 2010 compared to 2007 and 2008.

According to Cleantech Group, the UK is also the leading country when measured by number of investors, with 88 investors in 2009. France had 52 active investors, doubling Germany, which has 25 investors and Israel, with 21 investors.

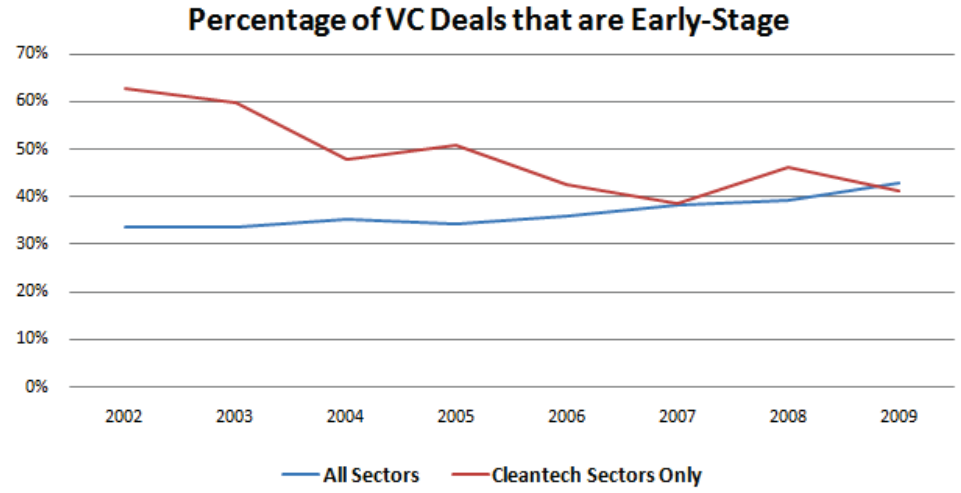
A larger share of deals in Europe is seed compared to the US

The initial funding (pre-seed and seed) is often pointed out as the most difficult capital to raise and the transition from R&D funding to market-based (public or private) equity capital is termed the "valley of death" because of the tendency for companies to stall or fail at this point in the development of an innovation .

Investors find it difficult to evaluate funding opportunities at the pre-seed and seed stages and therefore shy away from investments in these stages. This tendency characterises immature markets. As markets mature, investors will move downstream as they become better at evaluating technologies and business ideas. Increased competition for the good ideas will thus motivate investors to invest at the early stages to secure a stake in the most promising new ventures. However, disappointing returns on investment and track records can also motivate investors to move upstream to later stages where the risk is perceived to be less.

Within cleantech, lack of pre-seed and seed capital has also been highlighted as a particular problem. Historically, a larger percentage of the deals within cleantech have been in the early stages compared to all sectors. However, over the last couple of years the difference seems to have disappeared and, according to Cleantech Group data, the same number of deals is now early stage as other sectors.

Figure 4.7. Share of deals that are early-stage



Source: Cleantech Group, 2010

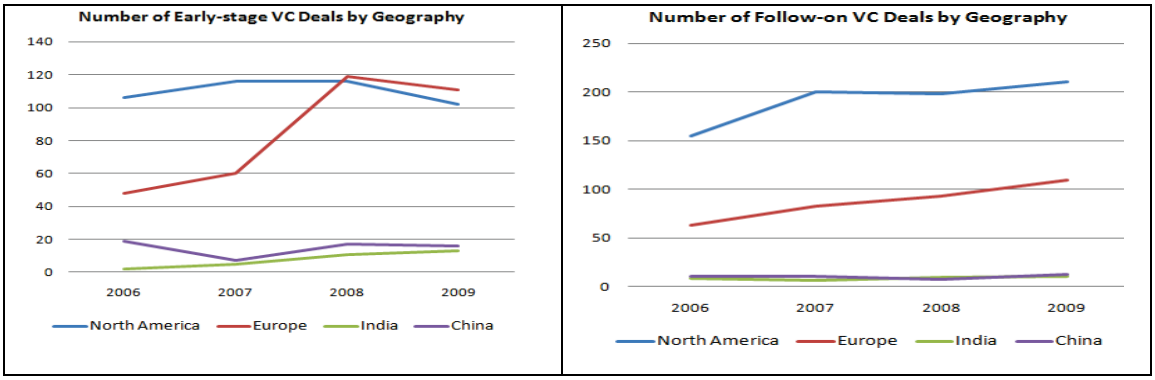
The main reason for this is most likely that cleantech is a newer investment area than other innovative sectors, such as biotech and ICT. Further, as illustrated above, it has been attracting growing investment interest. In 2002-2006, a larger share of cleantech companies was very young and consequently looking for early stage investments relative to other more mature sectors. Today, there are more companies and therefore more follow-on investment opportunities for investors. The development is therefore attributable to the growing pool of more mature cleantech companies and not a change in the distribution between early stage and later stage in cleantech compared to other sectors.

Further, in some cases it has been difficult for cleantech companies to exit (M&A or IPO) so they have to be funded by their VC investors for a longer period of time. This means they require additional follow-on deals, resulting in investors being less able to fund new, early-stage companies. However, this trend is also seen in other VC backed sectors. Based on the above figures, it seems that cleantech firms face the same difficulties attracting seed financing as venture capital fundable firms in other sectors. However, it is important to note that a comparison of the EU to North America shows that relatively more seed investments have been made in the EU. This is the case for the entire period illustrated in figure 3.15 below, but is especially prominent in 2008 and 2009.

Measured in number of deals both EU and North America had around 100-120 deals in the early stage in but North America had around twice as many deals in the follow up stage as the EU. Thus it is clear that a sig-

nificant larger proportion of the deals in the EU are early stage (around 115 out of 220) than in North America (110 out of 310).

Figure 4.8. Number of early stage and follow up deals in the EU and North America



Source: Cleantech Group, 2010

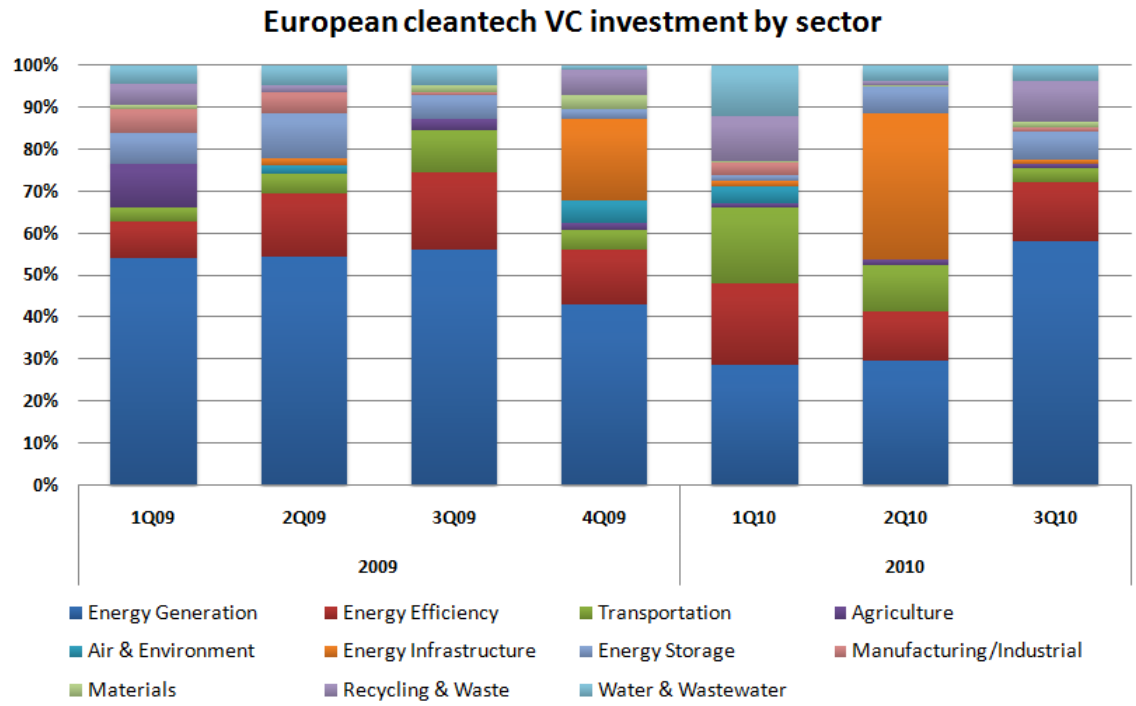
Looking only at the amounts invested in the seed stage, the relative seed-stage market is larger in the EU. In 2009, 33 million dollars out of total investments of 1,599 million dollars were invested in the seed stage (2.06%). In North America in the same year, 65 million dollars out of total investments of 3,673 million dollars were invested in the seed stage (1.77%).

Most investment goes to energy generation

Most of the venture capital invested in cleantech in Europe is invested in energy generation and energy efficiency. The developments over the last eight quarters show considerable fluctuations but energy generation attracts the most investments with a market share of between 30 and close to 60%.[14] Energy efficiency attracts 10-20%.These two sectors alone make up more than 70 percent of the capital invested in the third quarter of 2009 and 2010. The most attractive sector varies from quarter to quarter but in general transportation, energy infrastructure, recycling and waste, water and wastewater as well as air and environment are the areas that attract most investments after energy generation and energy efficiency.

[14] This is confirmed by the EVCA study (2010) though the study uses slightly different sectors and therefore is not comparable for all sectors.

Figure 4.9. Venture capital investments by sector in Europe



Source: Cleantech Group, 2010

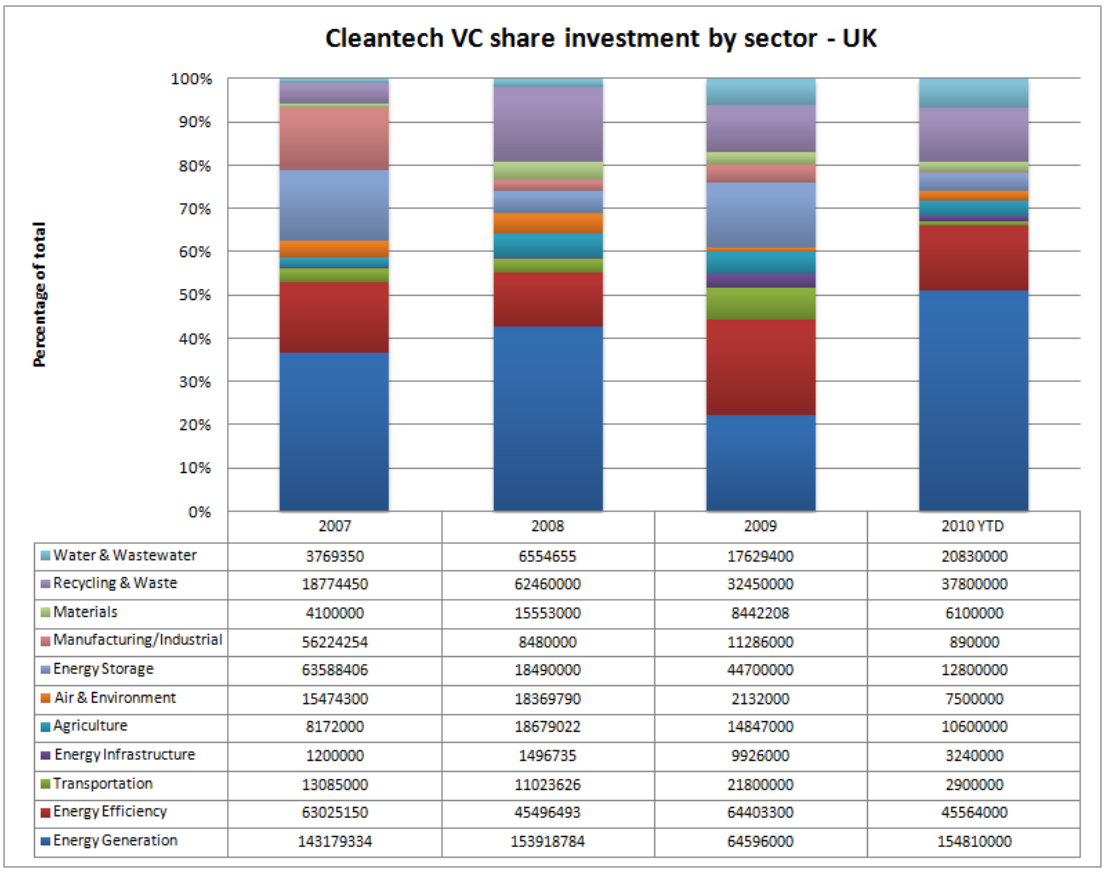
Energy infrastructure is the subsector that fluctuates the most, ranging from around 35% in 2Q 2010 to 0 percent in the early quarters of 2009. The large fluctuations are most likely due to the relatively low number of investments, as already mentioned. In 2009 as mentioned a total of 221 investments were made. On average, this consists of 55 investments each quarter distributed, distributed across 11 sectors. For the sectors attracting a small share of overall investments, this means that they only receive a couple of investments each quarter. Since the investments can be quite large, significant fluctuations are likely to occur.

Fluctuations within the 12 selected member states

The distribution among sectors varies from country to country and fluctuations over time in one country are often not found in other countries. This section covers the development in the 12 reference countries and Norway, which is the country with the largest VC market of the countries not among the 12 member states.

In **the UK,** energy generation dominates but in 2009 energy efficiency received as much money (around 65 million dollars). Energy storage also attracted around 45 million dollars. However, in 2010 energy generation is again by far the largest sector accounting for almost 50% of invested capital. It is also worth nothing that the UK seems to be a stronghold in recycling and waste, which in general accounts for a larger share of investments than the European average (7 pct).

Figure 4.10. Venture capital investments divided by sector in UK



	2007	2008	2009	2010 YTD
Water & Wastewater	3769350	6554655	17629400	20830000
Recycling & Waste	18774450	62460000	32450000	37800000
Materials	4100000	15553000	8442208	6100000
Manufacturing/Industrial	56224254	8480000	11286000	890000
Energy Storage	63588406	18490000	44700000	12800000
Air & Environment	15474300	18369790	2132000	7500000
Agriculture	8172000	18679022	14847000	10600000
Energy Infrastructure	1200000	1496735	9926000	3240000
Transportation	13085000	11023626	21800000	2900000
Energy Efficiency	63025150	45496493	64403300	45564000
Energy Generation	143179334	153918784	64596000	154810000

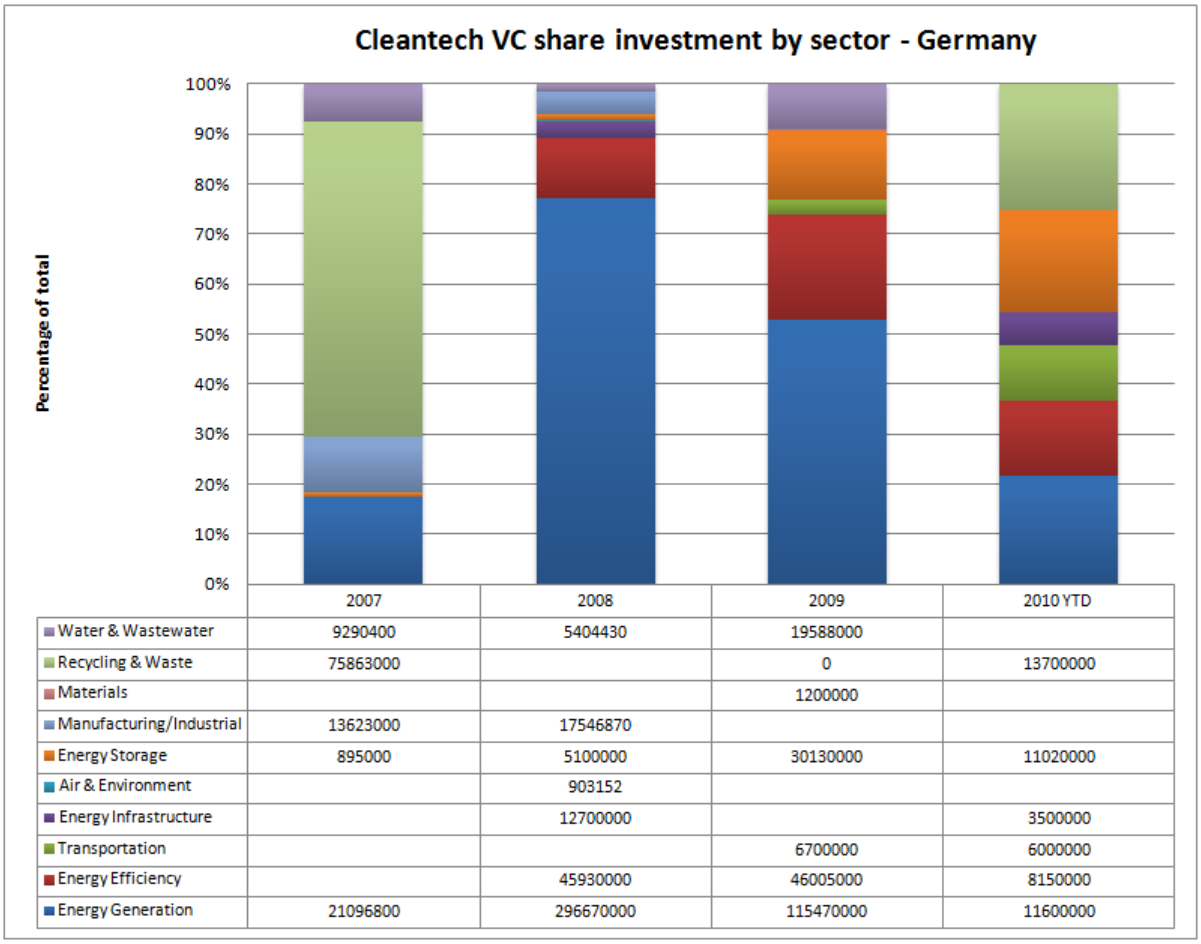
Source: Cleantech Group, 2010

Even though energy generation dominates, the sector distribution illustrates that the UK has a diverse range of cleantech investment opportunities which cover a wide range of sectors.

In **Germany,** the investments are concentrated in fewer sectors. Whereas all sectors have received investments in the UK every year, on average only 6 sectors receive investments in Germany. In 2008 almost 80% of investments went to energy generation primarily due to the focus on solar cells, where Germany is strong.

In 2007 and 2010 recycling and waste has attracted a large share of the investments and in 2010 the area is so far the area that has attracted the most investments. Energy storage and energy efficiency are the other big areas in Germany in 2010.

Figure 4.11. Venture capital investments divided by sector in Germany



	2007	2008	2009	2010 YTD
Water & Wastewater	9290400	5404430	19588000	
Recycling & Waste	75863000		0	13700000
Materials			1200000	
Manufacturing/Industrial	13623000	17546870		
Energy Storage	895000	5100000	30130000	11020000
Air & Environment		903152		
Energy Infrastructure		12700000		3500000
Transportation			6700000	6000000
Energy Efficiency		45930000	46005000	8150000
Energy Generation	21096800	296670000	115470000	11600000

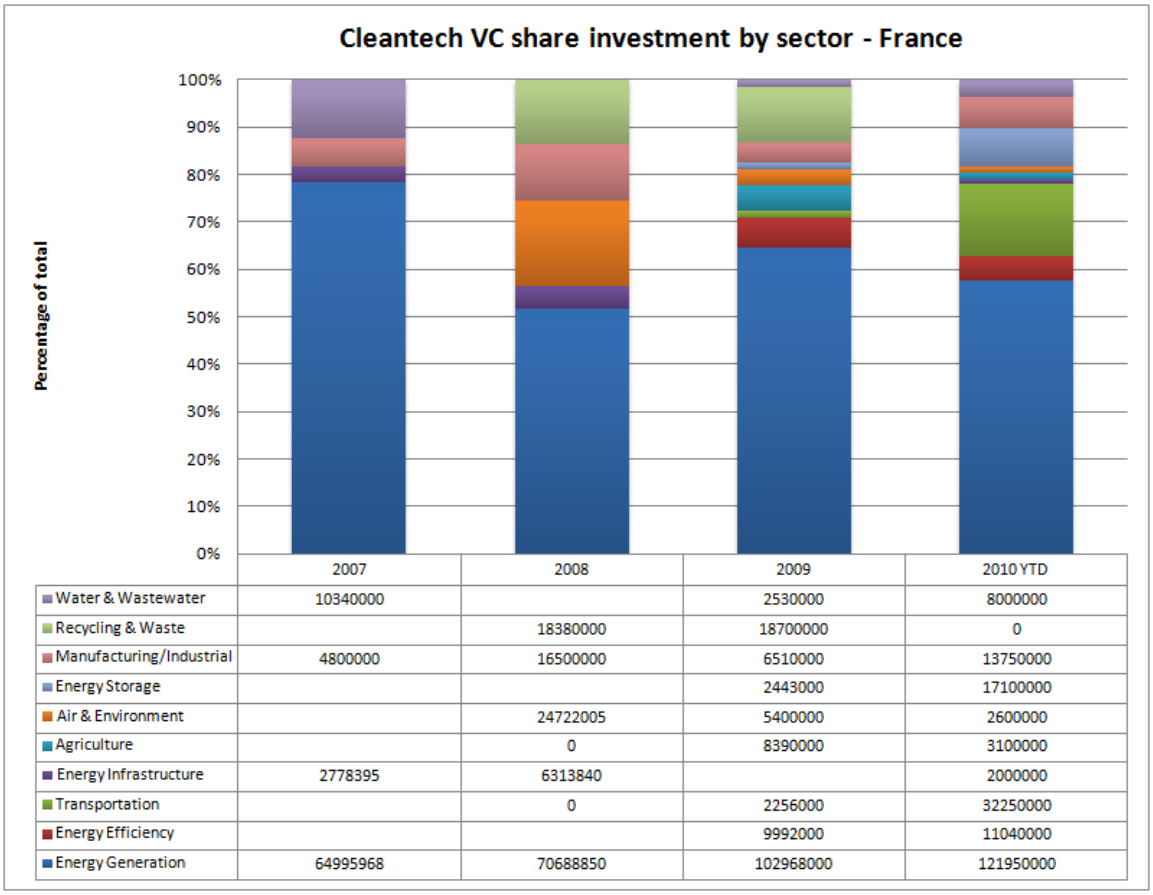
Source: Cleantech Group, 2010

Note: 0 means that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

The concentration on a few sectors is evident when looking at the number of investments. Over the four year period examined, only one investment has been made in materials. Air and environment, energy infrastructure and transportation have all received two investments each, and recycling and waste as well as manufacturing/industrial have received three investments. The low number of investments in each area also explains the large annual fluctuations.

For a number of years, the government in **France** has provided good conditions for setting up renewable energy parks and especially solar cell installations and this is one of the reasons for the large investments in energy generation. Thus, for all four years, energy generation accounts for more than 50% of the investments. However, support to solar cell installations has recently been reduced so it remains to be seen whether this trend continues.

Figure 4.12. Venture capital investments divided by sector in France



	2007	2008	2009	2010 YTD
Water & Wastewater	10340000		2530000	8000000
Recycling & Waste		18380000	18700000	0
Manufacturing/Industrial	4800000	16500000	6510000	13750000
Energy Storage			2443000	17100000
Air & Environment		24722005	5400000	2600000
Agriculture		0	8390000	3100000
Energy Infrastructure	2778395	6313840		2000000
Transportation		0	2256000	32250000
Energy Efficiency			9992000	11040000
Energy Generation	64995968	70688850	102968000	121950000

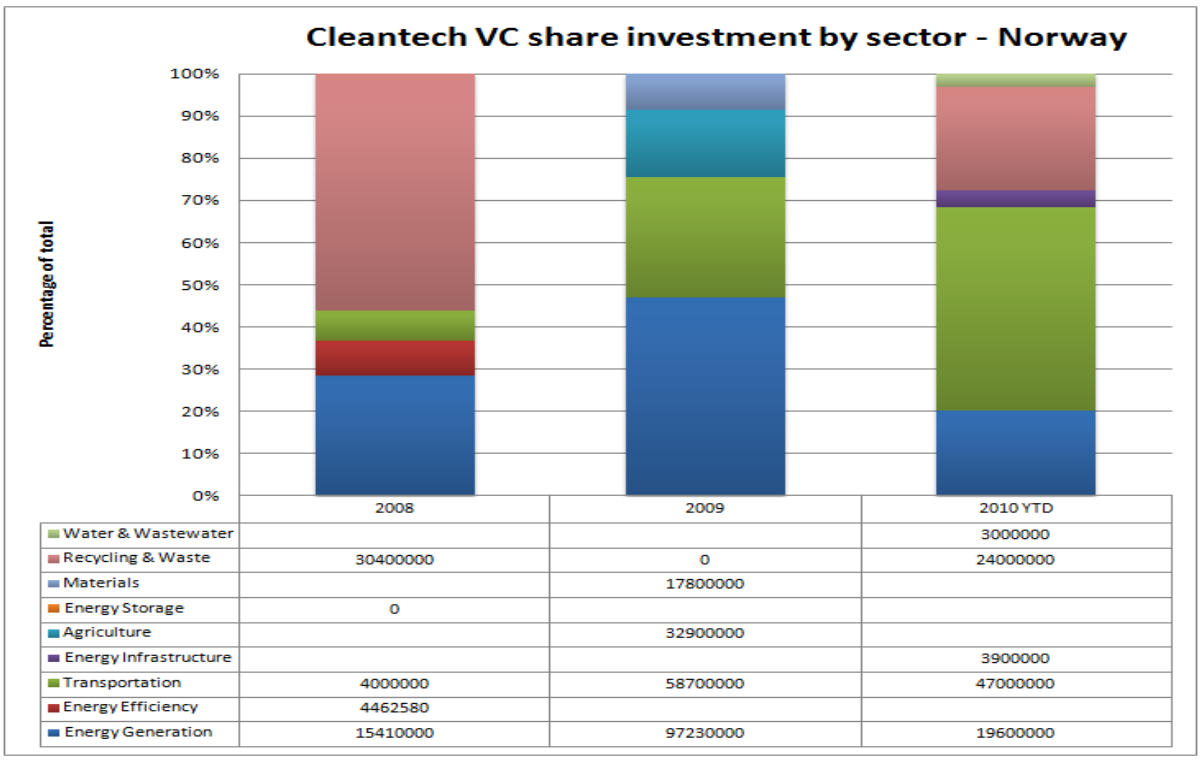
Source: Cleantech Group, 2010

Note: 0 means that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

Other significant sectors in France are recycling and waste and transportation. While recycling and waste still has not attracted any investments in 2010, transportation appears to be a sector that could gain increasing importance in the future. This is primarily due to the strong French tradition in the automotive sector and the effort to make transportation greener, driven primarily by such leading French manufacturers as Peugeot and Renault. France also has some of the largest players in water and wastewater (Suez Environnement and Veolia) but this does not seem to have had a positive effect on the VC investments in the sector.

Looking at the smaller European countries, the largest market is found in **Norway**. Even though energy generation attracted the largest share of investments in 2009, the area is less significant than in UK, Germany and France. In 2008 recycling and waste was the largest area. However, by 2010 transportation has emerged as by far the largest, followed by recycling and waste.

Figure 4.13. Venture capital investments divided by country in Norway



	2008	2009	2010 YTD
Water & Wastewater			3000000
Recycling & Waste	30400000	0	24000000
Materials		17800000	
Energy Storage	0		
Agriculture		32900000	
Energy Infrastructure			3900000
Transportation	4000000	58700000	47000000
Energy Efficiency	4462580		
Energy Generation	15410000	97230000	19600000

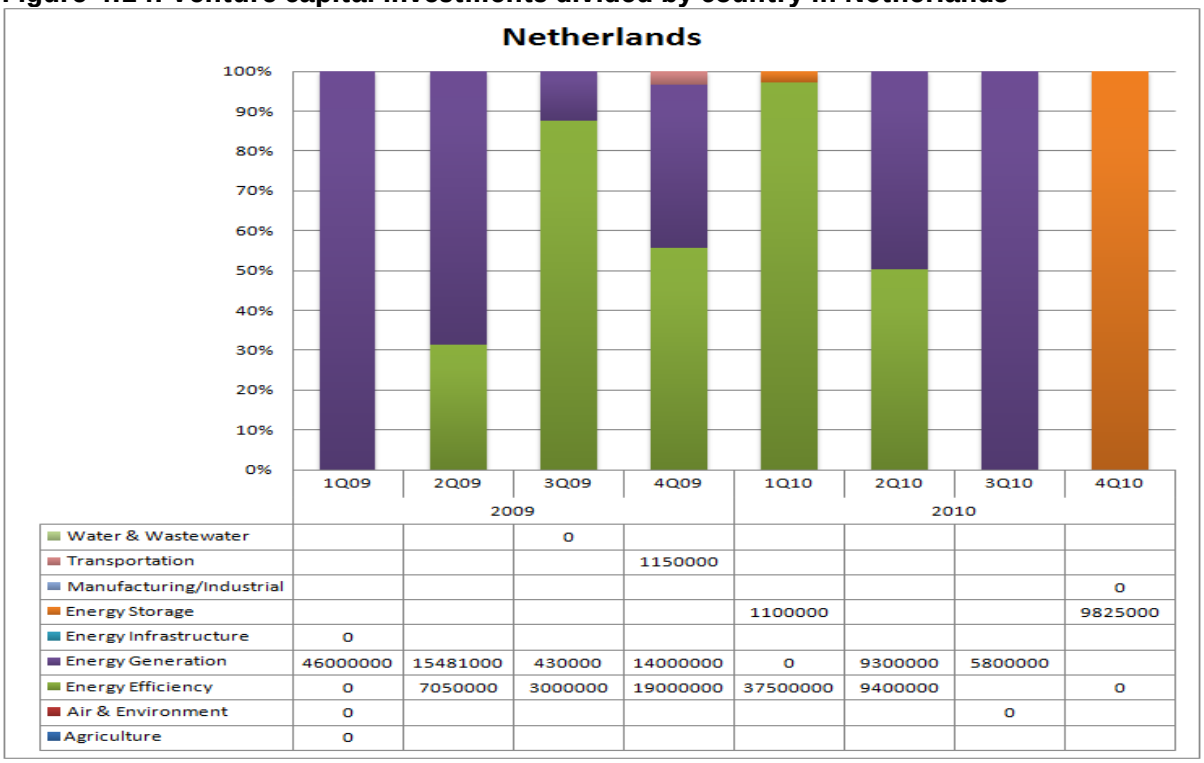
Source: Cleantech Group, 2010

Note: 0 means that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

Compared to Europe as a whole, Norwegian investment in energy efficiency stands out, as 2008 was the only year in which it received investment and this couned for less than 10% of total investments that year.

In the Netherlands, all investment falls within energy generation, energy efficiency, energy storage and transportation. As is illustrated by figure 4.14 the first two are by far the largest investment sectors.

Figure 4.14. Venture capital investments divided by country in Netherlands



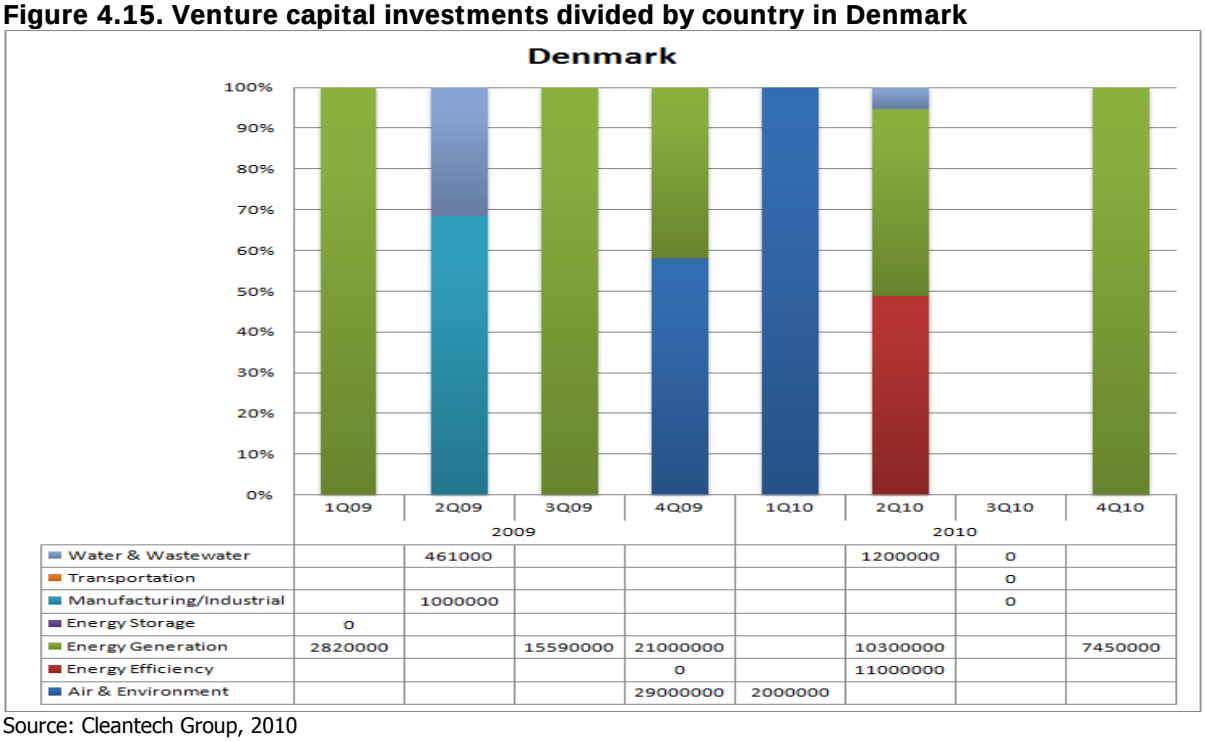
	1Q09	2Q09	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10
Water & Wastewater			0					
Transportation				1150000				
Manufacturing/Industrial								0
Energy Storage					1100000			9825000
Energy Infrastructure	0							
Energy Generation	46000000	15481000	430000	14000000	0	9300000	5800000	
Energy Efficiency	0	7050000	3000000	19000000	37500000	9400000		0
Air & Environment	0						0	
Agriculture	0							

Source: Cleantech Group, 2010

Note: 0 signifies that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

Energy generation is the sector that attracts the largest amount of investments in Denmark. In contrast to the investment patterns in other countries, air and environment is also a significant sector. Energy efficiency has only attracted limited interest from investors.

Figure 4.15. Venture capital investments divided by country in Denmark



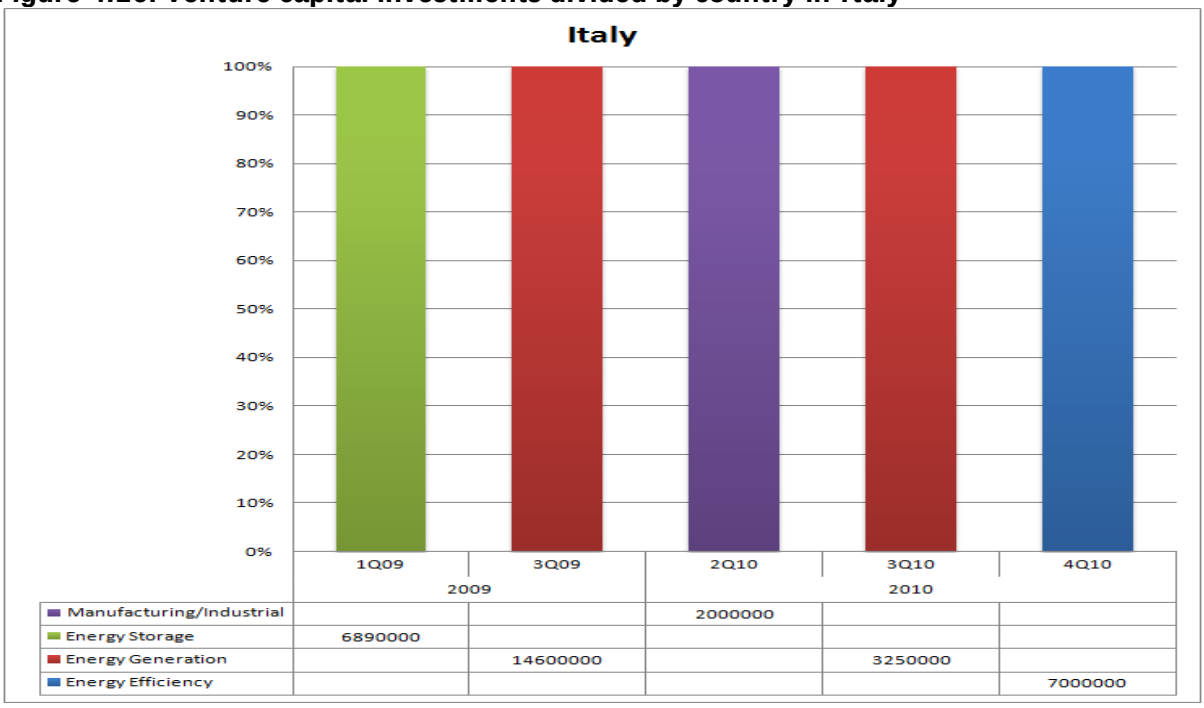
	1Q09	2Q09	3Q09	4Q09	1Q10	2Q10	3Q10	4Q10
Water & Wastewater		461000				1200000	0	
Transportation							0	
Manufacturing/Industrial		1000000					0	
Energy Storage	0							
Energy Generation	2820000		15590000	21000000		10300000		7450000
Energy Efficiency				0		11000000		
Air & Environment				29000000	2000000			

Source: Cleantech Group, 2010

Note: 0 signifies that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

For the remaining countries a limited number of deals have been tracked and the variation from year to year and quarter to quarter is therefore significant. For Italy too energy generation and efficiency is the dominant sub sectors followed by energy storage and manufacturing/industrial.

Figure 4.16. Venture capital investments divided by country in Italy

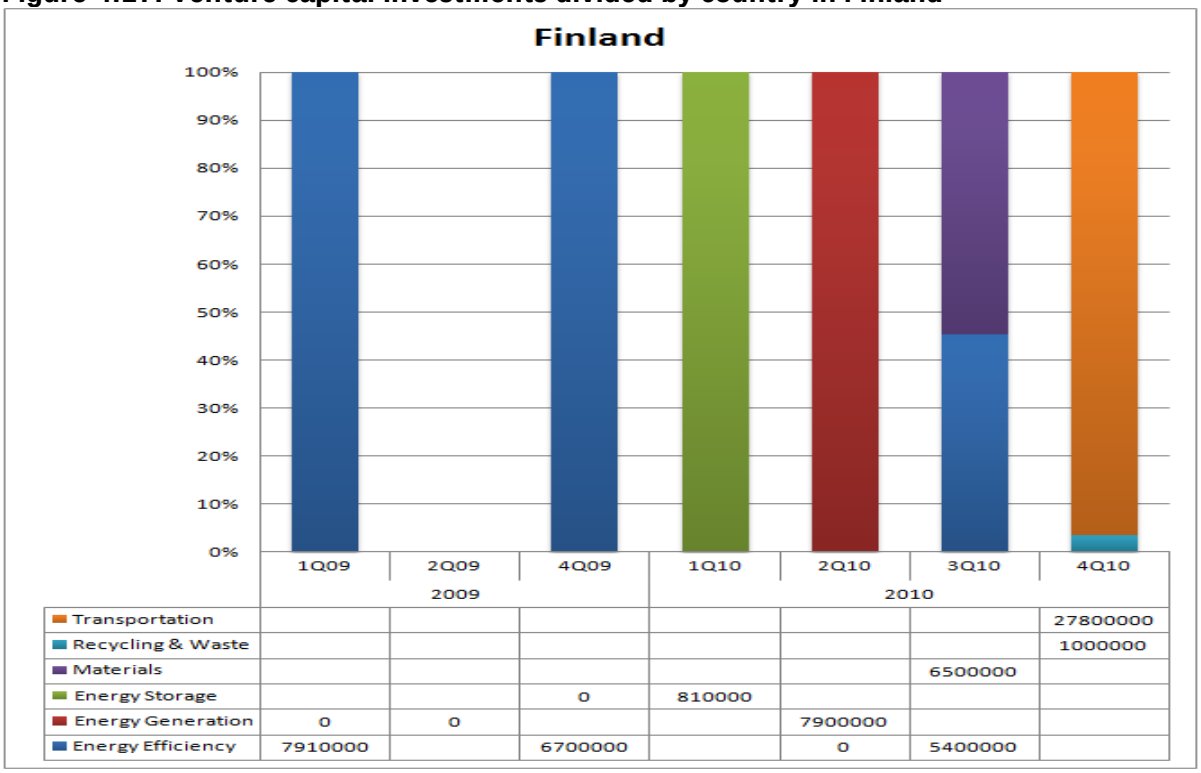


Source: Cleantech Group, 2010

Note: If there is no data for a quarter it is because no deals were tracked

Investments in Finland are a little larger but there is still significant variation over time. Energy efficiency dominated in 2009. Energy generation and energy storage also received investments but the deal size remained undisclosed. In 2010 investments in energy efficiency decreased but energy generation, energy storage, materials, transportation and recycling & waste all received investments.

Figure 4.17. Venture capital investments divided by country in Finland

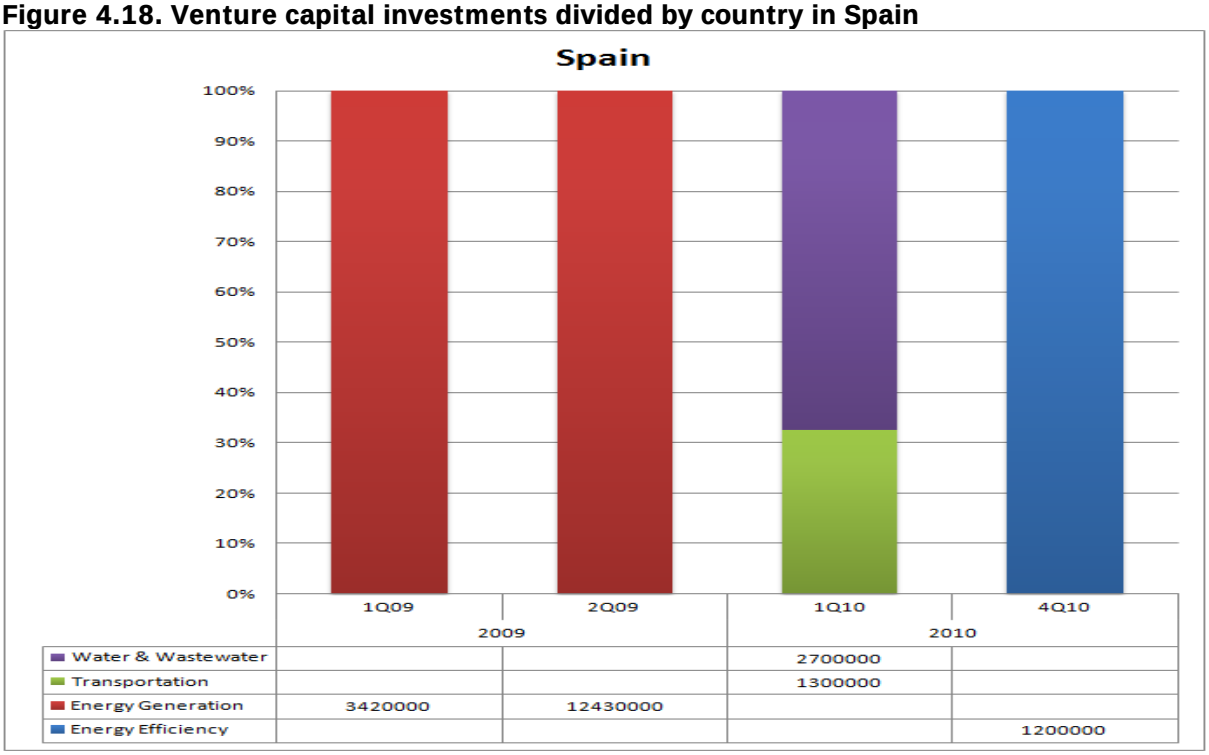


Source: Cleantech Group, 2010

Note: 0 means that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

In Spain the investments in 2009 were in energy generation. In 2010, investments were made in energy efficiency, transportation and water & wastewater.

Figure 4.18. Venture capital investments divided by country in Spain



Source: Cleantech Group, 2010 Note: 0 indicates that no deals of disclosed value were tracked but at least one deal of undisclosed value was tracked

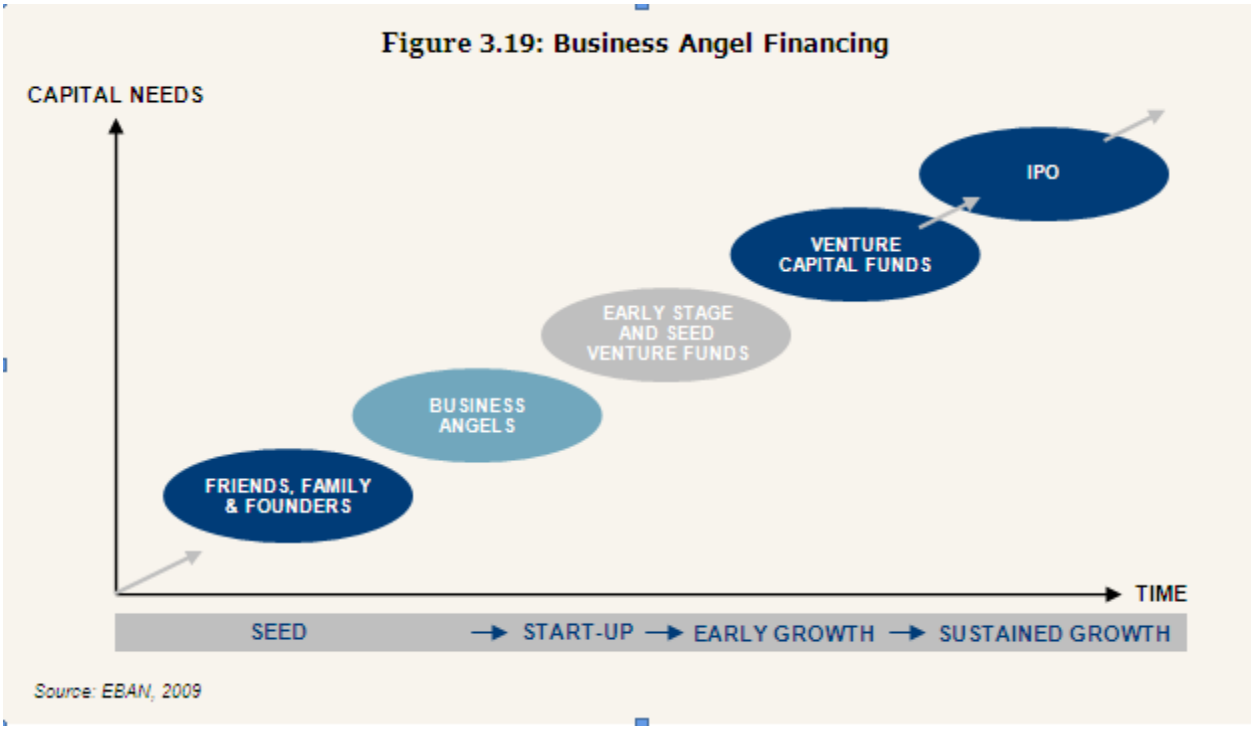
For Austrian and Czech Republic all tracked investments were made in energy generation. For Slovenia and Poland no deals were recorded.

4.2 Business Angels

Business Angels (BAs) typically invest their own funds. This is in contrast to venture capitalists, who manage the pooled money of others in a professionally-managed fund. While formal venture capital and business angel investing are in most other respects similar, significantly less is known about angel investing. Formal venture capital is organised around formal partnerships, which have legal reporting requirements. As a result, the activities, strategies and financial returns in formal venture capital are publicised, and data like the ones presented above are available to shed light on formal venture capital activity, including its development and distribution.[15]

Business angel investing, on the other hand, is done by individuals investing their own money directly into opportunities that they find attractive. These small private investments, generally made with no formal reporting requirements, are largely invisible. We know relatively little about the activity, strategies or financial returns of these business angel investors. Business Angels provide capital that plays an important role in filling the gap between public financing for R&D as well as the initial investments by the founder, family and friends and the first round of venture capital, as illustrated in figure 3.19.

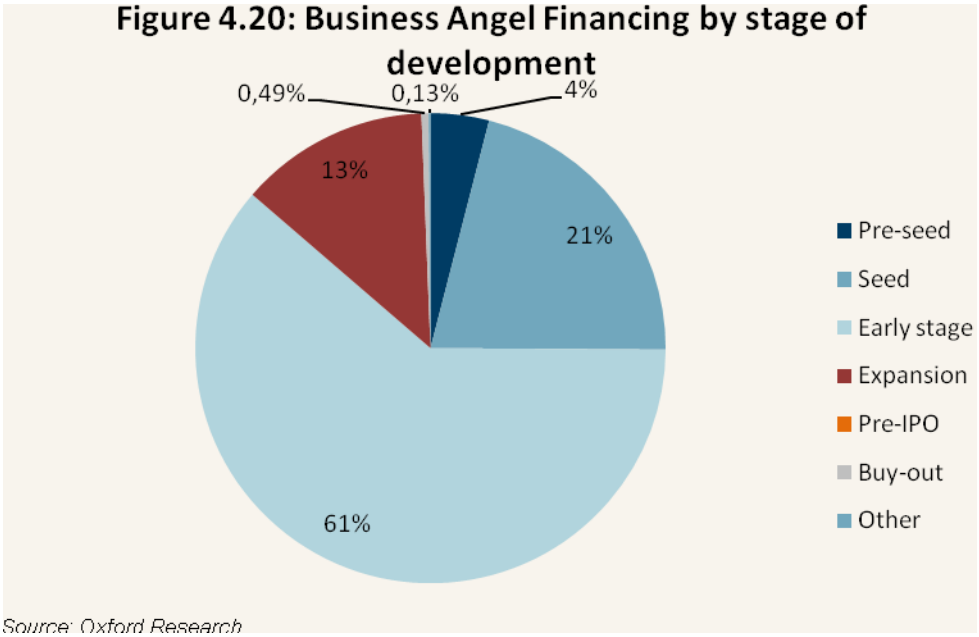
Figure 3.19: Business Angel Financing



Source: EBAN, 2009

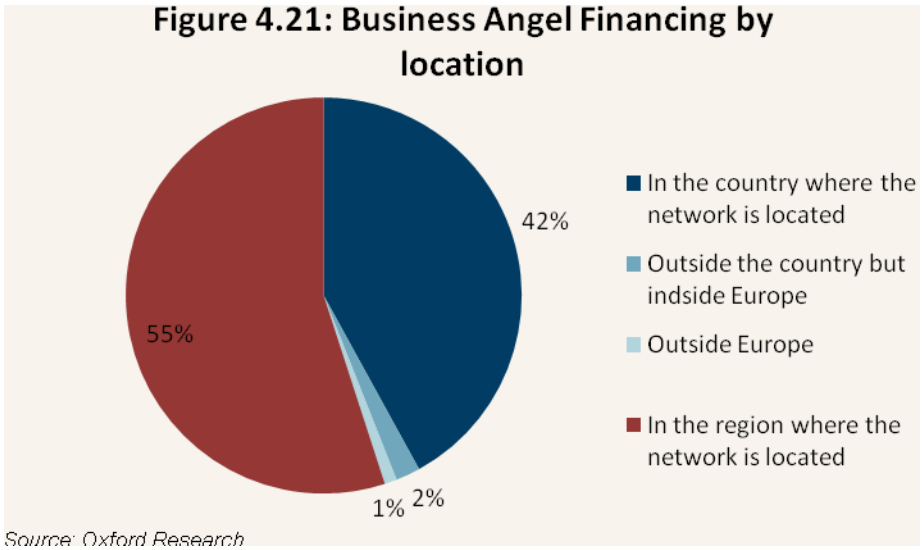
It should be mentioned that the financing chain above is a general illustration and that financing can be combined in a variety of ways. For example, seed funds will often invest in start-ups that have not received finance from a business angel. As suggested in the interviews with business angels, the target of business angels tend to be early stage companies with high growth potential. In addition to positive growth prospects, this is the stage at which business angels offer the most added value in terms of advice and networking opportunities. As can be seen, early-stage financing represents the vast majority of investments.

[15] NESTA (2009)



Source: EBAN, 2010.

Another key characteristic of business angel activity is the focus on local markets. As is made clear by figure 3.21, business angels tend to focus on their local market due to the high transaction costs of investing in companies located outside their immediate region. This is due to the high cost of linking to companies, in addition to the high degree of local knowledge that is required to be effective in the earliest stages.



Source: EBAN, 2010.

The number of Business Angel networks is estimated to be around 400 in **Europe**.[16] In 2009 the European Business Angel Network (EBAN) surveyed a total of **334** networks in Europe and obtained information about investment activity from **248** networks.[17] The survey shows that business angels in Europe most often in-

[16] Interview with Claire Munck, Director of European Business Angel Network, 9.11.2010.

[17] EBAN (2009).

vest in teams of 2-3 angels and invest between 25 000 - 250 000 euro per deal. The average deal size is estimated to be EUR 165, 000.

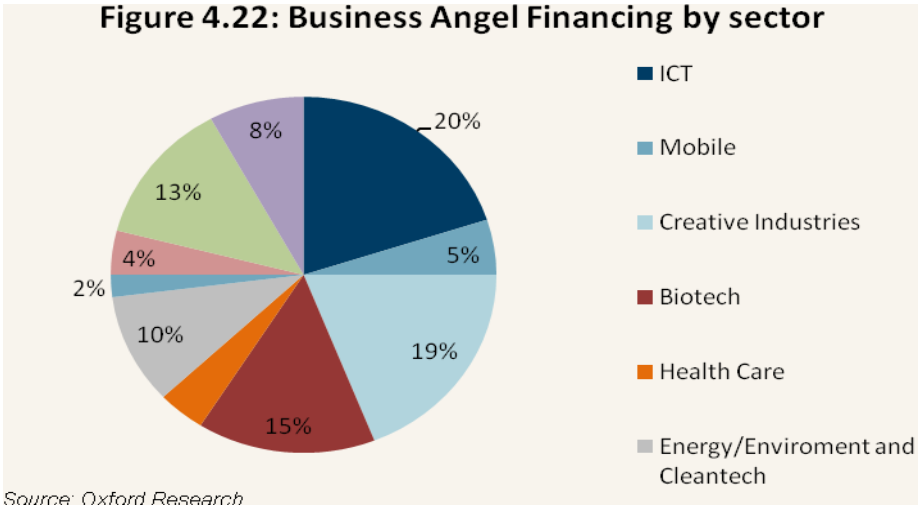
The **US** has the most mature market with more than 250, 000 active business angels estimated to invest around 20 billion dollars between them. A comparison between business angel activity in the US and EU conducted by EBAN using 2007 data shows that, on average, investments are smaller in the EU and that investment activity in the EU are only at around 25% of the US.

Table 4.2. Comparison between business angel activity in the US and EU

	EU	US
Networks	297	245
Estimate n of angels	75.000	250.000
Investment per round	165.000€	210.500€
Total estimate invested annually	3-5 billion€	20 billion€

Source: EBAN 2009 based on own data drawn from data from the Center for Venture Research.

It is important to note that the data above are for business angel activity in general and not only for eco-innovation. Research by the Center for Venture Research shows that around 17 percent of investments by business angels were made in the industrial/energy sector in 2009,[18] up from 8 percent in 2007. Industrial/energy is thereby only exceeded by software with 19 % of investments. Total investments in industrial/energy totalled almost 3 billion dollars in 2009. The data should be interpreted with care since the business angel market is difficult to measure and considerable uncertainties are related to them. It appears that the BA market is not only larger in the US than in the EU, but a larger share of the investments is made in environmental technologies. A survey undertaken by EBAN[19] of the various networks across Europe demonstrates the target markets of business angels. Looking at the the sectors of investment **based on the amount invested** in the companies in 2009, the distribution is as follows.

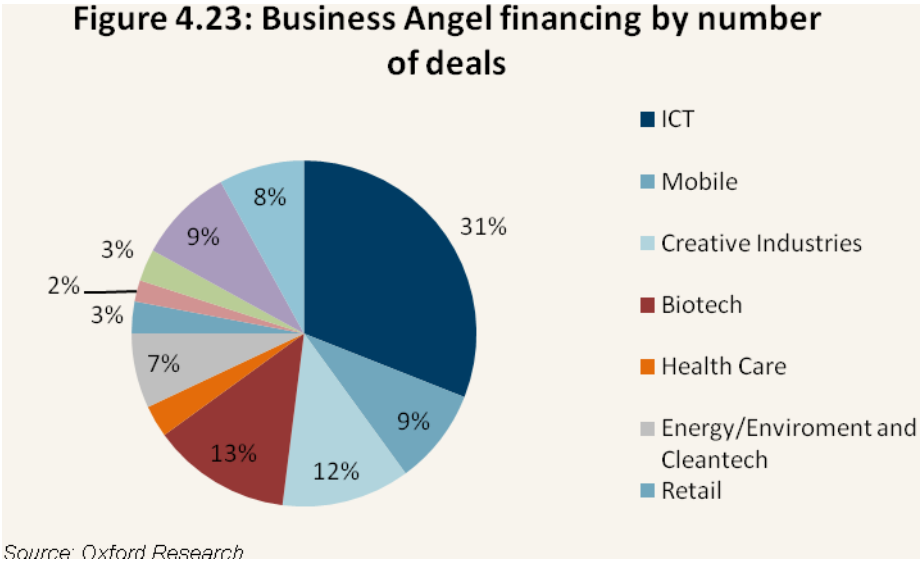


Source: EBAN, 2010.

While other such innovative sectors as ICT and biotech continue to attract the most attention from business angels, energy and cleantech attract a significant amount of investment from business angels. If we look at the sectors of investment based on the **number of deals**, the distribution appears to be toward smaller numbers of deal for energy and cleantech. This could be explained by the relative capital-intensiveness of eco-innovation, which requires larger volumes of capital upfront than do other such as industries as ICT.

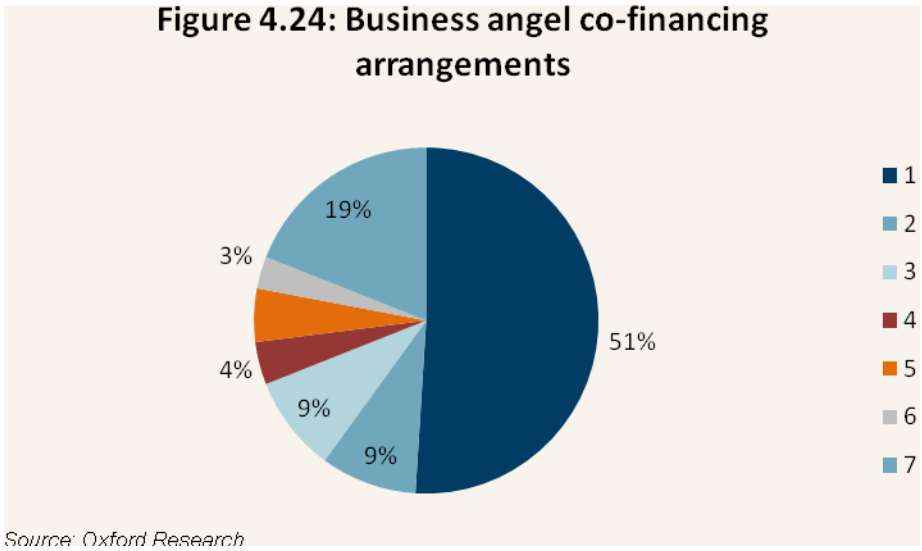
[18] Sohl (2010). No cleantech or eco-innovation category is included in the research.

[19] EBAN. 2010. STATISTICS COMPENDIUM 2010



Source: EBAN, 2010

Business angles often rely on co-financing arrangements to share risk and to raise additional capital. As business angels invest their own resources, the volume of money is limited. Moreover, rather than invest in only a few companies, business angels adopt a risk-management strategy of spreading investments across several companies. To do so, business angels have increasingly moved toward networking with other business angles in syndicates, allowing them to leverage additional sources of finance, spread risk, and extend value by offering a wider network of experienced investors.[20] Figure 4.24 demonstrates the tendency of business angels to co-finance. It should be noted that information is not exclusive to eco-innovation.

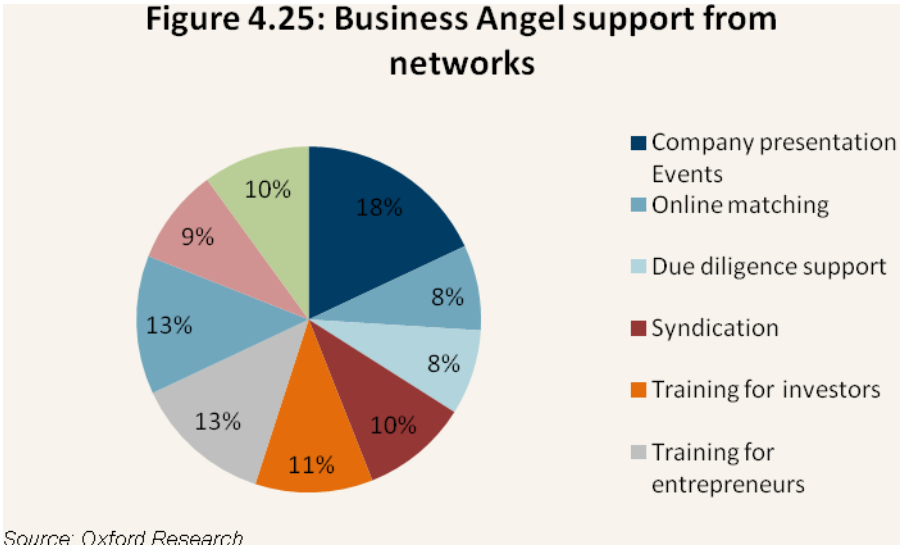


Source: EBAN, 2010

In addition to providing financing, business angels bring a number of value-added elements to the investee. These include market knowledge, networking opportunities, and other business related activities. Increas-

[20] See Grahame, David. 2009. Business Angel Syndicates in Scotland: an exploratory study of gatekeepers.

ingly, business angel networks have been increasing their capacity to support their members. Figure 4.25 demonstrates the range of additional services offered by business angel networks.



Source: EBAN, 2010.

4.2.1 Business angels at the national level

While there is an increasing amount of information at the European level, as was demonstrated in the previous section, most business angel activity is local. The evidence for local activity is scattered but illustrative of some larger trends. A British study suggests that there is over three and a half times as much business angel investment per capita in the US compared to **the UK**, despite the UK being the country in the EU with the largest formal venture capital market.[21] The study does not distinguish between sectors.

Another study of what is termed "the visible British Angel market" reports investments made by 20 of the 24 networks that are members of the British Business Angels Association (BBAA) and LINC in Scotland in 2008/09.[22] In 2008/09 a total of 233 businesses raised a total of £44.9m from 5,500 investors registered with the 20 networks under BBAA. A total of 590 investors actively participated in these investments. The average investment was £192,634 and involved 2.5 investors. Investors associated with LINC Scotland invested £17.9m in 74 deals. Thus, in the UK as a whole £62.8m was invested by angel investors registered with BBAA members or with LINC Scotland.

Most investments are made in the start-up and early stage/early growth stages. These stages account for 69% of all investments by BBAA investors and 88% of investments from Scottish business angels. Around 7% of the investments are estimated to be made in environment/ recycling/cleantech. This is significantly less than sectors like software/IT/Internet/telecoms (23%) and medical/healthcare/pharma/biotech (17%). Measured in number of deals, environment/recycling/cleantech accounted for 21 deals out of 299.

France also has a relatively well organised and active business angel segment which is very similar to the UK market measured in number of Angel investors and investment activity. This is primarily due to tax incentives to invest in innovative start ups and public support to organise business angel networks. France has around 80 business angels' networks with around 4,000 members. The primary purpose of most of the networks is to give business angels opportunities to invest together. The French Business Angels are estimated

[21] NESTA (2007)

[22] Mason (2010)

to have invested around EUR 64 million in 280 companies in 2009. In 2007, one of the few angel networks specialised in eco-innovation, Cleantech Business Angels, was founded. It is estimated that around 10% of total business angel investments are made in eco-innovation.[23]

In **Germany**, 29 of approximately 40 known Business angel networks are organised in Business Angels Netzwerk Deutschland (BAND). Around 1,400 members are organised in Business Angel Networks and they on average has a portfolio of 4.4 companies with investments averaging EUR 100,000 per deal. The business angels are estimated to invest EUR 100 million in total a year.[24] Due to the many Business Angels which are not registered with official networks this is believed to be only the "tip of the iceberg". All together 5, 000 business angels is estimated to operate in Germany and invest around EUR 200-300 million per year.

Germany has no sector split of business Angel investments. BAND is however publishing a quarterly business angel survey "Business Angels Panel" which measures the development in Business Angel activity.[25] The panel surveys what sectors are believed to be the most interesting. Over the last years environmental technologies has several times been pointed out as the most promising sector. In the last survey from august 2010 however 62% find web service/e-business attractive and 59% find environmental technologies attractive.

In **Italy** in 2009, total investments registered by the Italian Business Angel Network (IBAN) in all sectors amounted to EUR 31,5 million.[26] A development similar to the one that has taken place in France over the past 5-10 years is currently taken place. Thus, the Italian Business Angel Network, IBAN, is currently in the process of setting up a Cleantech Business Angel Network in order to facilitate syndication in cleantech investments. Around 8% of business Angel investments are currently estimated to be in cleantech with energy being the dominant sub sector.[27]

4.3 Bank financing

In general, access to debt finance has not received the same amount of attention from researchers and academics as venture capital. Thus, the availability of relevant data is scarce. Even though the UK, Italy and the European Central Bank carry out surveys of lending to SMEs, they do not include specific data for the environmental sector or eco-innovative SMEs.[28] This is most likely due to the fact that cleantech, the environmental sector or any other term used to describe the sector is not part of traditional industry or sector classifications. Indeed, as already mentioned, SMEs in this sector cut across the traditional sector classifications.[29]

As mentioned previously, debt finance is the type of financing used by the majority of traditional SMEs. This is also true for traditional companies providing environmental solutions. An EU survey in 2005 showed that almost 80% of SMEs in general relied on banks to acquire financing.

Figure 4.26. Institutions used by SME's to obtain financing

[23] According to the Cleantech Business Angel Network.

[24] www.vc-magazin.de/news/business-angel-netzwerke/index.hbs, www.business-angels.de

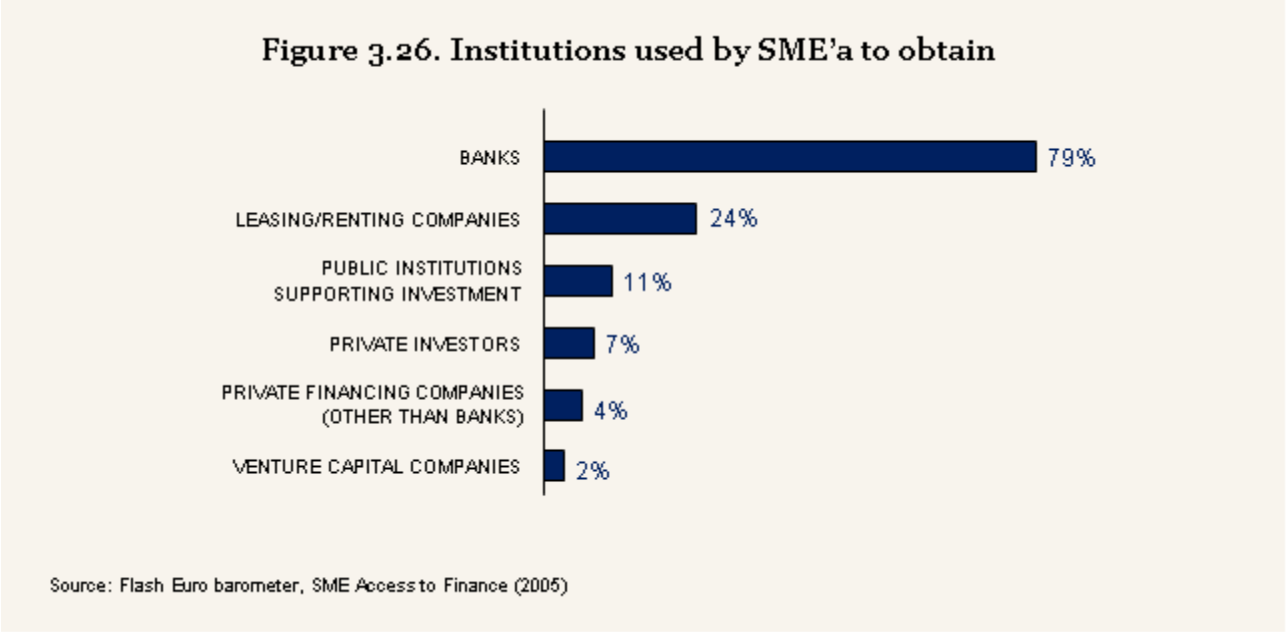
[25] http://www.business-angels.de/DWD/_111327/upload/media_6590.pdf

[26] http://www.iban.it/wp-content/themes/iban/risorse/englishguide.pdf

[27] Mentioned by the Italian Business Angel Network, IBAN, during interview conducted in October 2010.

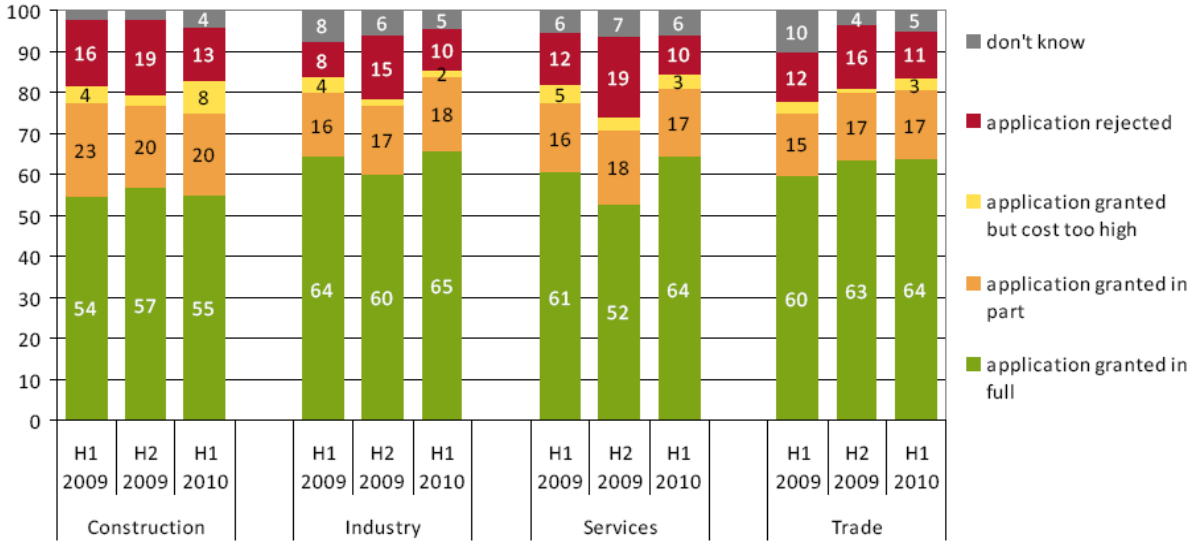
[28] Bank of England (2010), European Central Bank (2010), Banca D'Italia (2010).

[29] To compensate for this Oxford Research has contacted the 15 biggest banks in Europe and asked for data on landing to the environmental sector or to eco-innovative SMEs. All banks have asked to receive a written request but no banks have provided any data.



A number of surveys have pointed out that there is little evidence of overall scarcity of finance for SMEs.[30] Even though the financial crisis has made access to finance more difficult and led to tightening in credit terms, the latest survey on access to finance of SMEs in the Euro area shows that around 80% of SMEs which applied for a loan either fully or partly had their application granted. Given that a number of business ideas will not be viable and therefore likely to be turned down, 80% seems like a fairly high number. The survey distinguishes between construction, industry, services and trade but does not have specific data for the environmental sector. However the surveys show little variation between sectors.[31]

Figure 4.27. Outcome of applications for bank loans by SMEs across sectors



Source: European Central Bank, 2010.

[30] OECD (2006).

[31] European Central Bank (2010).

Consistent with the findings in Europe, a Canadian survey found that 54% of innovative SMEs that requested debt financing received authorization for the credit compared with 83% percent of non-innovative SMEs.[32]

As a result of the financial crisis, many banks have tightened their credit policy which has had an impact on businesses in the environmental industry as well as businesses in general. As a result, governments in some countries have called for banks to support the development of the green economy through providing loans to the sector. However, according to a survey by Norton Rose and Cleantech Investor (2010), which asked investors and cleantech companies if they regard banks as being more willing to lend to the cleantech sector, 62.6% of investors and 69.3% of the cleantech companies did not perceive banks as being more willing to lend to the cleantech sector because of its apparently strong political backing.

4.4 Summary

The data on financing for eco-innovation is scattered and leaves an unclear picture of the current state of financing. The most readily available data, that from the venture capital markets, point to a sharp decline during the recent economic crisis but an overall upward trend in the volume of investment in eco-innovation. Moreover, the drop was less severe within eco-innovation than in the wider VC market.

When compared to the financing situation in the United States, eco-innovation in Europe appears to be at a disadvantage. The total market for venture capital in the US is significantly larger in the EU. However, it is important to note that the share of total VC investments going into cleantech in the EU and the US the picture is different. According to Cleantech Group data, a larger share of venture capital in Europe is directed toward cleantech than is the case in North America. Thus, it can be concluded that the underinvestment seen in the European eco-innovation sector *vis-à-vis* the United States is a general problem of the venture capital markets in Europe and not the result of a lack of interest or sound policy framework supporting eco-innovation in the EU.

The data also reveal significant variation across Europe in terms of the amount of financing for eco-innovation. The UK has maintained consistently high levels of investment while most other countries have either yet to attract significant investment or have seen the volumes of investment drop dramatically due to a shift away from renewable energy, especially solar energy. There are also large fluctuations from year to year, due to the capital-intensity of some fields of eco-innovation, especially energy and infrastructure projects. Due to these large fluctuations, the differences across Europe could be exaggerated or minimised.

While data on venture capital is the most accessible and serves as a good proxy of larger trends, the more common sources of finance for eco-innovative SMEs consist of business angels and banks. In general, these sources of finance have not received sustained attention from researchers, though business angel financing is receiving greater attention and support from such organisations as EBAN. As a result of the new sources of data, it is clear that Europe lags far behind the US in terms of business angel financing, though the degree of difference is difficult to discern. Bank financing, in the form of debt instruments, is the least understood of all instruments despite being the most common form of finance. While quantitative information is largely absent, the picture obtained through qualitative data (see Chapter 6) reveals that eco-innovative SMEs face significant challenges when seeking debt financing. This topic is a major focus of the recommendations found in Chapter 7.

[32] Canadian Survey of Small Business (2010).

5. The perspectives of SMEs and financial actors

The previous section described the overall picture of financing for eco-innovative SMEs. The following section attempts to move toward a focus on the dynamics that underpin access to finance for eco-innovative SMEs.

This section draws on the available evidence to answer pertinent questions related to access to finance for eco-innovative SMEs. The sections build on input from the literature review and the field research conducted as part of the present study, including a survey of eco-innovative SMEs, interviews with the financial actors, and input from case studies. Given that the case studies are either interviews with eco-innovative SMEs or financial actors they are integrated in the relevant sections and do not have a separate section. Moreover, the sections draw on the evidence only where relevant.

5.1 Eco-innovative SMEs face multiple barriers in their early stages of development

This section looks at barriers for access to finance for eco-innovative SMEs with a particular focus on the early stages. Barriers for access to finance have been one of the main themes for both the literature review and the survey of the SMES.

5.1.1 Eco-innovative SMEs face internal and external barriers

The literature points to several barriers that eco-innovative SMEs face when trying to raise financing. As part of the research for the overall project, they were summarised in eighteen barriers for access to finance and organised according to whether they were considered *internal* or *external* barriers. Internal barriers are those that are linked mainly to the size or composition of the companies in question while external barriers relate more to the context in which they operate. Of course, the location of the barriers is open to a degree of interpretation. Seven barriers are internal and eleven are external. The barriers are listed below.

Internal barriers:

- Financial supplier requested an unacceptably high level of control of your business
- Lack of technical experience in your business as perceived by financial supplier
- Lack of business experience in your business as perceived by financial supplier
- Insufficient amount of collateral available
- Difficulty recruiting skilled professionals
- High administrative burden
- Limited resources dedicated to seeking or securing finance
- Lack of knowledge of financing options

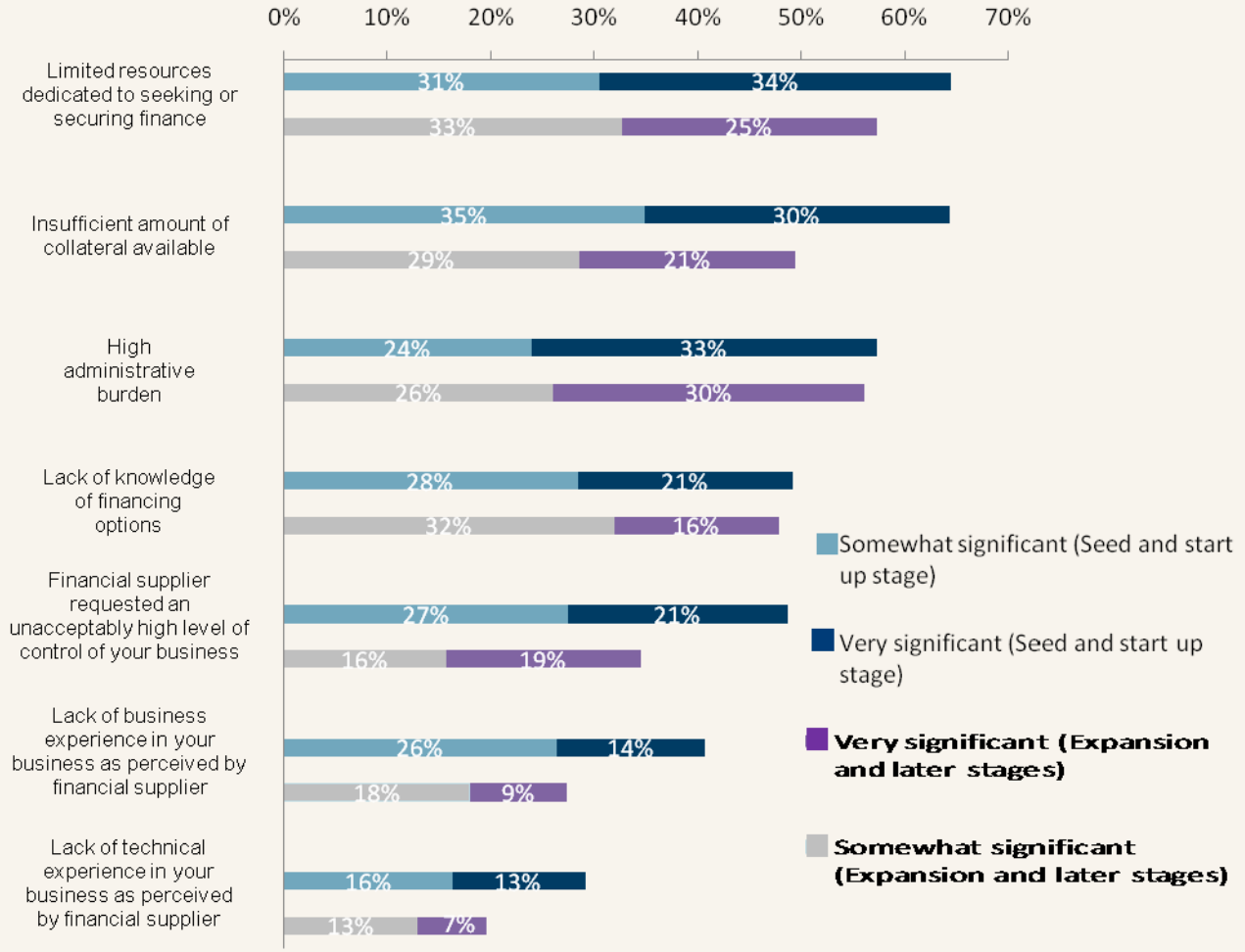
External barriers

- Insufficient market demand for innovation
- Limited market information (unknown number or type of customer)
- Difficulty meeting certification or regulatory requirements
- Protecting intellectual property rights is difficult and expensive
- Potential financial suppliers insufficiently engaged with eco-innovative industries
- Financial suppliers' expected returns are different from your business goals
- Financing available not tailored to small-scale investment needs
- Difficulty with public-sector customers
- Lack of contacts within your industry
- Uncertainty of government policy or regulation
- Lack of available demonstration sites

5.1.2 Eco-innovative SMEs lack financial resources and capacity to seek financing

The 18 barriers were included in the field research survey of the SMEs and they were asked if the barriers were perceived as very significant, somewhat significant or not significant. The three most significant **internal barriers** are **limited resources dedicated to seeking or securing financing, insufficient collateral available and high administrative burdens**. 65 % of the early stage SMEs find limited resources dedicated to seeking or securing financing and insufficient collateral available to be a very or somewhat significant barrier. 57 % of the early stage SMEs find high administrative burdens to be very or somewhat significant barrier. The remaining barriers are perceived as very significant or very significant by less than 50 % of the SMEs.

Figure 5.1 Significant internal barriers



Note: The figure shows the companys wich have said that a specefic internal barrier is significiant or somewhat significant.
Questions: How significant are the followig internal barriers for your business when seeking financing
n = 386 -388
Source: Oxford Research

Since the survey has not been conducted for non eco-innovative SMEs (a control group) it is difficult to assess whether the barriers are particular for early stage eco-innovative SMEs. Nevertheless, the three most prominent barriers are considered to be general barriers for SMEs. The transaction costs related to seeking finance and high administrative burdens are more prominent for SMEs because they only vary to a limited degree with the size of the company and because SMEs by definition are limited in size and resources. Insufficient collateral available has also often been pointed out as a general barrier for SMEs.[33]

For those SMEs that identified limited resources dedicated to seeking or securing financing and high administrative burdens as a barrier, there is only limited difference between early stage and later stage eco-innovative SMEs. Insufficient collateral available seems to be more significant for early stage than later stage eco-innovative SMEs. Only a limited number of SMEs point to lack of business experience in their business as perceived by financial suppliers as a very or somewhat significant barrier.

[33] OECD (2006). Better financing for Entrepreneurship and SME Growth. OECD Keynote Paper. The SME Financing Gap: Theory and Evidence.

5.1.3 Financial system not aligned with needs of eco-innovative SMEs

The 3 most prominent **external barriers** are: financing available not tailored to small-scale investment needs (up to €300.000), potential financial suppliers insufficiently engaged with eco-innovative industries, and uncertainty of government regulation**.** More than 70 % of the early stage SMEs perceive financing available not tailored to small-scale investment needs and potential financial suppliers insufficiently engaged with eco-innovative industries as very or somewhat significant barriers. 63 % find uncertainty of government regulation to be very or somewhat significant.

Figure 5.2 Significant internal barriers

Note: The figure shows the companys wich have said that a specefic external barrier is significiant or somewhat significant.
Questions: How significant are the followig external barriers for your business when seeking financing
n = 419 -435
Source: Oxford Research

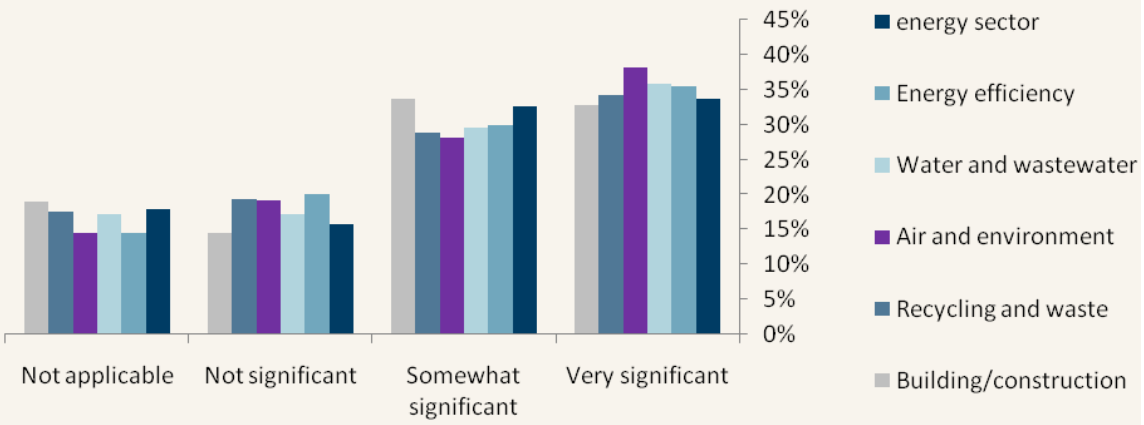
As opposed to the internal barriers, the external barriers are not among the ones most often mentioned in relation to SMEs and access to finance.[34] This indicates that these barriers are more prominent for eco-innovative SMEs. However, without a control group this cannot be analysed in greater detail. All barriers are perceived to be more significant for early stage eco-innovative SMEs compared to later stage eco-innovative

[34] See, for example, NEFI (2005). Financing innovation and research investments for SMEs. Challenges and Promotional Approaches.

SMEs. The largest differences are found for availability of collateral, protecting intellectual property rights and lack of available demonstration sites,

Comparing barriers for the sub sectors the eco-innovation target reveal very little difference among the most significant barriers. The difference is illustrated below for the two most significant barriers. Breaking down the barrier "potential financial suppliers insufficiently engaged with eco-innovative industries" into various subsectors reveals that there are no significant differences, as illustrated in figure 5.3.

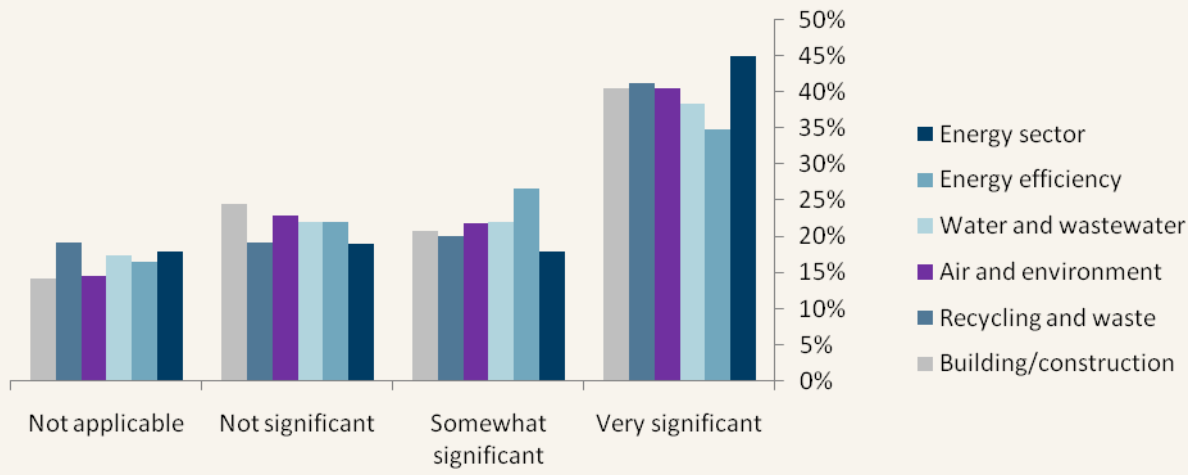
Figure 5.3 Potential financial suppliers insufficiently engaged with eco-innovative industries



Note: The figure shows the influence of an external barrier categorized by the target sector of the company. Be aware that each company was allowed to select up to tree answers, therefore a company can figurate in more than on target industry. Energy sector is composed from the three categories: Energy generation, Energy storage and Energy infrastructure.
Questions: How significant is the followig external barrier for your business when seeking financing : .Potential financial suppliers insufficiently engaged with eco-innovative industries. Which sector(s) do you consider to be the main target industry or industries for your products and/or services?

Similarly, for the barrier "financing available not tailored to small-scale investment needs", a slightly less than average number of SMEs targeting energy efficiency perceive the barrier to be very significant but more regard it to be somewhat significant. For SMEs targeting the energy sector it is the opposite. This is not surprising since the SMEs targeting the energy sector in general is regarded as fairly capital intensive where as energy efficiency is regarded as less capital intensive. For the other sub sectors the differences are minor.

Figure 5.4. Financing available not tailored to small-scale investment needs and target sector



Note: The figure shows the influence of an external barrier categorized by the target sector of the company. Be aware that each company was allowed to select up to tree answers, therefore a company can figurate in more than on target industry. Energy sector is composed from the three categories: Energy generation, Energy storage and Energy infrastructure.
Questions: How significant is the followig external barrier for your business when seeking financing : Financing available not tailored to small-scale investment needs. Which sector(s) do you consider to be the main target industry or industries for your products and/or services?
n = 346.
Source: Oxford Research

The authors have also analysed the difference for other barriers but as mentioned they are minor.

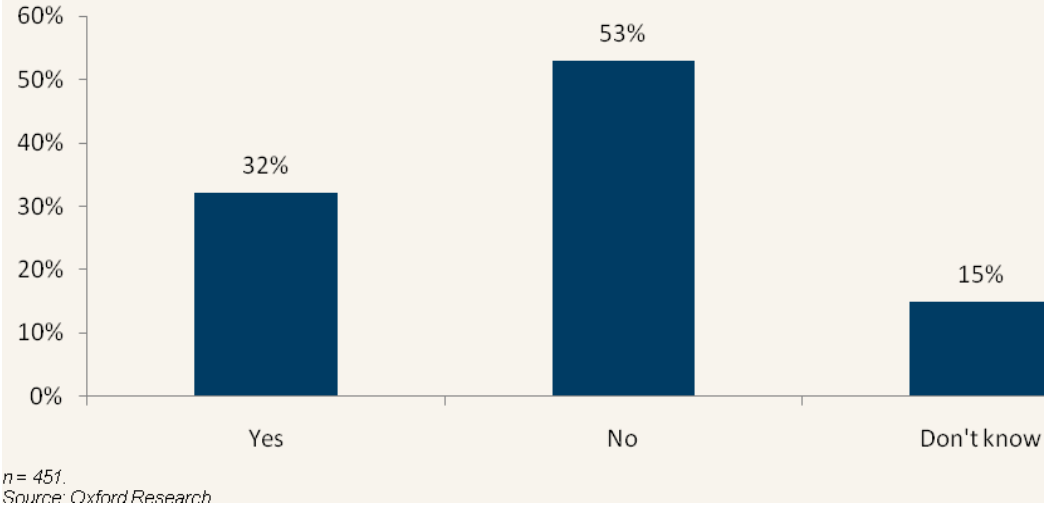
5.2 No explicit evidence that financing is more difficult for eco-innovative SMEs but 59% of the sample are looking for it

This section examines whether eco-innovative SMEs find it harder to access funding than other innovative SMEs. Like the previous question it is difficult to give an answer to the question without a control group to compare the answers for eco-innovative SMEs to. Still a number of questions regarding this issue have been included in the survey and the issue has also been discussed in the interviews with financial actors. A review of the literature did not yield explicit evidence that eco-innovative SMEs find it more difficult to access financing, but points to elements (e.g.: negative externalities, etc.) that create more difficult conditions for them as opposed to others, as elaborated in paragraph 6.3.

5.2.1 Eco-innovative SMEs do not perceive increased difficulty obtaining financing

A majority of the SMEs in the study indicate that it is not more difficult to access financing than for other innovative businesses. When asked to indicate their perspective on their access to finance *vis-à-vis* their counterparts in other innovative industries, 53 percent indicate that it is not more difficult to access finance for eco-innovative businesses compared to other innovative businesses. 32 percent state that they do indeed find that they perceive more difficulty, while the rest state that they do not know.

Figure 5.5 Is accessing finance more difficult for eco-innovative businesses than for other innovative businesses

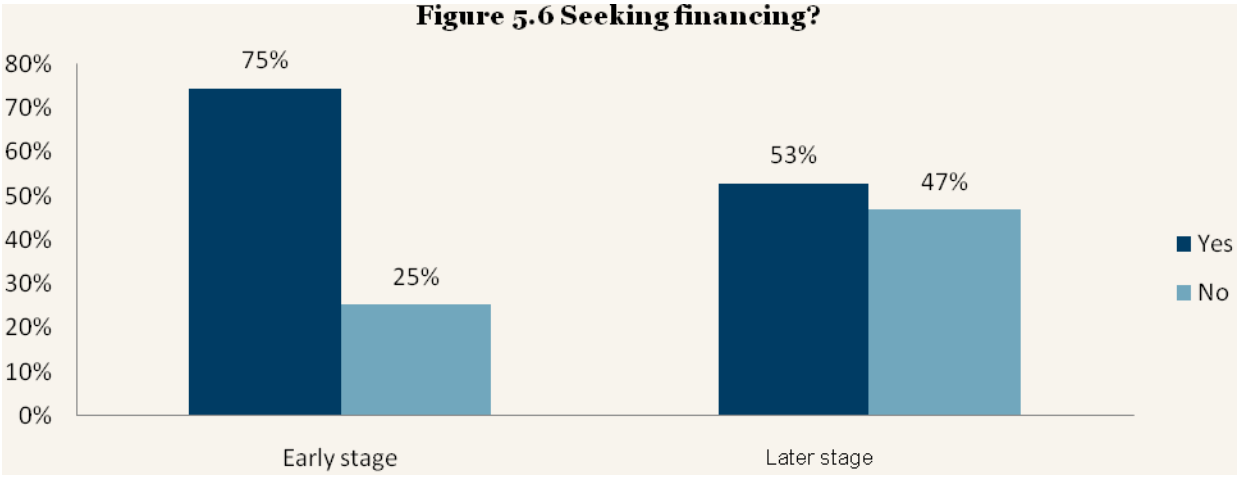


n = 451.
Source: Oxford Research

The question has been included in the survey to give an indication of how the eco-innovative SMEs perceive the situation but the results should be interpreted with care. First of all it might be difficult for a manager of an eco-innovative SME to judge how difficult it is to get access to financing for "other innovative businesses". Secondly, the answers do not provide the basis for concluding that eco-innovative SMEs in general do not lack financing. The only conclusion that should be drawn is that many do not perceive the problem to be worse than for other innovative SMEs.

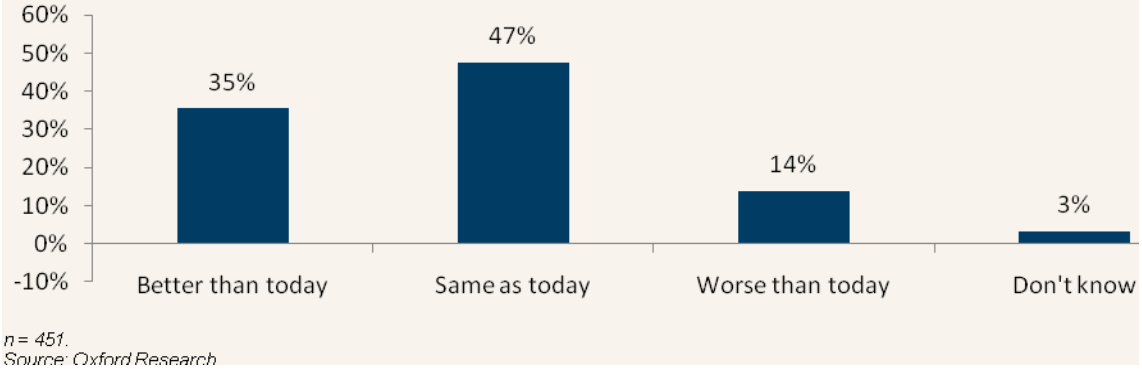
Looking at the number of eco-innovative SMEs that are currently looking for financing indicates that access to finance is not something that is easily obtained. 59 percent of businesses in the study indicate that they are seeking financing, while 41 percent signify that they are not seeking financing. It is, in particular, the early stage SMEs that appear to be seeking finance. 75 percent of the early stage SMEs are seeking financing while 53 percent of businesses in the later development stage state that they are seeking finance.

Figure 5.6 Seeking financing?



The share of eco-innovative SMEs seeking finance has most likely increased as a result of the financial crisis and the tighter bank credit policy which have impacted businesses in the environmental industry as well as businesses in general. As the financial crisis is retreating this situation might improve. Still almost half of the eco-innovative SMEs expect access to finance the next 12 months to be the same as today, with 35 percent of those surveyed expecting it to be better and only 14 percent expecting it to be worse.

Figure 5.6 Expected access to finance the next 12 months



n = 451.
Source: Oxford Research

5.2.2 Eco-innovative SMEs are constrained by underlying market characteristics

The interviews with managers of venture funds suggest that they do not consider it to be more difficult for eco-innovative SMEs to obtain venture capital than SMEs in ICT, biotech or other highly innovative sectors suitable for venture capital. Several investors have pointed out that although it is seen as a sector with a significant growth potential, certain market characteristics make eco-innovation a challenging investment area.

Several of the investment mangers as well as business angels interviewed for this study mentioned that it was difficult for the companies they are involved in to access to debt financing once they reach a point where they need working capital. This is often because the eco-innovative SMEs target markets that are only emerging and that the banks have limited knowledge of eco-innovative fields.

The banks focused on sustainability make a similar point regarding access to debt finance. The banks focused on sustainability which have been interviewed for this study are fairly conservative in their risk policy and do not take risks that traditional banks would not take. But because they are specialised in sustainability, including eco-innovation, they tend to have a deeper knowledge of eco-innovation, statistics for companies' credit history and default history on loans. Banks can also develop targeted risk assessment tools to assess the risk associated with loans in eco-innovative sectors. Credit Cooperatif in France has, for example, developed a special software tool they use to assess projects in renewable energy based on their experience in the field.

Moreover, the banks focused on sustainability only have a very limited share of the market and since they are not able to take larger risks than traditional banks, they are also reluctant to provide loans for new solutions which are unfamiliar to them. Limited ability to assess risk has been pointed out as a factor that makes it especially difficult for eco-innovative SMEs to obtain debt financing from traditional banks. Due to their experience with sustainability and focus on providing financing for purposes other than profit, the banks specialised in sustainability can, in their own opinion, assess the risks better than traditional banks and sometimes grant loans that traditional banks would not grant. However, it was made clear that the loan criteria were essentially the same as in any other field. Thus, it seems that it is not inherently more difficult for eco-innovative SMEs to obtain financing, but the inherent issues and difficulties (e.g.: negative externalities not incorporated in prices) related to the market in which they operate might force them to face uneven conditions compared to other innovative SMEs when accessing finance.

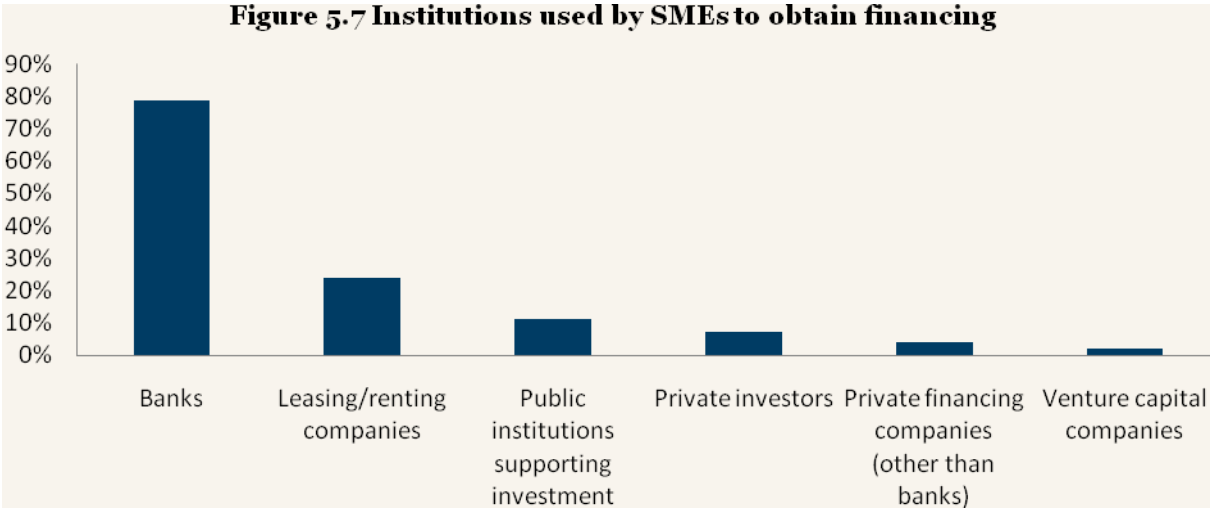
5.3 Financing structure of eco-innovative SMEs

This section presents data on the specific features in the way eco-innovative SMEs finance themselves.

5.3.1 General state of SME financing

A review of the literature identified one survey that sought to determine the financing structures of SMEs in general. In 2005 the EU Commission commissioned a survey of financing of SMEs in general. Even though the categories in the EU survey are not identical to the ones in this survey comparing them can provide interesting information on the differences between the types of financing used by SMEs in general and eco-innovative SMEs. In the EU survey, debt financing is used by 79 % of SMEs in general and venture capital is used by only 2 %.

Figure 5.7 Institutions used by SMEs to obtain financing



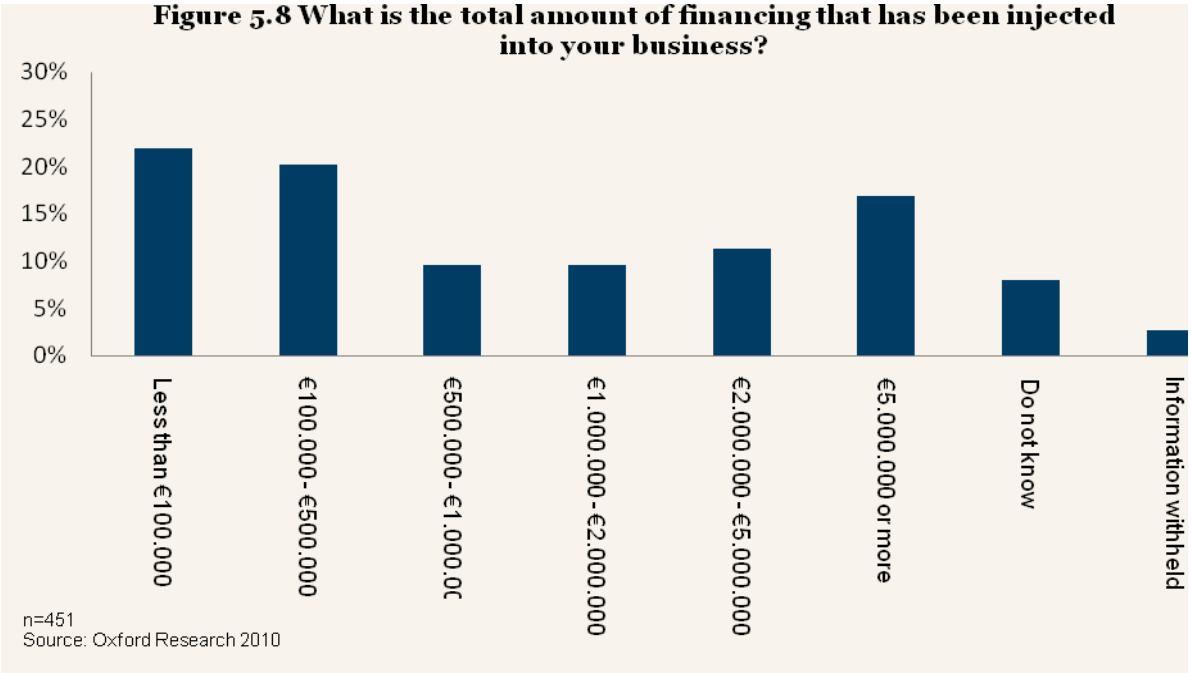
Note: It was possible to give more than one answer and therefore the sum does not add up to 100%.

It is important to note that this survey did not target innovative SMEs nor did it focus on eco-innovation. Finally, the survey was conducted nearly half a decade before the present study, prior to the recent economic crisis. In the EU survey, 79 percent of SMEs in the EU general survey relied on banks to obtain financing, while this was only the case for 56 percent of eco-innovative SMEs. However, still a significant share (56 %) managed to obtain bank financing.

5.3.2 Differences between general SMEs and eco-innovative SMEs

The eco-innovative SMEs have received their financing from a number of different sources. As illustrated by Figure 5.9, the primary source of financing, which 87 percent of SMEs indicate they have used, is *own source*, which includes family, friends, and founders.

42 percent of businesses have had less than €500.000 injected into their business. 31 percent have received financing between €500, 000 and €5, 000, 000, while 17 percent of businesses have received over €5, 000, 000 in total financing.

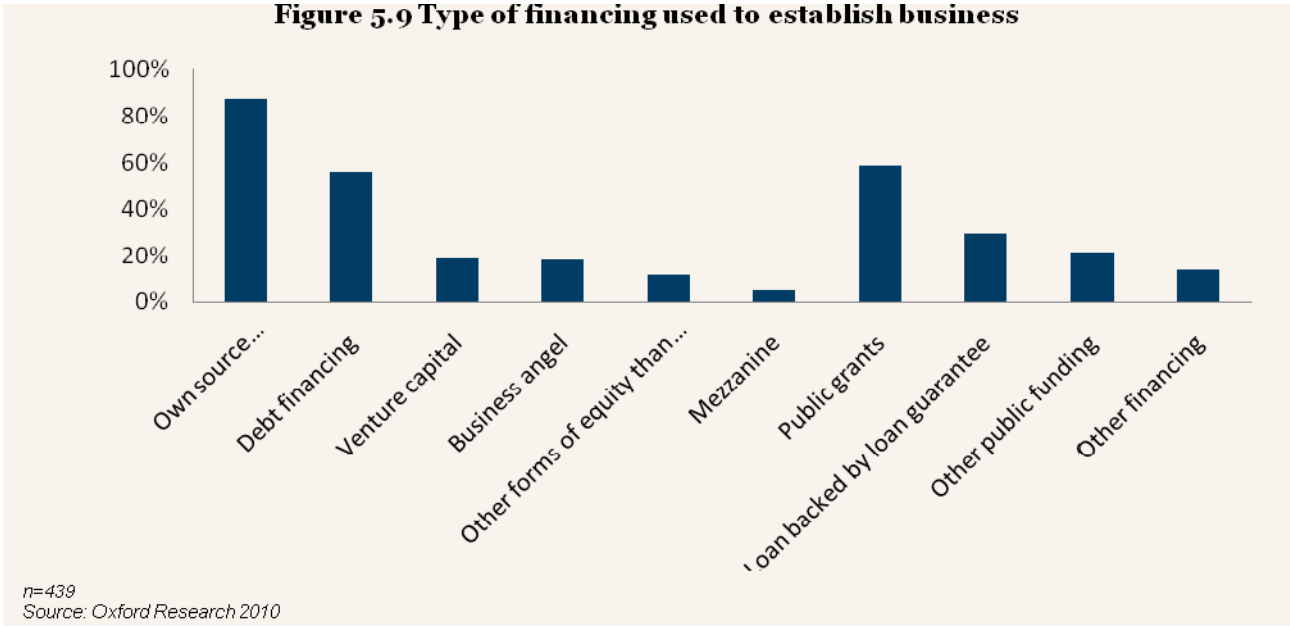


It is perhaps surprising that 42% of eco-innovative SMEs have received less than 500,000 Euros given that eco-innovative SMEs are regarded as capital intensive.[35] However, it has to be taken into account that eco-innovative SMEs in the energy sector have deliberately been reduced in the survey and they are often regarded as the most capital intensive of the eco-innovative SMEs.

Debt financing and public grants are the second-most commonly cited financing sources– 56 and 59 percent indicate that they have received financing from each of these two sources. 29 percent of businesses indicate they have received loans backed by loan guarantee. It was possible to give more answers to the question and the businesses which have ticked debt financing should be the same as the ones who have ticked loan guarantee since loan guarantee is a form of debt financing. Business angels and venture capital have provided financing to approximately 18 percent of the businesses. Finally, 21 percent have received funding from other public sources.

[35] See for example http://www.altassets.com/private-equity-features/article/nz18489.html

Figure 5.9 Type of financing used to establish business



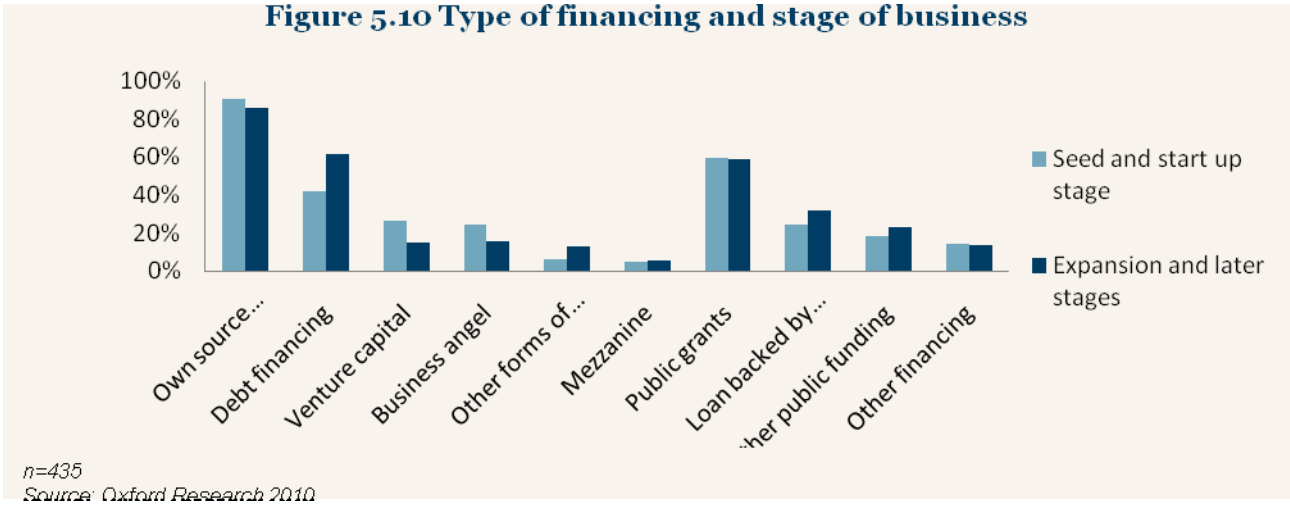
Note: It was possible to give more than one answer and therefore the sum does not add up to 100%.

Looking at the amount of financing each instruments comprise shows that own source of financing tend to comprise a relative bigger part of businesses' total financing than other types of financing. For nearly 50 percent of businesses that have received own source financing it has comprised over 50 percent of the total amount of financing. The other types of financing in general cover smaller amounts of businesses' total financing.

The comparison also shows that eco-innovative SMEs are more likely to receive public grants (59 percent) compared to traditional SMES (11 percent receive funding from public institutions). Finally 18 percent of eco-innovative SMEs rely on venture capital, while this is only true for 2 percent of traditional SMEs.

Figure 5.11 compares the different types of financing, which businesses in their early and later development stage respectively use. There are in general only minor differences between the types of financing that the businesses make use of. However, early-stage businesses tend to use their own sources of financing, venture capital and business angels slightly more than later stage businesses.

Figure 5.10 Type of financing and stage of business



Note: It was possible to give more than one answer and therefore the sum does not add up to 100%.

The fact that 42 percent of early stage eco-innovative businesses have used debt instruments to finance their business shows that there are many other types of eco-innovative businesses, even in the early stage, than the innovative high-tech businesses that rely on venture capital. In fact debt finance is an important instrument for financing early stage eco-innovation and more than twice as many eco-innovative businesses in the early stages rely on debt financing as venture capital.

5.3.3 Public financing plays a significant role at the earliest stages for eco-innovative SMEs

The case studies of eco-innovative SMEs revealed some insight into the process used to seek and obtain financing. The earliest stages appear to be financed with public money. All of the case studies of SMEs mentioned government programmes that were accessed to provide financing for product development and feasibility studies. Companies that had the most success mention that early seed financing was made available to cover initial costs, especially if the founders did not have additional resources.

As the companies grow, there is a greater range of potential financing options. However, the hurdles to accessing finance often appear during this stage. It appears that moving beyond the initial seed stage is the point at which companies need to become more strategic and demonstrate a clearer path to market. In this stage, some companies were able to use additional public money while others were on solid enough footing to rely on private financing. Business angels played a prominent role in at least one company. For the case of Corso Magenta[36], the innovative nature of its product meant that investors had a difficult time assessing the market potential of the product. Moreover, the rigid terms imposed by VC were unacceptable to the company. Thus, the company relied on the less formalized business angel financing to transition of the earliest stages, where public financing is more common.

It appears that SMEs look to investors that can add value to the company beyond the value of the financing they provide. Protix Biosystems undertook an explicit selection process for financiers when moving into their second round of financing. Because the upcoming strategy involved scaling up production and preparations for market entry, Protix consciously chose to work with investors that had experience with market introductions, scaling up, and a relevant business network. Another example is Visedo, which is relying on the financial expertise of VNT management as they plan for an exit strategy. Although a number of actors are involved in the financing structure, it appears that the know-how of the particular actors is important.

Bank financing is largely absent in the case studies, due mostly to the youth of the companies studied. The case studies focused mainly on early-stage companies that were transitioning out of public funding arrangements and into the private market. It was also mentioned that many of the companies studied had little or no collateral at the earliest stages, and thus bank financing was never considered as an option.

[36] Corso Magenta is one of the 10 case studies develop as part of this study. It is a French eco-innovative SME. Corso Magenta produces prefabricated film with paint and varnishes on rolls. The dried film is estimated to be 10 to 20 times less polluting compared to traditional paint.

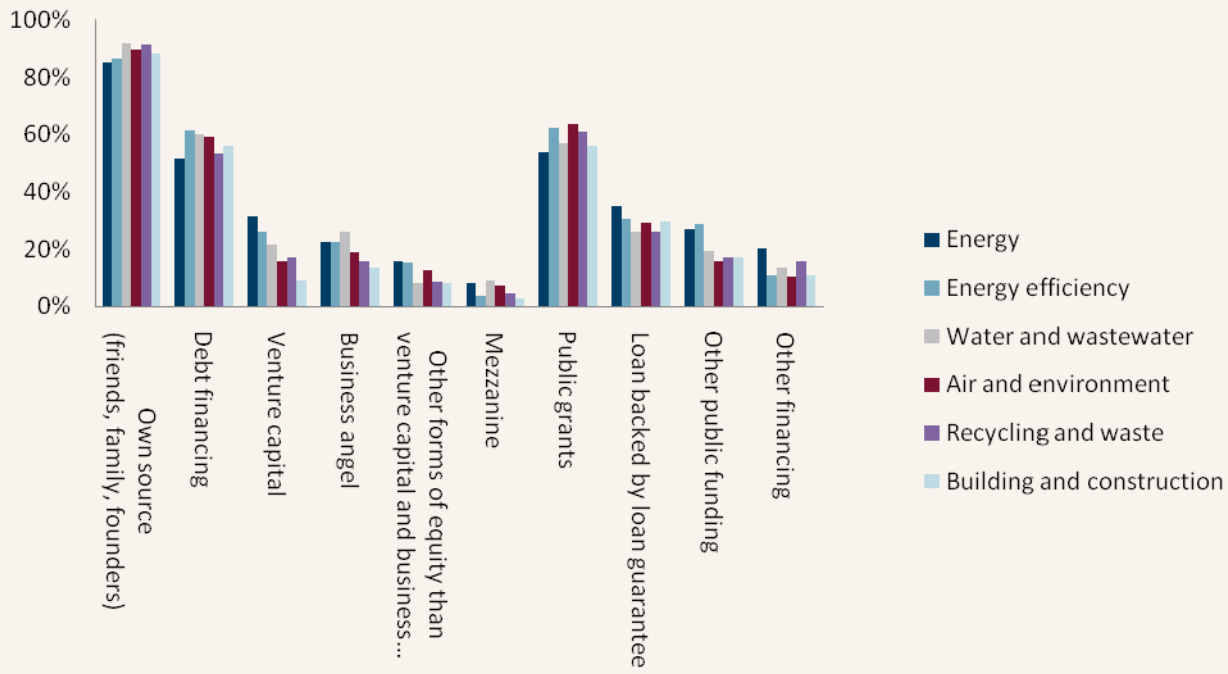
5.4 Few subsector difference in SMEs financing

The section outlines how the features in the way eco-innovative SMEs finance themselves change according to the industry the eco-innovative SMEs target. Since the question is addressed directly at the SMEs, the answer will rely on data from the survey of the SMEs.

5.4.1 Eco-innovation: sector or theme?

Figure 5.12 shows the different types of financing used by eco-innovative SMEs according to which sub sector the eco-innovative SMEs target. There are only minor divergences between the sectors and their type of funding. For example, own source provide between 85 percent and 92 percent of businesses with funding across the different sectors. However, there are a couple of deviations from the standard. Venture capital for building and construction only comprises 9 percent, while it for the energy and energy efficiency is above 25 percent. This is not surprising since venture capital data also shows that the largest portion of venture capital goes to energy related sectors.[37]

Figure 5.12: Financing eco-innovation in different sectors



n=353
Source: Oxford Research 2010

Note: I was possible to give more than one answer and therefore the sum does not add up to 100%.

26 % of eco-innovative SMEs which target water and wastewater receive finance from business angels and only 13 % of the SMEs targeting building and construction have received capital from business angels. Public grants are most frequently used by SMEs which target air and environment and energy efficiency.

[37] Please refer to the data presented in the literature review for a distribution of VC investments on sub sectors.

There is little additional evidence to emerge from the interviews with SMEs that particular industries tend to have unique or definite characteristics. Indeed, the study draws attention once more to the fact that **eco-innovation is not a traditional 'sector'** in that the range of activities, products, and business models covered by the term limits the extent to which discernable differences can be identified. The heterogeneity of the eco-industries appears to minimize the sector differences.

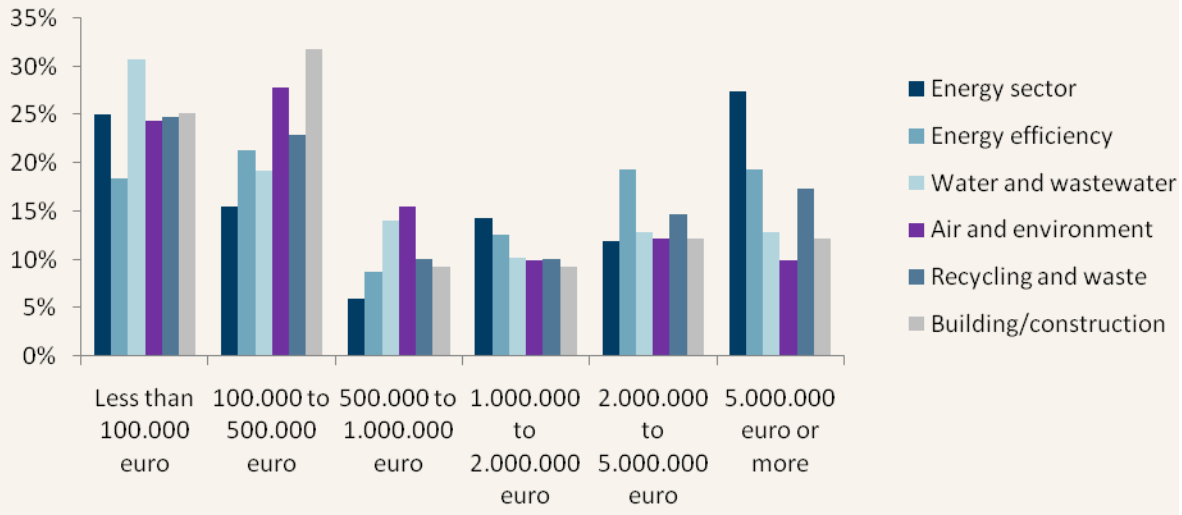
5.5 Subsector financing differences

This section looks at how the amount of financing required to commercialise eco-innovations changes according to subsector. Since this question is also addressed directly at the SMEs the answer draws primarily on data from the survey of the SMEs.

5.5.1 Energy-related industries are more capital intensive

The analysis of the differences in the total amount of financing injected into the eco-innovative SMEs in the different subsectors confirms the view of the energy sub sector as capital intensive. 54 % of the eco-innovative SMEs targeting the energy sector have had more than 2 million Euros injected and 27 % have had more than 5 million Euros injected. Perhaps more surprising energy efficiency also stand out as relatively capital-intensive. Significantly less has had more than 5 million Euros injected but 51 % have had more than 2 million Euros injected. For the other sub sectors it is between 32 and 42 % which have had more than 2 million Euros injected.

Figure 5.13 Total amount of financing injected into business



Note: The figure shows the total amount of financing that has been injected into a company, categorized by the target sector of the company. Be aware that each company was allowed to select up to tree answers, therefore a company can figurate in more than on target industry. Energy sector is composed from the three categories: Energy generation, Energy storage and Energy infrastructure.
Questions: What is the total amount of financing that has been injected into your business? Which sector(s) do you consider to be the main target industry or industries for your products and/or services?
n = 276.
Source: Oxford Research

As shown in figure 5.13, the differences between sub sectors are limited. Beyond finding that energy-related subsector are more capital-intensive, it is difficult to derive typologies of eco-innovative SMEs based on differences between sub sectors in the survey of SMEs. Some ways of distinguishing different types of eco-

innovative SMEs have been pointed out in the interviews with financial actors. This is explored further in section 6.7. However, there is little systematic evidence available to identify trends.

5.6 Eco-innovative SMEs are limited by lack of business experience

This section looks at whether there is, when compared to other innovative SMEs, a particular lack of business skills that hinders eco-innovative SMEs from obtaining external financing. The question was addressed in the survey to the SMEs and was also discussed with the financial actors. Further, the issue was mentioned in several articles reviewed for the literature review as being a major barrier to finance.

5.6.1 Lack of business skills: *eco-innovation* problem or an *SME* problem?

The literature suggests that while a lack of business competency has been observed in SMEs across several industries, it might be especially pronounced in eco-innovative companies because of the emphasis on environmental goals. [38] Lack of commercial skills is a general problem for eco-innovative SMEs because they tend to lack the organizational capacity to support sustained research, commercialization, and investment-seeking activities. Further, in some cases, the availability of public funding is a risk in it can direct companies to advance to the development phase with insufficient business competence.[39] Indeed, this is confirmed by research carried out by Cambridge University for EIU on 73 young cleantech SMEs on their perception of barriers to growth, which confirms that improving investment readiness and significantly upgrading cleantech management is crucial to attract venture capital investment and ultimately deliver the technology to market successfully.[40] It might also be a particular problem for SMEs because sustainable enterprises, apart from economic goals, pursue additional goals, such as ecological goals.[41] Many eco-innovative firms tend to emphasise environmental advantages instead of focusing on a sound commercial case and potential returns.

5.6.2 SMEs themselves do not perceive a lack of business skills

The eco-innovative SMEs were asked how experienced they considered their management team to be in terms of business. Since SMEs gain commercial skills as they develop, the answers have been divided on early stage and later stage eco-innovative SMEs. As illustrated by figure 5.14 the eco-innovative SMEs in general regard their management team to have a good level of business experience.

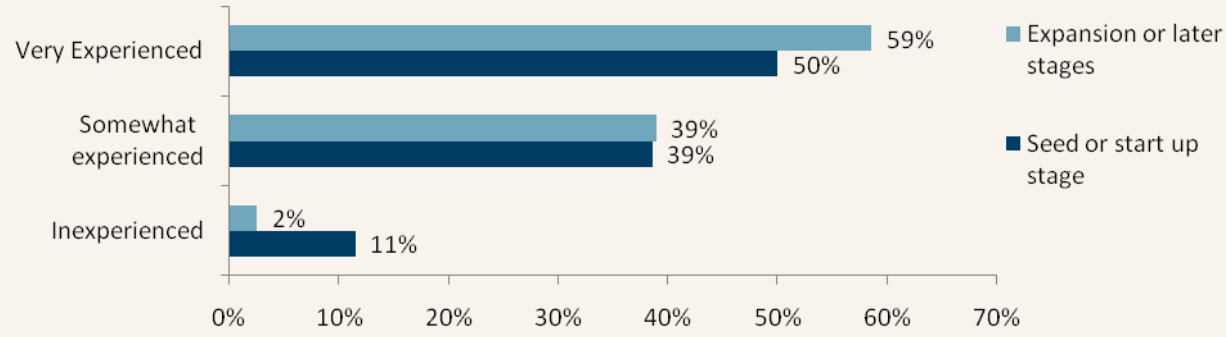
[38] Chapple (2007)

[39] Makela (2008)

[40] Chapple (2007)

[41] Hasenhuttle et al (2008)

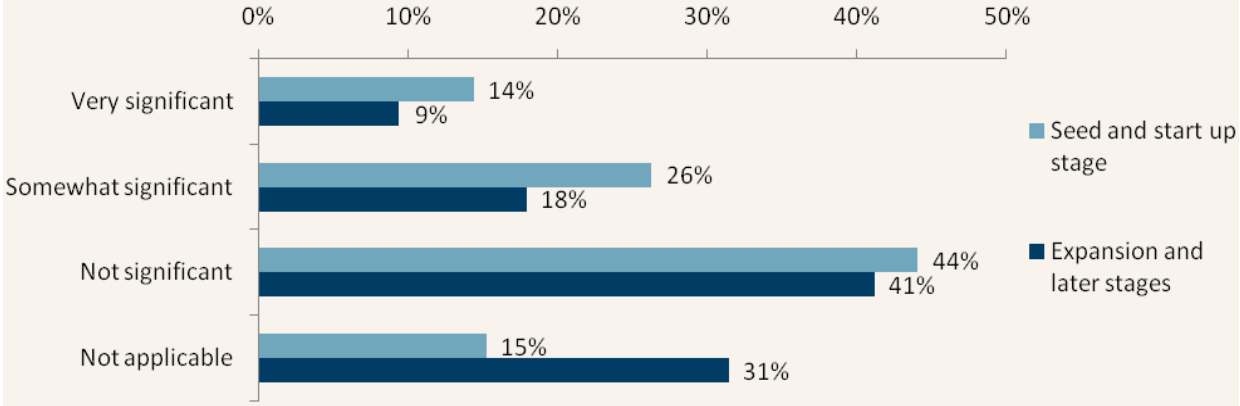
Figure 5.14 Business experience and stage of development



Note: The figure shows the managemet teams level of business experience categorized by the company's stage of development.
Questions: How technical experienced do you consider your management team to be in regard to business? In which stage of development would you consider your business to be?
n = 393. Chi^2 for statistical independens between development stages: p≤0,01
Source: Oxford Research

The questions on barriers also included "lack of business experience in your business as perceived by financial supplier" as a potential barrier. This was rank as the third least significant barrier out of the 18 possibilities. 40 % of the early stage eco-innovative SMEs regard is as a very or somewhat significant barrier while 44 % regard it as not significant.

Figure 5.15 Lack of business experience in your business as perceived by financial supplier

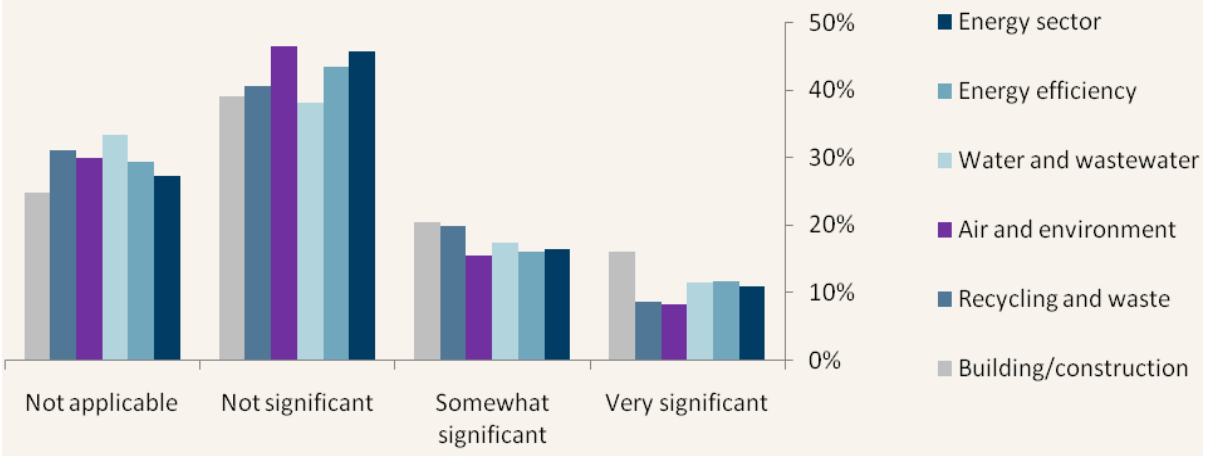


Note: The figure shows the influence of an interanel barrier categorized by the company's stage of development.
Questions: How significant is the followig internal barrier for your business when seeking financing : Lack of business experience in your business as perceived by financial supplier. In which stage of development would you consider your business to be?
n = 436. Chi^2 for statistical independens between development stages: p≤ 0,05
Source: Oxford Research

Thus the eco-innovative SMEs do not seem to regard business skills as a significant barrier according to themselves or the feedback they have received from providers of finance. It should be kept in mind that the survey was targeted at existing eco-innovative SMEs. They have therefore managed to find financing to keep the business going. If businesses which had closed because they could not find financing had been included, more might have pointed to lack of business experience as a barrier.

Looking at differences between subsectors does not reveal great differences. 36 % of eco-innovative SMEs in the building and construction sector find lack of business skills to be a very or somewhat significant barrier while this is only the case for 23 % in air and environment and 27 % targeting the energy sector.

Figure 5.16. Lack of business experience in your business as perceived by financial supplier and target sector



Note: The figure shows the influence of an internal barrier categorized by the target sector of the company. Be aware that each company was allowed to select up to tree answers, therefore a company can figurate in more than on target industry. Energy sector is composed from the three categories: Energy generation, Energy storage and Energy infrastructure.
Questions: How significant is the followig internal barrier for your business when seeking financing : Lack of business experience in your business as perceived by financial supplier. Which sector(s) do you consider to be the main target industry or industries for your products and/or services?
n = 357.
Source: Oxford Research

5.6.3 Lack of business skills is a general problem for technology-focused innovations

The providers of finance disagree with the eco-innovative SMEs and they regard lack of business skills and commercial understanding as the perhaps most frequent reason for turning down requests for finance. The providers of finance also agree that lack of business skills is a general challenge for innovative SMEs applying for finance.

The lack of business experience is in particular highlighted by venture capital funds and business angels. The venture fund looks for teams with a diverse background, including both technical skills and commercial skills. These teams are often hard to find. In eco-innovation new solutions are often very technical and sometimes developed by people with a research background. For these types of businesses, commercial skills are often a weakness. This is often witnessed by a limited focus on which market to address and who the potential customers are. Often the entrepreneurs which focused mainly on technical aspects of a new solution tend to believe that the solution is so brilliant that it will "sell itself".

While all funds agree that it is important to have a mix of commercial and technical skills venture funds have different views on how easily commercial skills can be added to the team if they are not present initially. Some funds put strong emphasis on the team and others put more emphasis on the solution and are willing to invest as long as the founders are willing to bring in people with commercial skills.

Although the providers of finance agree that business experience is sometimes a barrier they do not agree among themselves whether it is a larger problem for eco-innovative SMEs than other innovative SMEs. Some

believe that the fact that the technical requirements in eco-innovation tend to be very high more often than for other sectors tip the balance in the management team towards technical skills.

Several interviewees also point out that lack of business skills is particularly a challenge for the start ups that originates from universities. This is often seen in renewable energy but can also be teams from other sub sectors. This is not unique for eco-innovation since other areas like biotech is also very research focused but it is different from for example ICT where many believe the commercial skills are stronger.

5.7 The high costs of seeking financing

This section examines whether the ability to look for financing sources and present a business case/financing request to financial actors' are particular problems for eco-innovative SMEs. The issue was cited frequently in the literature and was therefore addressed in the survey to the SMEs.

5.7.1 Lack of capacity to seek and request financing

The literature points to some evidence that SMEs lack information and that seeking finance is a high burden, especially if there are multiple sources from which to choose. As already mentioned SMEs tend to lack the organizational capacity to support sustained research, commercialization, and investment-seeking activities. Especially the smaller SMEs suffer from this. Thus one survey found that small companies employing less than 10 people expressed difficulties in controlling administration related to financial matters, as the small size of the company meant that proportionally more human resources were dedicated to managing non-innovative activities.[42] The literature suggests that venture capitalists are of the opinion that eco-entrepreneurs lack the business skills, such as marketing, management or financial competences, which are necessary to run their businesses. [43]

The literature identified the lack of a 'good' business plan as a central barrier to funding for eco-innovative SMEs. According to some venture capitalists, funding for start-ups is often refused because entrepreneurs submit a 'bad' business plan. For venture capitalists, a 'bad' plan reflects an incomplete or inconsistent business concept, a lack of essential data (e.g. expected revenues), or too much irrelevant data (such as an overemphasis on world environmental problems). This is supported by the British Forum for the Future's report "Clean Capital – Financing clean technology firms in the UK", which found that many cleantech firms tend to emphasise environmental advantages instead of focusing on a sound commercial case and potential returns. [44]

5.7.2 Eco-innovative SMEs lack resources to seek and obtain financing

As already mentioned, the eco-innovative SMEs survey as part of the present study do not consider business experience to be one of the most significant barriers to accessing financing. They do point out, however, that limited resources dedicated to seeking or securing finance is the most significant internal barrier. Also the third and fourth most significant internal barriers when seeking finance are "high administrative burdens" and "lack of knowledge of financing options".

A significant finding of the literature review is that a lack of awareness of appropriate financing acts as an impediment to accessing finance. Some evidence exists that eco-innovative SMEs are not sufficiently aware of type of financing.

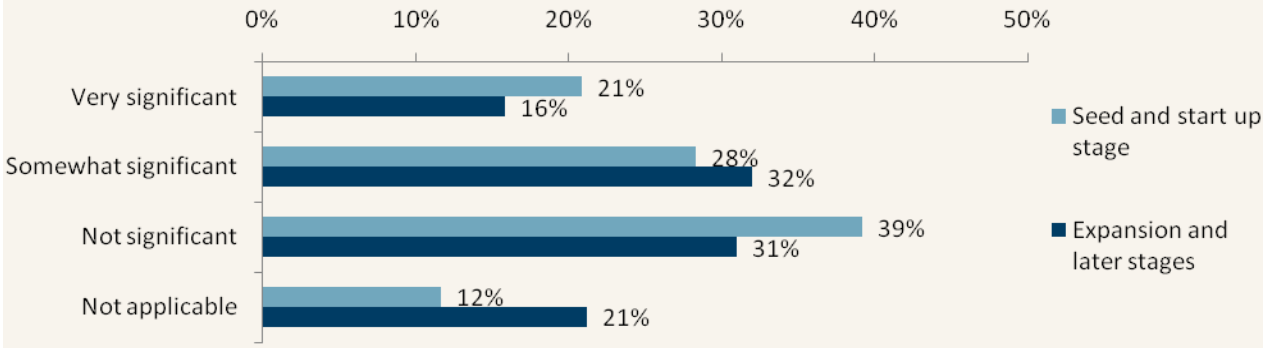
[42] Aarras et al (2008)

[43] Randjelovic et al. (2003)

[44] Chapple et al. (2007)

The survey of SMEs revealed that there appears to be a lack of knowledge of financing options. Moreover, similar numbers of early stage and later stage SMEs report a lack of knowledge of financing options to be a barrier. The percentage of early stage and later SMEs that found this to be a barrier was nearly the same, with 47 percent of early stage and 48 percent of later stage SMEs identifying this as a barrier. However, in terms of the companies that found this to be a significant problem, only 16 percent of the later-stage SMEs found this to a problem, compared to 21 percent of their early stage counterparts. Thus, it appears that more established companies eventually improve with experience, even though 16 percent of later-stage SMEs still consider this to be a very significant barrier.

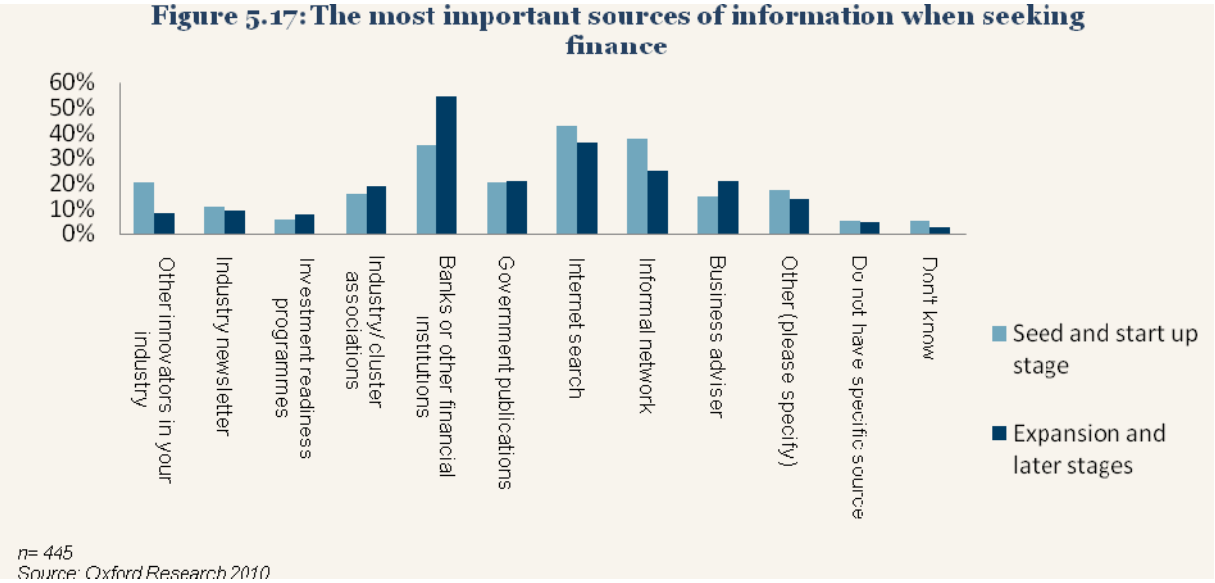
Figure 6.3. Lack of knowledge of financing options



Note: The figure shows the influence of an internal barrier categorized by the company's stage of development.
Questions: How significant is the followig internal barrier for your business when seeking financing : Lack of knowledge of financing options. In which stage of development would you consider your business to be?
n = 436. Chi^2 for statistical independens between development stages: not statistical significant
Source: Oxford Research

When seeking finance, eco-innovative SMEs use a wide variety of information sources. The most common source for information, which 49 percent of businesses have identified, is banks or other financial institutions. Internet search is named as a source of information by 40 percent of businesses. Internet search can also cover several of the other categories. SMEs can for example search information from banks and financial institutions online. Informal networks are the third most common source for information being utilized by 28 percent. Other central sources of information are government publications (21 percent), business advisors (19 percent), and industry/cluster associations (18 percent).

There are some differences between businesses in the early stage and the later stage as illustrated in figure 5.17. It appears from the figure that early stage businesses are more inclined to use informal and less expensive sources of information such as internet search, informal networks, and other innovators in their industry, while later stage businesses tend to consult more formal sources of information when seeking finance, for example, banks or other financial institutions, and business advisors.



Note: It was possible to give more than one answer and therefore the sum does not add up to 100%.

5.7.3 Some eco-innovative SMEs lack financing-readiness

As mentioned in section 5.6, lack of experience in management and business and an inability to present a business plan are some of the main concerns that venture capital funds express when discussing the business competence of entrepreneurs in eco-innovation. Although a technology might be highly innovative, SMEs that lack experience in business also tend to lack a commercial-orientation. However, as mentioned not all providers of finance regarded this as a particular problem for eco-innovative SMEs but rather as a general problem for innovative SMEs. Further, some argue that commercial skills can easily be added to the team and others argued that they would rarely invest in a company if the founding team did not demonstrate competent business skills.

At least one business angel and one venture capital fund, both in Italy, described how information programmes were likely required to better inform entrepreneurs of financing options. Both types of investor state that banks are a consistent source of referral. The venture capital fund uses these referrals to identify potential projects. However, the BA stated that he and his group of investors generally ignore referrals from banks, as the types of referrals are generally not cutting edge; they have been turned down at least once, so the likelihood of the referral being appropriate is quite low.

The traditional option has been to seek financing at a bank, irrespective of the type of financing needed. Some banks confirmed this tendency to seek financing from banks, stating that banks generally dominate the financial sector and that other types of financing are generally not as well known. The evidence does not suggest that the problem of a lack of knowledge of financing options is more concentrated in eco-innovation than in any other industry. Thus, any lack of knowledge of financing option appears to be common to innovative SMES all industries

5.8 Geographic focus of financing eco-innovation

This section looks at how common it is for SMEs look for funding outside their national or regional borders. This issue was addressed through a number of questions to the eco-innovative SMEs and to a limited extent in the literature reviewed.

5.8.1 Local focus on financing eco-innovative SMEs

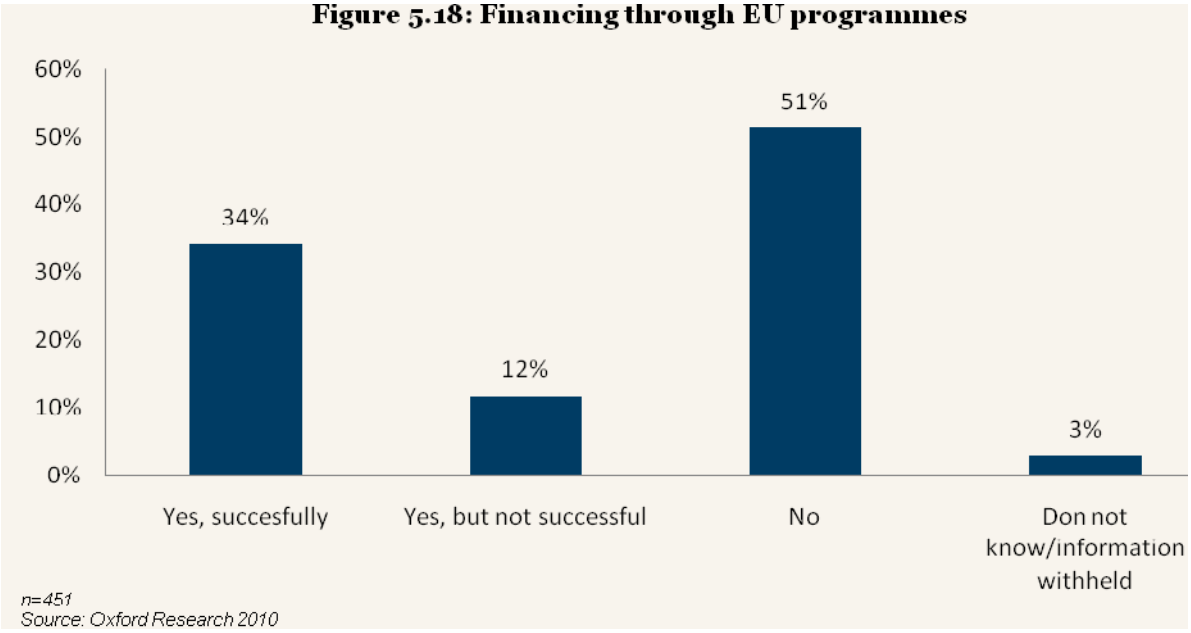
There is limited data available to determine if eco-innovative SMEs look outside of their own country when seeking capital. Nevertheless, the single study that was identified found that SMEs rarely obtain funding from outside their own country. According to a series of Finnish surveys, almost none of the SMEs surveyed had acquired funding outside Finland. In 2009, about 1 % of micro companies had acquired funding abroad, 3% of small companies and about 5 % of medium-sized companies (and 20 % of large companies).[45]

The FUNDETEC report found that some SMEs sought funding from the EU, but that the barriers to doing this were high. There are risks involved in spending time putting together a consortium and proposal, with a chance that the application could be rejected.[46] Many of the firms interviewed had experienced difficulties in securing venture capital or even often modest amounts for research and development (R&D) purposes. The problem extended to locating grant aid from European sources. Bids often escalated into complex, bureaucratic and unwieldy projects involving other partners far beyond the scale of the resources originally required.[47]

5.8.2 European-wide financing regime yet to be developed

Figure 5.18 looks at the distribution of businesses that have sought financing through EU programmes. 46 % of the eco-innovative SMEs have sought financing from EU programmes. 34 percent have sought finance and been successful, while 12 percent were unsuccessful. 51 percent have not sought financing through the EU programmes.

Figure 5.18: Financing through EU programmes



At first glance it seems like a very large share of companies which have received funding through EU programmes. However the results cannot be generalized to all eco-innovative SMEs since some of the eco-innovative SMEs have been identified using EU databases containing beneficiaries of EU programmes. Thus eco-innovative SMEs which have received funding from EU programmes have deliberately been selected

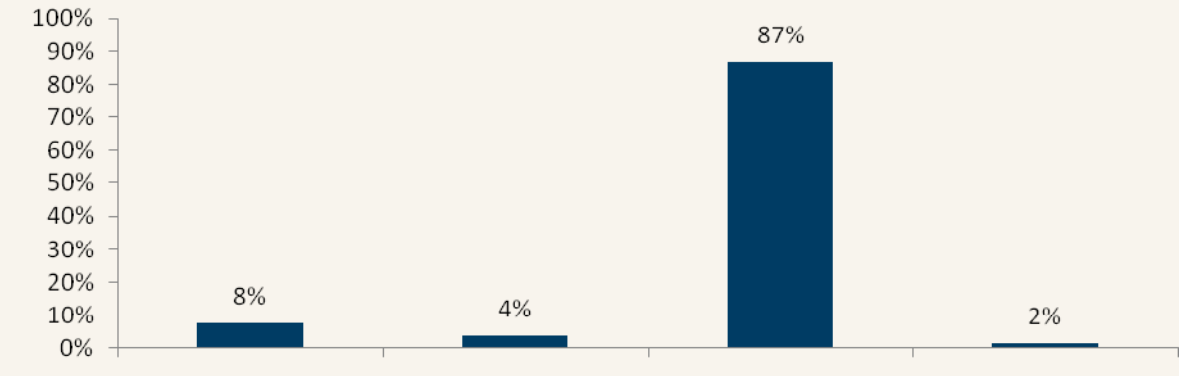
[45] Conf. of. Finnish Industries (2009)

[46] FUNDETEC (2008)

[47] Smith (2001)

The survey also shows that except for EU programmes very few search for finance from outside their home country. Only 12 percent of businesses have tried to get financing from other EU countries, and only 8 percent of these have been successful.

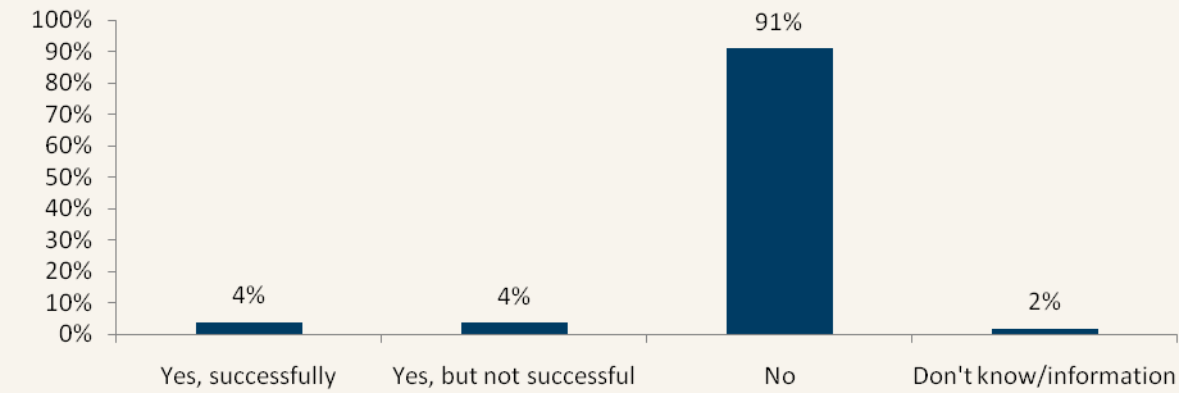
Figure 5.19: Financing through providers from other European Union countries



n=451
Source: Oxford Research 2010

An even smaller part of eco-innovative SMEs have tried to get funding outside the EU; 8 percent have tried but only 4 percent have been successful.

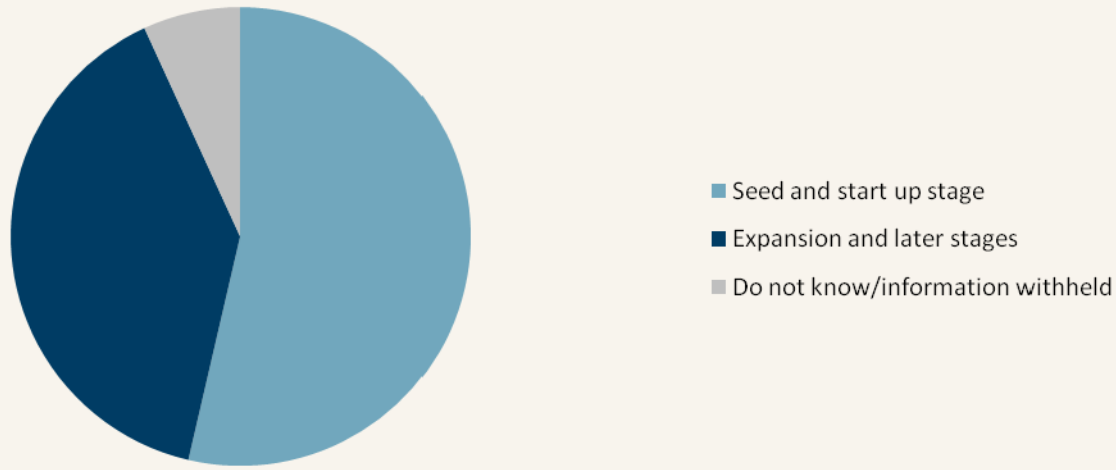
Figure 5.20: Financing through providers from non-EU countries



n=451
Source: Oxford Research 2010

Given that the Finnish study mentioned in section 5.8.1 found that larger companies more often seek financing outside their own country one might also expect the later stage SMEs to more prone to seeking financing outside their home country than early stage SMEs. This is not the case for the eco-innovative SMEs in our survey. Of the eco-innovative SMEs which have successfully sought financing internationally 54 % of the SMEs started seeking financing already at the early stage. 40 % started at the later stage and 7 % did not answer.

Figure 5.21 When did businesses start looking at international financing?



n=248
Source: Oxford Research 2010

5.9 Summary

At the outset of this project, eighteen distinct barriers for access to finance were identified through a review of the literature and existing studies, such as the FUNDETEC study. These were then tested in field research to determine the severity of each and the sources of the barriers as they relate to eco-innovative SMEs. Ultimately, the field research undertaken as part of the present study revealed some issues that had either been overlooked, exaggerated, or minimised in the literature.

Based on the field research, it became clear that the financing system in Europe was not aligned with the innovation system that supports eco-innovation. The financing system either puts significant burdens on eco-innovative SMEs, is not transparent enough, or the risk models upon which investments are made systematically biases investment away from eco-innovation.

Based on surveys, the four most significant internal barriers are limited resources dedicated to seeking or securing financing, insufficient collateral available, high administrative burdens related to seeking and obtaining financing, and the finding that SMEs lack knowledge of the various financing options available. The high organizational barriers to seeking financing means that scarce SME resources need to be directed away from innovation and toward the tasks of obtaining financing. Meanwhile, the three most prominent external barriers were found to be that financing available not tailored to small-scale investment needs, potential financial suppliers insufficiently engaged with eco-innovative industries, and uncertainty of government regulation.

In addition to the barriers identified above, the interviews revealed that the problem of a lack of business competency might be overstated in the literature. The lack of business competency was consistently identified in the literature as being a major, if not the major, reason for underinvestment in eco-innovation. While the companies in the sector might indeed lack experience in eco-innovation, it was suggested that these barriers can be overcome using the added-value elements that are often tied to investments: providers of finance are able to use their business networks or expertise to improve the business competence of the company. This is especially the case for venture funds and business angels, which tend to link eco-innovative companies with experienced business people or take an active role in the management of the company. Nevertheless, it was argued that investors would rarely invest in a company if the founding team did not demonstrate competent business skills, such as the ability to identify a market and target customers.

Thus, while the financial actors did confirm that a lack of business competency was a barrier, it is important that it not be overstated as there are other, more pressing concerns in the sector.

Another goal of the research was to identify sub-sector within eco-innovation. There is little additional evidence to emerge from the survey or interviews that particular industries tend to have unique or definite financing characteristics. Indeed, the study draws the attention once more to the fact that **eco-innovation is not a traditional 'sector' in that the range of activities, products, and business models covered by the term limits the extent to which discernable differences can be identified**. Eco-innovation better understood as a theme or approach.

Ultimately, the research reveals that field of eco-innovation is a challenging investment sector that requires comprehensive approaches beyond the mere addition of larger pools of capital.

6. The perspective of financial actors

This chapter is focused on better understanding the perspective of financial actors active in eco-innovation. Each section addresses a key topic in access to finance and will build on input from a literature review, interviews with the financial actors, input from case studies and in a few instances a survey of the eco-innovative SMEs. The case studies are either interviews with eco-innovative SMEs or financial actors and the information from the case studies are integrated in the relevant sections and do not have a separate section. However, all sources are not relevant for all questions and will hence only be included where they provide relevant information.

6.1 Rationale for financial actors providing financing for eco-innovative SMEs

This section draws on evidence, both from literature and from field research, to understand the rationale underpinning the reasons financial actors choose to provide financing to eco-innovative SMEs. The traditional incentive for providing finance to innovative SMEs is to generate a high financial return. For providers of finance to eco-innovative SMEs, environmental impact might be another motive. The importance of the different motives is analysed in this section drawing on input from the literature and interviews with financial actors.

6.1.1 Investors are motivated by high returns

According to the literature, high financial returns are the main motive for investing in eco-innovation. Even if motives such as environmental responsibility and green image seem to play a role for some investors, generating high financial returns remains the first and foremost motive for investing. Some investors also experience pressure to invest in eco-innovation from shareholders and government, among others, but such pressure is not yet as important as other factors.

The New Energy World Network Survey of institutional investors' shows that the institutional investors' motive first and foremost is to generate high financial returns. Almost all refer to this as their overriding objective. However, 64 % also claim environmental responsibility as a motive, while 59 % claim social responsibility as a motive, as long as the return requirement is met. The return requirement is for the majority traditional VC return rates (20-25 %).

A little more than one-third of the surveyed institutional investors say they are also affected by pressure from shareholders, beneficiaries or trustees in their allocation decisions, while one in four are influenced by pressure from government and customers to pursue a green agenda. This pressure can thus be deemed significant, though not yet as important as other factors.[48]

In 2007, the European Private Equity & Venture Capital Association (EVCA) conducted a survey among members investing venture capital about the environmental investments they had made over the past 12 months.[49] The larger market potential owing to a rising demand from consumers and corporations was most often referred to as the main reason for investing in environmental technologies. The second most quoted

[48] CPI Financial (2010)

[49] EVCA Barometer Issue 49 (2007)

reason was the rising demand from trade buyers, providing good exit potential. Also, governments support and new regulations were mentioned, followed by a more stringent enforcement in recent years. No one mentioned rising demand for environmental investments from limited partners. The EVCA reports notes that recently (in 2007), pension funds have put more weight into environmental investing, either voluntarily or encouraged by the government.

The survey also asked respondents who had not invested in environmental technologies about their absence from the field. 38 % stated that environmental technologies were not a part of their investment focus. 14 % referred to a lack of expertise and contacts in environmental industries and another 14 % stated a combination of both. Only 5 % stated that they did not see enough business potential in the field, while 29 % had other reasons. Among these, some were planning to invest or had not seen any investment projects so far that fulfilled their requirements in terms of technology and management team at a convenient price.

The above mentioned survey results mainly focus on the motives of venture capital funds. Less has been written on business angels and banks. Nevertheless, some literature points to little difference between investments in eco-innovation and investments in other sectors.

A recent study by Eurosif concludes that a majority of high net worth individuals considers financial opportunity to be the main driver for sustainable investment demand.[50] Another survey by Norton Rose looks at whether banks are influenced by pressure from the government to provide finance to eco-innovative SMEs. As a result of the financial crisis, many banks have tightened their credit policy which has had an impact on businesses in the environmental industry as well as businesses in general. As a result, governments in some countries have called for banks to support the development of the green economy through providing loans to the sector. However, according to a survey by Norton Rose and Cleantech Investor, which asked investors and cleantech companies if they regard banks as being more willing to lend to the cleantech sector, 62.6% of investors and 69.3% of the cleantech companies did not perceive banks as being more willing to lend to the cleantech sector because of its apparently strong political backing.[51]

6.1.2 Eco-innovation is a 'multiple-impact' investment field

The interviews with financial actors confirm that financial return is the main motive for providing finance for eco-innovative SMEs. This is the case for venture capital funds, business angels and banks. However, there are some differences between traditional banks, banks focused on sustainability and state promotional banks. While the main motivation for investing in eco-innovation remains the opportunity for healthy returns, there are some additional drivers of investment. However, these additional drivers are 'extras' rather than the main motivation for investment.

6.1.3 Banks

As mentioned it is important to distinguish between traditional banks, banks that have a special focus on eco-innovative SMEs and state promotional banks. The focus of this study has primarily been the latter two.

A number of the banks interviewed for this study are all characterised by having a broad focus on sustainability, ethics and solidarity. This is the case for Merkur Bank from Denmark, Banca Etica from Italy, Triodos from the Netherlands and Credit Cooperatif from France. The focus on eco-innovative SMEs is, for these banks, part of their overall philosophy and commitment to what they see as a "just" society. This distinguishes them from traditional banks which normally have a focus on maximising value for their shareholders. Thus the bank focused on sustainability has two incentives for providing finance to eco-innovative SMEs: like traditional banks they aim for providing value for their shareholders but they also seek to promote a sustain-

[50] Eurosif (2010). HNWI & Sustainable Investment 2010

[51] Norton Rose and Cleantech Investor (2010)

able society. The sustainable banks interviewed point out that they are fairly conservative in their risk policy and do not take risks that traditional banks would not take.

The objective of state promotional banks is to support investment activities of enterprises in order to foster development of new technologies, innovation, entrepreneurship, employment and growth. In general, they provide loans with favourable terms, liabilities and grants which are available for all enterprises irrespective of which sector or branch they belong. Thus the state promotional banks tend to have a different objective than traditional banks and contrary to banks focused on sustainability they can take additional risks. However, environmental impact is generally not an incentive for providing finance.

The state promotional banks can have a special focus on eco-innovative SMEs if it is considered to be beneficial to society as such. Austria Wirtschaftsservice (aws), one of the banks interviewed for this study, is Austria´s national promotional bank. aws offers a broad range of investment promotion programmes and services, such as financial assistance and consultancy for companies, from the pre-seed phase up to the expansion stage. Concretely they offer loans, guarantees, grants and/or equity as well as consultancy services. The objective of aws is also to support leading Austrian industries and environmental technologies has been pointed out as a stronghold. Thus, aws has a politically motivated incentive to provide finance to eco-innovative SMEs.

6.1.4 Business Angels

In the interviews undertaken as part of the field research, business angels consistently pointed to good investment opportunities as the main reason for focusing on eco-innovation. Business angels are more flexible in terms of how they invest and who they invest in than venture funds and banks because they invest their own money. Therefore, it is more difficult to generalise for this group. While not being one of the main motivations for most business angels, a desire to do something good for the environment also plays a role in their decision to invest in eco-innovation for some business angels. However, it is mainly a secondary benefit and not the main incentive.

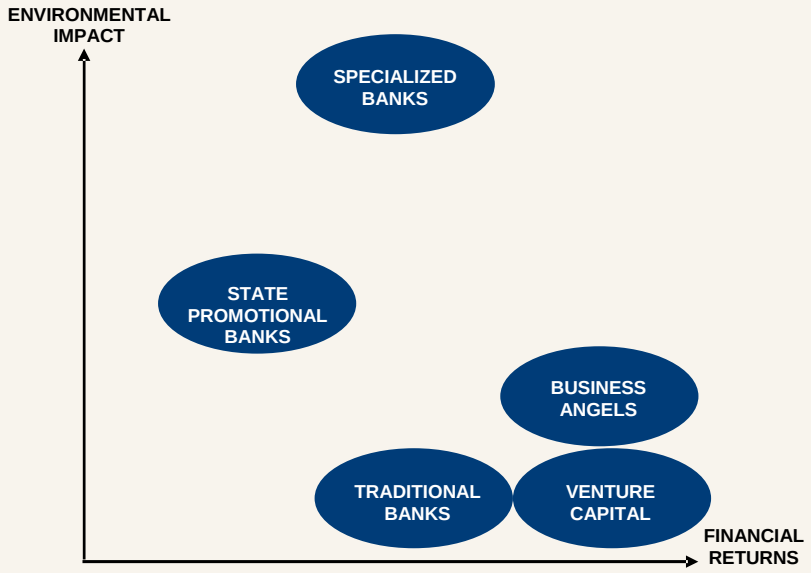
6.1.5 Venture capital funds

The investments made by venture capital funds are done by a management team that invests on behalf of those who have invested in the fund. The leading partners might also have provided some funding, but in general the management team invests on behalf of others. This means that the management is bound by a contract that specifies how and why they should make investments.

The managed teams which have been interviewed for this study also have highest possible return on investments as their overall objective. This is what their performance is measured on and eco-innovation has been chosen as an investment area because of the opportunities it provides. They do not have a humanitarian or green mandate as part of their investment guidelines. No management teams have, for example, mentioned positive environmental impact of the companies they invest in as a parameter they are being measured on.

This clearly sets the funds apart from the specialised banks and state promotional banks mentioned above because the venture funds does not have the mandate to take additional risks which the state promotional banks have and neither have the sustainability mandate the bank specialised in sustainability have. The balance of different incentives is illustrated in the figure below.

Figure 6.1: Incentives for providing finance to eco-innovative SMEs



Source: Oxford Research 2010

As illustrated, the venture capital funds and business angels makes the most risky investments and look for the highest financial returns. None of them have a strong focus on environmental impact but business angels are more flexible to give this more weight if they wish. Some business angels in eco-innovation have an additional interest in eco-innovation, either because of professional experience or interest, but this is not always the case. Traditional banks and bank focused on sustainability make less risky investments and in general look for a lower financial return. Environmental impact is key to sustainable banks but does in general not play an important role for traditional banks. The state promotional banks aim to promote innovation and entrepreneurship and financial return is not the main motive. Environmental impact is not a motive but can be if the state wishes.

6.2 Emerging capacities of financial actors

This section examines whether or not financial actors are well equipped to evaluate the financing needs of eco-innovative SMEs. While examining this question, the interviews revealed a range of emerging practices that are creating new capacities within the investment community. However, while the approaches appear to be beneficial, there is little consensus regarding the optimal approach to capacity-building within the financial community.

Eco-innovation is a relatively new investment area that did not exist as recently as a decade ago. It is therefore difficult to evaluate what characterises the successful providers of finance and lessons learned from success stories. Indeed, the literature is silent on the issue of characteristics of the financial actors that invest in eco-innovation.

The interviews undertaken suggest that there are some approaches or characteristics that are likely to lead to greater success in eco-innovation. However, the interviews revealed that there is not one 'best' approach to investing in eco-innovation. Indeed, on at least three fundamental points of differentiation, there were opposing approaches taken by leading venture funds: size, geographic focus, and degree of specialisation.

Given the relatively recent emergence of a dedicated eco-innovation financing community, few actors have been formally studied for evidence of effectiveness, nor has much academic literature been published that identifies specific characteristics of different financial providers targeting eco-innovation.

6.2.1 Wide range of eco-innovation investment strategies

As mentioned, there is little evidence to support a definite 'best' approach in eco-innovation, nor has the industry produced what can be identified as clear success stories. However, there is some evidence that some investors were developing characteristics that could potentially lead to better outcomes in eco-innovation. In at least three fundamental points of differentiation, there were opposing approaches taken by leading venture funds: size, geographic focus, and degree of specialisation. In addition, many investors, especially the venture funds, have stated that a strong track record is both a pre-condition and result of success.

With regard to **geographic focus**, one question that appears to be pertinent to the overall success of a fund is the decision to focus on Pan-European investment strategies or focusing on a local market. As discussed in previous sections, SMEs rarely look outside their own borders when seeking finance. This appears to be a sound approach, as there are few funds or business angels that take a Pan-European approach, and the interviews revealed hesitation about the desirability of expanding into other markets.

Several investors presented ideas about the characteristics of funds that would allow for Pan-European investment. As explained below, size and 'critical mass' are the key features that allow venture funds to move across borders. Some larger funds stated that they have developed successful partnership with local investors to support foreign investment. This is in contrast to the investors that choose to focus exclusively on their own home market. Several investors stated that they would likely not seek to finance companies outside of their home market because successful investing in eco-innovation relies on deep knowledge of the industry, especially as the markets are tied so closely to regulations.

Closely related to the question of geographic focus is the **size** of the investment team. One interview with a fund that invests across Europe revealed that a critical mass must be reached before venture funds can successfully invest in foreign markets. Funds generally reach this threshold at EUR 100 million; funds that do not reach this size can only invest responsibly within their home market. The reason for this is that the fund needs to meet a threshold of managers to allow some to travel to the home market of the investees. In other cases, larger funds have opened offices in the target market and have staffed them with local fund

managers. Again, venture capital managers stated a preference for active management. For this reason, some funds have pursued a strategy of growing smaller funds and focusing on local, high-growth SMEs.

With regard to **specialization,** there was significant variation in the extent to which the financial suppliers interviewed were engaged with the industry. Generally, it appears that engagement can be divided into two types, *passive engagement* and *active engagement*. The business angels and the venture funds that were knowledgeable in eco-innovation reported being much more engaged with the industry and were pragmatic in the way they identified potential investments. Business angels were the most likely to be actively seeking opportunities and describe spending significant resources to acquire knowledge about cutting edge technologies. Business angels identify potential investments by following leads or through a close knowledge of the industry. According to one BA, there is a need to be directly involved in the industry, and BAs tend to ignore referrals from institutional investors because at that point the idea is no longer cutting edge or has already been passed on by someone else. Some 'sustainable' banks did indicate that they were more prone to engage with eco-innovative SMEs because of their commitment to sustainability and more specialised knowledge of eco-innovative field.

The venture capital funds report that because the industry is developing quickly, the fund dedicates time to follow policy discussion, understand technological issues, and identify opportunities in developing markets. Some venture funds maintain industry 'clubs', a network of specialists, research organizations, and public authorities. Other venture funds rely on referrals from members of their respective networks to identify opportunities for investment.

One bank states that maintaining a network of experts is very important, as is maintaining a focus on relationships with organizations with small enterprises. However, the banks use their industry contacts passively to verify technologies or to connect SMEs to more experienced business people. This same bank mentioned that it uses its local network to provide business and technical skills to the smallest companies, based on a case-by-case basis.

The factors of size and degree of specialisation are tied to **approaches to capacity building**. There are three distinct approaches to capacity building that have been identified in the interviews. The first two approaches are competing, while the third is very limited in its use. Due to the small sample and the recent emergence of the funds dedicated to eco-innovation, the relative success of each type of strategy has yet to be established. Nevertheless, the examples are presented to illustrate the variety of perspectives on building capacity.

The larger funds generally have developed in-house specialists with technical backgrounds. In some cases, half the investment team will have a technical background and the other half will have a finance background. In other cases, there are people with training in technical fields who have then supplemented their experience with business training.

This is in contrast to some smaller funds that generally choose to focus on their home market. These smaller funds tend to stay small in terms the number of investors in the organisation. These investors tend to have a finance background and have deliberately chosen to contract out the technical appraisals and outsource to experts in the field in which the technology lies. The interviews suggest that there are two reasons for adopting this approach. First, the technologies in eco-innovation tend to be diverse and novel. It is difficult to develop in-house expertise to cover the range of technologies that exist. Contracting out allows the investment team to acquire the best advice possible at the moment that it is needed. Furthermore, it has been suggested that the technical aspects of proposals to venture funds are less likely to act as barriers compared to the more common problems of business-related barriers, such as market characteristics or the skill of the management team. Cleantech innovations that are likely candidates for venture capital tend to be sufficiently advanced in terms of their technology but often lack the market-orientation to be successful. Thus, the investors tend to see their role as adding value to in areas where they have expertise, such as developing the market strategies, helping the company to scale up, and acquiring bank financing to move into full production.

Bank managers interviewed as part of the field research have expressed that they are not always equipped to evaluate requests for loans. To overcome this, some develop **special tools to assess the risk associated with loans in eco-innovative sectors**. While these banks did not develop specific financing instruments dedicated to easing access to financing for eco-innovative SMEs that were not available to other SMEs, they did develop tools that facilitated access to finance. Credit Cooperatif in France has, for example, developed a special software tool they use to assess projects in renewable energy based on their experience in renewable energy. However, given that the specialised banks are not willing to take larger risks than traditional banks, they are also reluctant to provide loans for new solutions with which they are not familiar. **Nevertheless, loans are granted on the same risk level as any other innovative SME.**

Another characteristic that was often cited as a contributor to success is a good track record and solid reputation. Two implications have been linked to a solid track record. First, some venture funds state that they prefer to avoid referrals from other financial actors. It is preferable to have identified the innovator themselves or to have the entrepreneur establish contact. Generally, when other financial actors have passed up on an opportunity, there is good reason. The types of high-growth companies that venture capital or business angels prefer are often identified very early. Second, venture funds have stated that it is difficult to raise a first fund. **Due to the market characteristics and uncertain returns in eco-innovation, raising a first fund is especially difficult in eco-innovation**. Several venture funds point to the fact that they have established track record in other sectors or in the energy sector before moving into related eco-subsectors outside of energy. Some venture fund managers state that they started or continue to be generalist technology funds, or that they operated in similar fields before taking on a more explicit focus on eco-innovation.

The case study of Terrawater[52] suggests that the attention paid to cleantech as an important industry has facilitated access to financing because it has helped the financial community understand the potential market and the better understand the risks. Thus, the successful mainstreaming of the 'green agenda' can be considered a contributor to successful access to finance for eco-innovative SMEs.

6.3 Investing in eco-innovation

This section examines the investment process in eco-innovation and whether or not investments in eco-innovation are inherently different from investments in other highly innovative fields. As explained in section 5.1 the main motive for investing in eco-innovation is not different from other sectors. This section takes a closer look at the criteria providers of finance use for evaluating investment opportunities and the challenges related to investing in eco-innovative SMEs. This section will also look at what the biggest challenges for eco-innovative funds are when it comes to specific issues like the due diligence process, legal/tax conditions, growth/exit perspectives.

6.3.1 Eco-innovation is a difficult investment field

The literature mentions a number of markets failures and special characteristics that are general to SMEs or innovative SMEs. Two aspects stand out as specific for eco-innovation.

Many environmental innovations combine an environmental benefit with a benefit for the company or user. Eco-innovations produce positive spillovers in both the innovation and diffusion phase. Positive spillovers of R&D activities can be usually identified for all kinds of innovations. The peculiarity of eco-innovations is that positive spillovers appear also in the diffusion phase due to a smaller amount of external costs compared to competing goods and services on the market. This peculiarity of eco-innovations has been called the **double**

[52]Terrawater is a German SME that has developed a new drinking water filtration system. The Terrawater system utilises renewable energy sources such as solar heat, geothermal heat, photo-voltaic and wind power in the generation of drinking water. It is substantially different from the traditional reverse osmosis technologies normally used. The SME obtained financing from both a private and public venture capital fund, as well as from the founder of the company.

externality problem. For example, the benefits of environmental goods and services such as electricity from renewable energy have no additional private benefits compared to the use of fossil or nuclear energy. Thus, there is no incentive to switch. The benefits are external.

Moreover, if an innovation were to encourage several players in the industry to switch, the social benefits would accrue to everyone. However, eco-innovators are not rewarded when an industry adopt a new technology, unless the innovator is rewarded directly through sales. Thus the double externality problem reduces the incentives for firms to invest in eco-innovation in spite of the social benefits such innovation would provide.[53]

There are also market distortions caused by high-carbon fuel pricing that does not reflect the environmental and social costs they impose.[54] In fact fossil fuels are often subsidised which distorts the market even more. As long as markets do not punish environmentally harmful impacts and reward environmental improvements, competition between environmental and non-environmental innovation is distorted and a socially sub-optimal amount of investment occurs.[55]

Another special characteristic of eco-innovation is that **some new solutions are dependent on government regulation and subsidies to make them competitive**. The dependence on government regulation which investors cannot affect is a considerable risk to especially medium and long-term investments. Adding to the risk perceived by investors is that in most countries environmental legislation is complicated and unclear. Failure or delay in updating or implementing environmental regulations can also affect the investment conditions for providers of finance and eco-innovative SMEs.

Several sources also point to eco-innovation as a relatively new investment area and therefore characterised as an immature market. Immature markets refer to markets where investors find it difficult to evaluate funding opportunities at the pre-seed and seed stages due to lack of experience and knowledge of the area. As the markets mature investors will move downstream as they become better at evaluating technologies and business ideas. Further increased competition for the good ideas will motivate investors to invest at the early stages to secure a stake in the most promising new ventures.

Other sources point out that eco-innovative start-ups are a very **heterogeneous group** with often very little in common, making it difficult for potential investors to evaluate the process and asses the risks.[56]

In 2007, the DG Enterprise and Industry held a workshop on "Seed finance for high-growth SMEs active in eco-innovation". Here, EU venture capital funds representatives expressed difficulties in **understanding the projects presented by entrepreneurs**. Experts at the workshop noted that "people prefer to invest in technologies that they know, in industry sectors where they know people who can help then evaluate a technology or a market."[57] This was highlighted as a problem for the eco-innovation sector, as most VC investors had a background in IT, communications or biotech. The long time span needed for the development of most eco-innovative technologies reinforces this trend. It is therefore a recommendation from the workshop that VC managers are trained to develop skills for better informed due diligence in the eco-innovation sector.

An article on "The emergence of green venture capital"[58] suggested that VC firms or managers often refuse to finance eco-innovations because they do not understand a particular technology or the particular industry the eco-entrepreneurs wanted to enter. Also, the FUNDETEC report mentions this as a challenge especially to non-energy environmental technologies. When investors are not able to understand the concepts behind the technology, they will be unable to judge its future market size and value.[59]

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[53] Beise And Rennings (2008)

[54] Reid (2008)

[55] Beise and Rennings (2008)

[56] Chasnier (2010)

[57] DG Enterprise and Industry (2007)

[58] Randjelovic et al. (2003)

[59] Ermen et al. (FUNDETEC) (2008)

This problem of investors' lack of competences in the area of eco-innovation is also noted by the investors themselves. For example by Olivier Dupont, president of the private VC fund Demeter Partners which specializes in providing financing on a 5-8 years horizon for companies in relatively new industries such as eco-industries and eco-energies. In a round table discussion held by the French Ministry of Ecology, Energy, Sustainable Development and the Ocean, Mr. Dupont pointed out that the complex set of regulations governing the eco-innovative industries, combined with the emergence of new business models, requires a **high degree of specialization** that the fund has had to act upon.[60]

6.3.2 Eco-innovation is subject to market-related difficulties

The special characteristics of eco-innovative SMEs have been one of the main focuses of the interviews with providers of finance. Overall the interviews shows that the providers of finance **use the same criteria when assessing request for finance from eco-innovative SMEs as they use for other highly innovative SMEs**. However the underlying markets that eco-innovative SMEs target exhibit market characteristics that influence the opportunities for investments in eco-innovation.

Eco-innovative SMEs are highly different and it can be difficult to generalize. The characteristics pointed out below should therefore be seen as characteristics that are more pronounced for eco-innovative SMEs than other highly innovative sectors rather than characteristics that are valid for all eco-innovative SMES.

6.3.3 Banks

Traditional banks and sustainable banks treat eco-innovative SMEs the same way they treat other innovative SMEs and the overall criteria for assessing loan applications are the same for eco-innovation and other sectors. The weight attached to different criteria can vary from bank to bank but, in general, most banks take into consideration such features as:

- The team behind the business
- The business plan
- The balance sheet
- Assets that can be used as collateral
- Payment incidences and credit history
- The risk related to the market, including competition
- The risk related to the product or service
- Credit rating

However, the banks specialised in providing finance for eco-innovative SMEs have an additional criteria which is whether the new solution is sustainable. This is not specific to eco-innovation but was found to be true for all loan applications in the specialised banks interviewed.

One of the characteristics of eco-innovation pointed out by the banks, and in line with what the literature says, is that eco-innovation is an immature market. This is especially true for the non-energy related sub sectors. Banks have limited history in providing finance to these eco-innovation sub sectors and limited knowledge of the area. Therefore they also lack statistics for the credit history of eco-innovative SMEs and default history on loans. This makes it difficult to assess risks and can make banks reluctant to provide finance.

[60] Ministère de l'écologie, de l'énergie, du développement durable et de la mer (2009)

As mentioned the specialised banks which have been interviewed for this study are fairly conservative in their risk policy and do not take risks that traditional banks would not take. But point out themselves that because they are specialised in eco-innovation and have a deeper knowledge in these areas, they can assess the risks better than traditional banks and, therefore, sometimes grant loans that traditional banks would not grant. Credit Cooperatif in France has, for example, developed a special software tool they use to assess projects in renewable energy based on their experience in renewable energy.

However, given that the specialised banks are not willing to take larger risks than traditional banks, they are also reluctant to provide loans for new solutions with which they are not familiar. In these cases SMEs either have to present a known technology, so that the bank have operations and income as security for the loan, or if the SME presents an unknown technology, they must to be able to cover the full risk in the period where the solution is being developed.

6.3.4 Business angels

The business angels interviewed also use the same investment criteria and threat eco-innovative SMEs the same way they treat other sectors. Since business angels are accountable to themselves and not to share-holders or investors, they can, as already mentioned, be more flexible when it comes to their investment criteria. Thus, they can make investments if they have a good feeling about a company even though it does not quite fulfil the criteria they normally apply. Therefore, it can be more difficult to generalise for the business angels.

However, the business angels still have some criteria they use as their general guidelines. The cleantech business angels' network in France first does an initial screening of all ideas they receive before they are passed around the network. The criteria in the initial screening phase are:

- Is it cleantech?
- Are they looking for between €300.000-600.000 in investment?

If they fulfil these criteria, they are sent out to members of the network to see if anyone might be interested in looking at the idea in more detail. If so, the business angels can apply their own criteria:

- The persons/team. Some say if the team is right they will make it. Others say if the product/technology/innovation is good enough you will make it despite the team being less good. The truth is probably somewhere in between.
- Do they, compared to competitors, have key success factors? Do they address a "customer pain"[61]?
- The Market. Are you at the right place at the right time? Is there a wave to catch?

Even though the criteria are the same, a number of factors have been identified which are important when the criteria are applied to eco-innovation. Government regulation and subsidies, as mentioned above, are two. However, they are the same for business angels and venture funds and will be described in more detail in the section below on venture capital.

[61] Customer pain is a sales term that relates to the value proposition of a given product in terms of meeting customer needs. Sales professionals and product developers are successful when they focus on providing a solution to customers' "pain" by offering solutions that address a key problem.

6.3.5 Venture capital funds

Like the business angels, the venture funds all agree that they use the same criteria irrespective of the industries, which could include eco-innovation, ICT, biotech, water, waste or energy efficiency.

The venture funds have slightly different investment criteria but the interviews suggest that they all attach considerable importance to analysing the team, the value proposition, the market and scalability when they do due diligence on a new business.

The venture fund looks for teams with a diverse background, including both technical skills and commercial skills. These teams are often hard to find. In eco-innovation new solutions are often very technical and sometimes developed by people with a research background. For these types of businesses, commercial skills are often a weakness.

In addition, venture funds state that they often look at whether the teams are well connected in the sector. If not, the venture funds consider whether their own network can be brought in to make up for the entrepreneurs' lack of network.

The value proposition is about analysing what value the solution brings to the customers. This can also be called the competitive advantage or the customer pain that the solution addresses. Often it is an assessment of whether the solution is cheaper, faster, better quality or in another way addresses the needs of the customers.

The market analysis usually focus on which market the solution should target as well as the size of the market, the future growth of the market and the expected market share that the new solution can be expected to achieve.

Finally, there is the scalability and profitability of the new solution. Given that the risk attached to the new solutions are very high and many do not succeed, the ones that tend to do best have the potential to generate a significant return on investment to make up for the others. Therefore, it is important that the solution can be scaled up easily to generate fast growth in the company as opposed to individual solutions that can cannot be put up in other locations or sold to other customers. Some funds, for example, only invest if they can see that the start-up can increase the value ten times over five years or if the company can double their value every year.

In addition to these four criteria that most funds have included in their investment criteria are a number of other criteria. Most of these are also general, but a few are of special importance to eco-innovation.

Some explained that whether injection of equity capital from a venture fund and opening of the fund's network can make a difference for the company.

Other funds, especially those with a more technology-orientation, have a high level of innovation as an explicit criterion. Not all funds mention this as a requirement, but in order to be able to fulfil the other criteria it will in all cases be an implicit criterion even though it is not mentioned.

Many also look at whether the solution can be protected though a patent or in another way. If an investor wants a new solution to be highly profitable over a long time they often need to be able to protect it to avoid competition and reduced profitability. In this way eco-innovation is different from, for example, ICT where it can be difficult to protect your intellectual property. In this regard, eco-innovation is more similar to, for example, biotech.

It is also one of the areas where venture funds are different from business angels. At least many business angels say that this is an area that they focus less on than venture funds. Business angels also focus on whether a start up can defend its superiority, as mentioned above, but it does not have to be formalised through a patent or similar.

Some also list as an explicit criterion that it has to be within the focus of the fund. Others look at whether it is an area the investment managers know well and understands.

Most funds will also implicitly or explicitly look at whether the capital requirement of the company is within the range of what the fund invests. Some also mention a realistic business plan as an important criterion and some mention good exit possibilities and potential to internationalise. This is common to all venture funds, but it was pointed out regularly as a key investment criterion.

Even though venture funds and business angels are quick to point out that the criteria mentioned above are the same for every sector the underlying markets that eco-innovative SMEs target exhibit market characteristics that influence the opportunities for investments in eco-innovation.

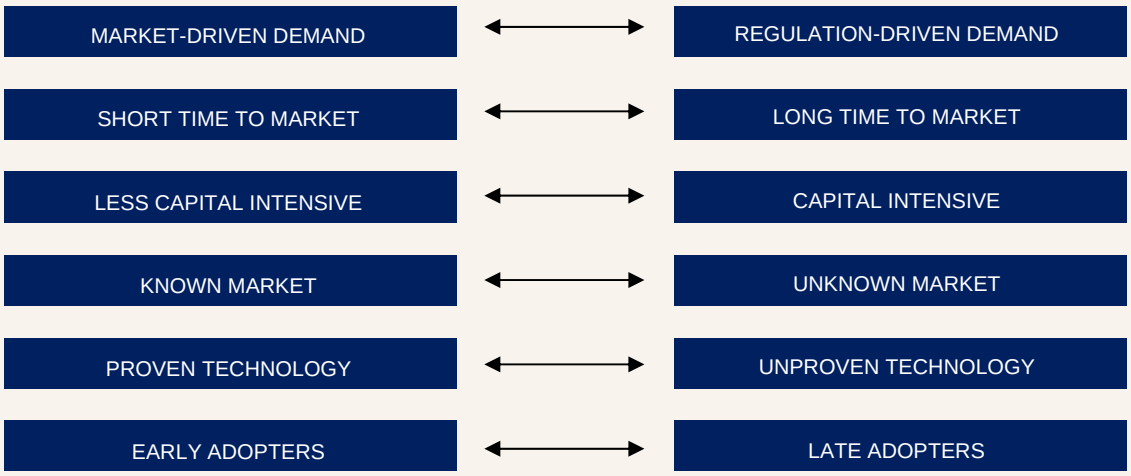
The interviews have confirmed the findings from the literature that eco-innovation is different from other highly innovative sectors such as ICT and biotech in that it is not built around a single technological platform. Examples from the interviews point to different technologies within the same subsector. Within water one SME might deal with small scale membrane technology for water filtration and another might deal with desalination of water. Within energy efficiency one might develop enzymes for chemical processes, another might produce LED lightning, another might produce energy efficient technology for refrigerators and yet another might develop smart grid solutions. These SMEs will face highly different markets and customers and the concrete challenges for the SMEs will be different even though they belong to the same sub sector. But even for SMEs that seem to produce the same type of products the challenges might be different. One investor gave the example of an SME they had invested in that produced small windmills to be put on the roof of buildings in order to utilise that the wind accelerates when it hits a large building and is pushed up over the building. As opposed to traditional windmills this new windmill is an unproven technology and the market and customers are completely different from traditional windmills. In reality there was very little to be learned of relevance to the new types of windmills from looking at traditional windmills.

For investors to have a good understanding of all markets is therefore a challenge. As a consequence some funds have selected areas within eco-innovation they specialise in. This is normally energy and a couple of other areas. All the funds and business angels except one which have been interviewed are focused on energy as one of their areas but it varies which other areas they cover.

At the same time, venture funds have more resources to do due diligence on individual investment opportunities and can take more risks than the banks. Therefore the interviewees seem to regard the challenges in understanding eco-innovation technologies and markets as less of a problem than the banks. Some venture funds like Emerald Technology Ventures, have investment teams that include specialists in different sub sectors and others, for example Northzone Ventures, have management teams with more general competencies but hire specialists to assist with the due diligence process.

This heterogeneity of eco-innovation also makes it very difficult to talk about general characteristics or general challenges for eco-innovative SMEs or for providers of finance. Still, interviewees point out that there are market features which are more pronounced for eco-innovation than other highly innovative sectors and which makes it a challenging sector to invest in. At the same time they pose more of a challenge for some types of eco-innovation than for others. The characteristics are summarised below.

6.2: Market Characteristics



Related to this is the fact **government regulation** plays a decisive role as **driver of demand.** Regulation can be a driver of demand by introducing new tougher standards for Co2 emission, clean water, energy use in housing, energy efficiency in transport or emission standards in manufacturing.

Some investors point to the **capital intensity** of some eco-innovations as a road block and something that sets eco-innovation apart. Some new technologies are so far from market introduction that the investment needed to get there is far larger than venture funds can accommodate. Therefore some funds have decided not to look at certain areas within eco-innovation. Instead they point out that other investors, either the state or large companies, must bring these types of solutions forward. This can for example be the case for **wave energy and bio fuels**. **Transportation** is also a sub sector dominated by investment from the large car manufacturers, energy companies and the state.

Eco-innovation is not the only sector which tends to be capital intensive. This is also the case biotech or life science. But investors point out that there are often exit points for the investors along the way if a new product looks promising. This is not yet the case for a technology like wave energy where the models are still quite far from being commercialised and it is still unknown whether the technology will ever become a new important type of renewable energy.

Some providers of finance also point out that they are more reluctant to provide finance if the market the SME target is dominated by **(public) monopolies and/or limited competition**. Alternatively they are run by the public sector using private companies to carry out some or all of the services required. **Energy generation, energy transportation, energy infrastructure, water filtration, water conservation, recycling and waste treatment are example of such areas**. This can influence the market dynamics in several different ways.

Many investors, especially those in countries with a strong tradition of public involvement in the economy, point out that if the market is still a (public) monopoly there is no competition and new business cannot attempt to do the same as the monopoly is doing. A start-up can still develop a new solution and become a supplier to the monopoly. In that way there might still be a market. However, the monopoly might have fewer incentives to introduce new risky solutions than in other sectors where competition is high. As long as the public monopoly can stay within budget supply security might be their main concern. They do not have much to gain through introducing new solutions but they have a lot to lose. This is different from other sectors where competition pushes businesses to constantly focus on improving in order to stay competitive.

Related to this is also another factor which sets some parts of eco-innovation apart and that is the low number of **potential customers**. This means that the SME is dependent on being able to convince one or two customers to buy their solution. This is generally the case for the same sub sectors as mentioned above where state monopolies do or used to dominate. Due to this some investors focus on **talking to the potential customers very early** in the development phase to clarify if they might be willing to buy the solution. They stress that it is always important to get feedback from potential customers but the fewer they are the more important it is.

Investors have also pointed out that eco-innovation is an immature sector **with unknown markets and business models**. Most investments have been made within the last five years and many funds and angel investors still have not exited their investments. Therefore it still remains to be seen which business models are the most profitable and if investments can generate the financial returns investors aim for. Other sectors like ICT, biotech, life science etc. are more mature. Many companies have been successfully exited and more is known about pros and cons of different business models.

While the risk is clearly lower for solutions that build on **proven technologies** and **target existing markets** it has also been pointed out that high growth and profits can best be achieved in uncontested markets (blue oceans) as opposed to existing market space characterised by tough competition and low profitability (red oceans).[62]

6.4 European eco-innovation investment market

The volume of venture capital directed toward eco-innovation is lower in Europe than it is in North America. This section seeks to understand whether or not financial actors consciously choose to limit investment in eco-innovation, or if the problem is unique to eco-innovation.

6.4.1 There is a lack of investment in eco-innovation across Europe

As shown in chapter 4, venture capital investments have increased from USD 0.4 billion in 2004 to around USD 1.6 billion in 2009. Thus investments in cleantech have quadrupled since 2004 and European funds focused on cleantech like WHEB Ventures, Environmental Technologies Fund (ETF), Capricorn Venture Partners, Demeter-partners, Emerald Technology Ventures, Carbon Trust Investment Partners, Low Carbon Accelerator, Ludgate Investment, GIMV and Set Venture Partners have emerged.

Based on data from Venture Source, Cleantech Group that the share of total venture capital investments in cleantech is around 20-25% globally, and historically Europe has been a bit higher than the overall global average. However, it is difficult to arrive at precise comparisons because methodology and definitions are slightly different between those who track venture capital deals.[63] Nevertheless, European venture capital investments in eco-innovation likely remain higher than in North America, where estimates range from 17-20 %. This should however also be seen in relation to the significantly larger size of the venture capital market in North America. Even though the share of venture capital invested in cleantech in North America is smaller than in Europe the total market is still larger, accounting for USD 3.6 billion or 64 % of total global cleantech investments.[64]

To conclude whether investments in cleantech in Europe represents an over or under investment would require a detailed analysis of the potential size of the cleantech market and the pipeline of cleantech companies which is beyond the scope of this report. However it can be concluded that venture capital investments have increased rapidly over the past 5-7 years.

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[62] W. Chan Kim and Renée Mauborgne (2005), Blue Ocean Strategy.

[63] Presentation by Andrew Thomsom of the Cleantech Group at the 9th ETAP Forum in Brussels. http://ec.europa.eu/environment/ecoinnovation2010/2nd_forum/presentations_en.htm

[64] Pricewatershousecoopers (2009). http://www.pwc.com/en_CA/ca/technology-industry/publications/calgary-cleantech-2009-10-en.pdf.

There is literature that indicates that venture capital investment market in Europe has scope for improvement. A recent survey from Norton Rose and Cleantech Investor looks at which region investors regard as generally offering the greatest incentives for cleantech investment. 42.6% point to Germany and 11.6% point to the UK. 15.8% point to US and 6.4% point to China. Combined, more than half of the respondents selected Europe as a whole as offering the greatest incentives for cleantech investment leading the survey to conclude that Europe in general offers the greatest incentives.

Despite this, many prefer to invest in the US. In the Norton Rose survey, 43.6% of the investors expect that the US will benefit the most from private equity driven cleantech investment. China is ranked second (19%) followed by UK (9.5%) and Germany (9%). The results leads the authors to conclude that the majority of respondents selected the US because of the number of cleantech investors and/or dedicated funds based in the US and because the country is seen as a safe investment home due to its perceived efficiency in deploying investment capital.

Altogether the survey conclude that the incentives to invest in cleantech in the leading countries in Europe are not matched by any other countries but that the maturity, availability of capital, and track record of investors in the US will trump the good conditions in the EU.

In 2008 Venture capital investments in Central and Eastern Europe accounted for EUR 186 million or 2.7 % of the total European venture capital market.[65] Most of the investments were made in Poland, Czech Republic, Hungary and Romania. As confirmed by chapter 4, investments in cleantech is limited in Central and Eastern Europe. In 2007 and 2008 the share of venture capital invested in cleantech was around 5 % of total investments.

6.4.2 Underinvestment is a general problem, but attention is needed for eco-innovation

Interviews with venture fund managers confirm that it has been increasingly difficult to raise finance for new funds. However, this has not only been the case for funds fully or partly dedicated to cleantech but for all types of venture capital funds. The investors in particular point to two reasons behind this. Firstly, the financial crisis has made capital a scarce resource in general. Secondly, venture capital in Europe has found it difficult to build a good track record and provide their investors with a return on their investments which can compete with alternative assets classes. This is aligned with the finding from the literature review that maturity and track record of the European venture capital market is a barrier when it comes to raising capital.

However, this is a barrier for venture capital in Europe in general and not a barrier which is specific to cleantech. The investors interviewed only invest in a very small proportion of the ideas they see but this is the same for all investments areas. There is little evidence to suggest that eco-innovation itself deters investment. However, the sector is at a disadvantage due to the target market. When asked if access to venture capital was more difficult for cleantech companies than other highly innovative companies, most investors said that access to finance was difficult for eco-innovative SMEs due to the market characteristics. **As mentioned in section 6.3, cleantech is a difficult sector to invest in but it is also a sector that currently attracts a lot of attention due to the perceived great market opportunities in the future, especially in areas related to energy. Nevertheless, investment is currently at a level that is below socially-optimal levels due to market failures, such as the well-known 'double externality problem' (see section 6.3.1).**

On the under-investment in Eastern Europe the providers of finance in Poland and Czech Republic mainly pointed out that the capital markets are in general less developed than the most advanced markets in Western Europe and the lack of tradition for making high risk venture capital investments. They also point out that the venture capital industry is less mature and the fund managers less experienced. In many cases the fund managers are managing their first funds and gaining their first experiences with venture capital investments. They are first generation funds and fund managers.

[65] EVCA (2008). Special Paper on Central and Eastern Europe Statistics.

This also means that their investments often are less risky and with lower return on investment potential. In several instances in Poland venture capital funds have for example invested in project developers who establish renewable energy parks. These are investments in proven technologies and not development of new technologies and are in Western European countries not regarded as an area for venture capital investments.

EU is currently supporting the creation of a venture capital industry in Central and Eastern Europe and improvements are expected in the coming years. In Poland, for example, several new early stage venture capital funds are currently being set up, many with EU Structural Funds resources invested through the National Capital Fund, and around EUR 250 million is estimated to be made available to Polish early stage companies over the coming years.

6.5 Supporting eco-innovation

This section looks at elements that could increase the supply of funding to eco-innovative SMEs. The section relies on input from literature, SMEs as well as financial actors. Specifically, the section seeks to identify specific actions that favour investment in eco-innovation.

6.5.1 Investors' views of support measures for eco-innovation: consistent and comprehensive approaches required

The literature contains several surveys of investors that have examined what policies would increase supply of eco-innovation funding. A survey conducted at Jefferies' 8th Global CleanTech Conference in December 2009 with more than 200 participating institutional investors representing over USD 400 billion of assets under management found that the most important issues were important as continued government subsidies and a general recovery of the financial markets.[66]

The already mentioned study by Norton Rose and Cleantech Investor[67] illustrate how public subsidies are a driver and a risk at the same time because regulation creates opportunities but also pose a risk. The majority of investors (37.7%) selected the impetus of political and regulatory support as the most important driver supporting long-term growth in the cleantech investment sector. The same investors pointed to change of government agenda and market shift in focus as the single biggest risk factor in the development of the cleantech sector in attracting investment.

A 2009 Deloitte survey on global trends in venture capital shows that VCs are looking more to government investments and incentives.[68] A majority of the 725 VC investors surveyed think that one of the most important actions governments could take is to **motivate institutional investors to invest in VC**. This is also the main message of the Eurosif study on VC4S, urging an increase in institutional investors' allocating capital to the VC4S space in order to help VC4S to grow as a component of the overall VC market.[69] Eurosif specifically mentions European pension funds and foundations as they have a long-term orientation. The need to attract long-term oriented investors was also noted at a 2007 conference on "Financing eco-innovation in Central and Eastern Europe".[70] The Jefferies survey also mentioned in the beginning of this chapter showed that institutional investors view **government subsidies** as being crucial to the cleantech sector.[71]

[66] http://www.tradingmarkets.com/.site/news/Stock%20News/2741997/

[67] http://www.nortonrose.com/knowledge/publications/pdf/file30016.pdf?lang=en-gb

[68] Deloitte (2009)

[69] Eurosif (2007)

[70] Regional Environmental Center (2007)

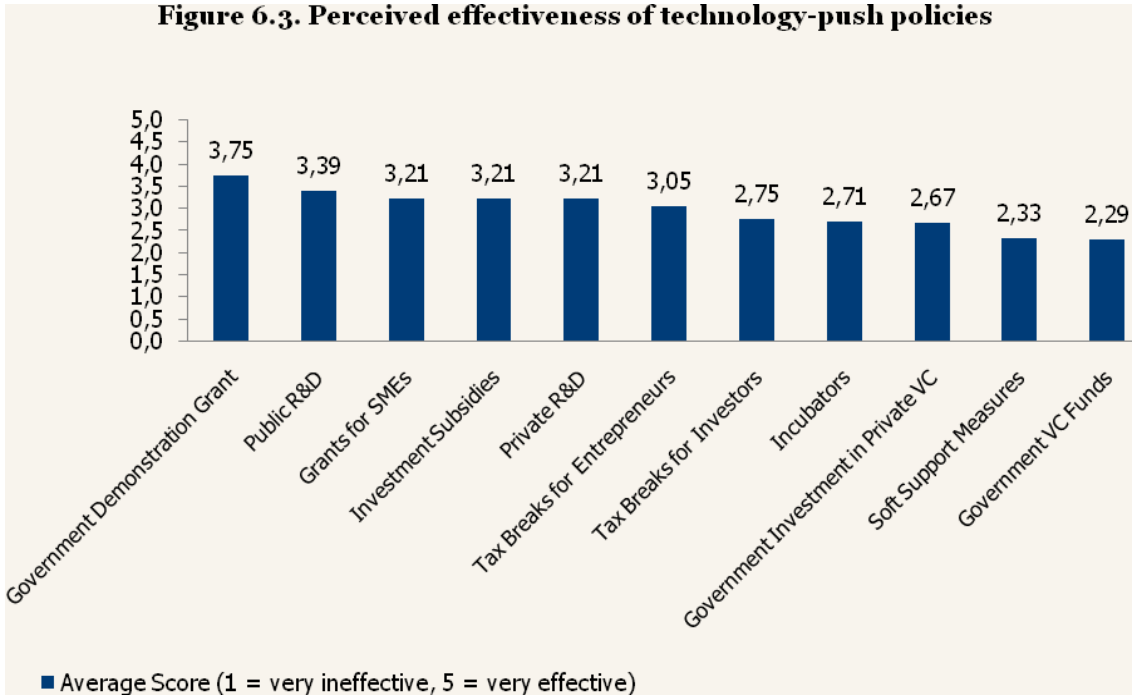
[71] Jefferies (2009)

A study in the journal *Energy Policy* in 2009 looks in more detail at what kind of public policies institutional investors are looking for. It is a survey on the policy preferences among 60 private equity and venture capital investors in renewable energy. Even if the study is focused on renewable energy, the results might give some hint as to which policies would be preferred with regards to eco-innovation in general. The researchers conclude that "several market-pull and technology-push policies were rated highly effective showing that **adequate policy indeed does increase private equity fund managers' interest to invest in new clean energy technologies**."[72] The best technology-push policy considered was government demonstration grants, while the best market-pull policy considered was feed-in tariffs.

The researchers also note that investors also agreed that a **mix of policies** was needed, that technology-push and market-pull policies were complimentary, and that the most important aspect of policy was that it should be **consistent** and that political risks to financiers should be reduced by **long-term strategies**.

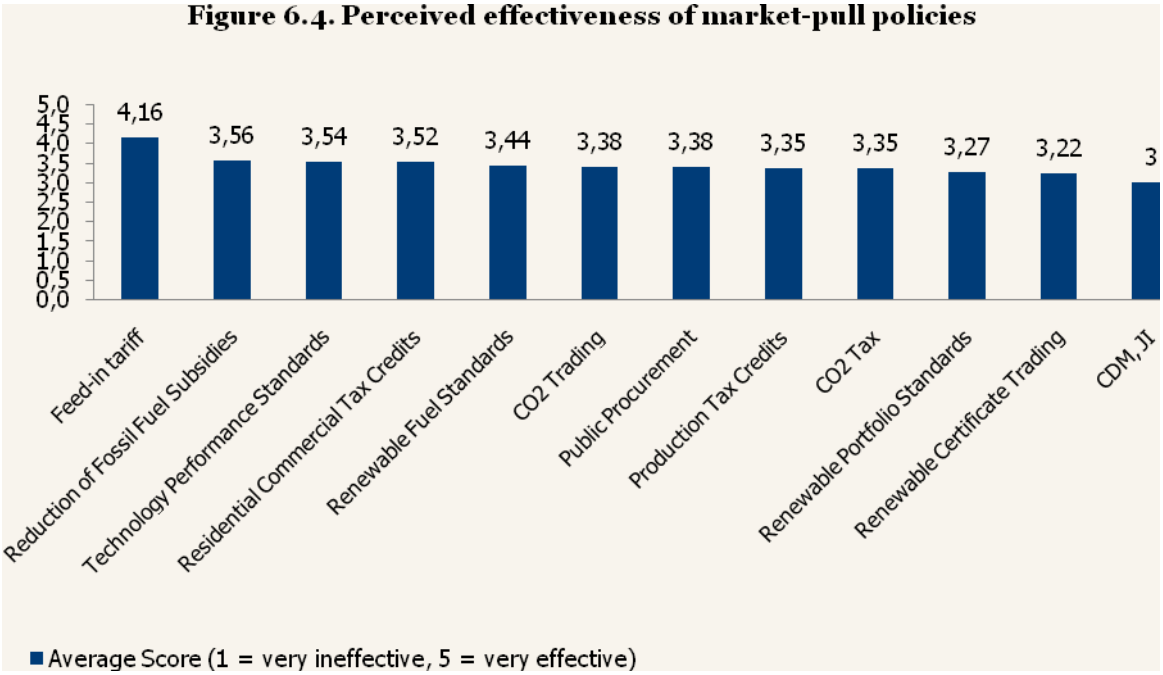
The graphs below show the assessment of different renewable energy policies by venture capital and private equity investors in the survey.

Figure 6.3. Perceived effectiveness of technology-push policies



Source: Bürer & Wüstenhagen (2009)

[72] Bürer & Wustenhagen (2009)



Source: Bürer & Wüstenhagen (2009)

In relation to this study it is worth noting that elements such as feed-in tariffs and reduction of fossil fuel subsidies are rated as more important than investment subsidies and tax breaks for investors.

At a DG Enterprise and Industry workshop on seed finance for eco-innovative SMEs workshop participants concluded that the most important issue for policy makers to facilitate flows of finance to the relevant companies is the **creation of secure markets**. One way to finance high growth markets in eco-innovation is to identify lead markets which can potentially reduce the risk to the supplier of eco-innovation and therefore also to investors. The public sector can thus help creating the conditions for eco-innovative products to penetrate the market through e.g. **public sustainable technology procurement**.

A study by Eurosif on venture capital for sustainability (VC4S) – thus looking at a broader area than only eco-innovation - urges an increase in institutional investors' allocating capital to the VC4S space in order to help VC4S to grow as a component of the overall VC market.[73] Eurosif specifically mentions European pension funds and foundations as they have a long-term orientation. The need to attract long-term oriented investors was also noted at a 2007 conference on "Financing eco-innovation in Central and Eastern Europe".[74]

6.5.2 Investors have mixed views on European instruments

Many of the financial actors interviewed have pointed out that instruments in order to be relevant must be **easy to apply for, easy to administer, based on general principles as opposed to individual assessments of applications for financing, transparent and simple**. If this is not the case banks, business angels and venture funds will opt not to use them.

[73] Eurosif (2007)

[74] Regional Environmental Center (2007)

This has specially been brought up in relation to EU programmes which have been critisised for being bureaucratic, burdensome and slow. Investors are often not aware of the difference between grant programmes and financial instruments. The granting instruments are tied to significantly tighter control mechanisms given that money does not need to be paid back.

Some investors described the process of applying for the grant programmes and administering grants received under the programmes as being unduly **bureaucratic**. It takes considerable resources to apply for such programmes as the Seventh Framework Programme (FP7) and they are therefore not regarded as targeted at SMEs which do not have the substantial amount of resources required manage an application. Some programmes are thus characterised as being for "the **large and already successful corporations**," as one investor expressed it. This same investor suggested that EU support serves to entrench the positions of some financial actors over others, which runs counter to the aim of creating innovation in the system.

Others have emphasised that the financial instruments must be **flexible** and fast in order to be relevant. Financial actors compete for the best early stage eco-innovative SMEs. If they come across an attractive early stage company looking for funding, they want to be able act quickly. Public funding schemes where the investor has to obtain co-funding of each deal or similar are therefore not regarded as an attractive option. One business angel in France, for example, decided not to accept co-funding from EU structural funds because co-funding would be provided in relation to each deal in the investment portfolio, and each would take 6 week to assess.

The criticism from investors are supported by the findings from the SME survey where **lack of information about financing options, few resources available to seek financing and administrative burdens** in relation to seeking finance are among the most significant barriers.

6.5.3 SMEs' views: Financing system not aligned with eco-innovation

As mentioned in section 5.1 the SMEs rank *financing available not tailored to small-scale investment needs, potential financial suppliers insufficiently engaged with eco-innovative industries and uncertainty of government regulation* as the three most significant barriers. Thus according to the SME small scale financing opportunities, better engagement with the financial community and certainty of government regulation would improve access to finance. These sources of uncertainty drive the continued ambiguity of perspectives on European financing instruments. One recurring theme that surfaced in interviews with SMEs is that there is a secondary industry of consultants that has developed to link companies to European-level programmes. This is related to two characteristics of the European-level instruments, as perceived by those interviewed for the present project: complexity and lack of awareness.

Based on the interviews, there is a distinct lack of awareness of European financing instruments among eco-innovative SMEs. An improvement would be to increase visibility, many entrepreneurs have no idea what kinds of instruments there are, in particular on EU-level. On national level, there should be better ways to announce the launch of a new subsidy program, often the limited visibility impacts on the ability of enterprises to be aware and participate.

In communication about financial and other instruments there has to be clarity about which enterprises come into consideration for certain instruments, grants and subsidies. Some instruments are also very broadly defined, for some instruments this is not a problem. However for some enterprises, for example, eco-innovative start ups, the investments of applying for a grant or subsidy simply are not worth the effort if chances of actually receiving it are low. For this group, more specific instruments could be more effective, if combined with adequate information. This is linked to the role that consultants have come to play in the system.

Consultants are one type of intermediary in the link between the companies and European financing programmes. In the cases where other types of intermediaries are mentioned, such as public-backed business incubators, the experience has been positive. These intermediaries are able to bundle together financing,

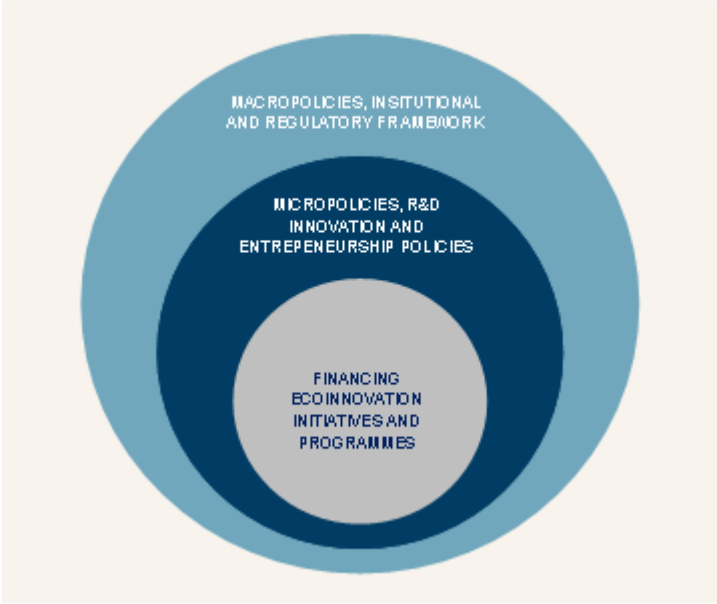
advice, and investment readiness programmes. One SME suggested that an **interactive website** where enterprises can fill in their characteristics, development stage and reason for seeking finance, could guide them to the most appropriate sources of finance or subsidy. This would eliminate the need to fall back on expensive consultants and intermediaries.

Another topic that was commonly cited related to the length of time it takes to obtain financing through public financing instruments. According one SME, both European and national grants and subsidies would be more effective for early stage eco-innovative enterprises when throughput time can be shortened significantly and procedures simplified. An initial step could be to select promising early stage enterprises based on a very short application, a pitch, so enterprises that are unlikely to receive a grant beforehand, as well as their examiners, do not invest time and effort in a process that is likely to lead to failure. According to this same SME, efficiency, flexibility and throughput time could also be enhanced by working more in stages and providing smaller amounts of money in a faster pace per stage.

6.5.4 Holistic approach to supporting eco-innovation are required

The proposals and ideas for how to improve eco-innovation funding that have emerged as part of the field work can be divided into three levels. One set of ideas addresses **policies at the macro level such as the institutional and regulatory framework** for the EU and member states. Another set of ideas address **micro policies and focus on R&D policies and innovation and entrepreneurship policies**. A third set of ideas are targeted at specifically at financing eco innovation instruments.

Figure 6.5. Three policy levels to address to improve access to finance for eco-innovative SMEs



Source: Oxford Research, 2010

It was pointed out by interviewees that **all three levels must be addressed at the same time and that favourable framework conditions** must be created at all three levels. It does not produce the desired results to introduce programmes and initiatives to improve access to finance if the regulation surrounding eco-innovations is not efficient and does not support the development of eco-innovations or if the innovation and entrepreneurship eco-system does not work.

6.5.5 Macro level policy instruments – institutional and regulatory framework

The interviews with providers of finance confirmed the findings from the literature that government regulation and subsidies are seen as key drivers of eco-innovation and access to finance. Several of the interviewees pointed out that to improve access to finance, policy makers should start by taking a broad look at the overall regulation of society and the environmental sector and not focus exclusively on financing instruments.

One investor pointed out clearly the need to set appropriate framework conditions in addition to providing financing to eco-innovative SMEs, stating, "The overall driver of the market is money. Therefore, if you can make it profitable to invest in eco-innovation more money will automatically be made available and access to finance will be improved. This can be done by looking at the regulation of the sector. Subsidies to eco-innovations, regulation that drives demand and pricing of conventional solutions which reflect the harm to the environment they cause".

The interviews also confirmed that it is crucial that the regulation is stable. Investors make investment with 5-10 years time horizon and therefore look for stable regulation that does not eradicate the profitability of a new solution before the investment can be exited.

Another policy tool of similar nature is so called "smart regulation" which many countries currently are considering. The idea is to set specific future **targets for sectors in order to increase demand for new improved solutions and thereby foster innovation**. Targets for the reduction of greenhouses gasses and use of renewable energy is the best known example but standards for energy efficiency in buildings has alos been highlighted as an area where regulation has been used successfully to drive innovation.

Deregulation and privatisation of markets is also seen as a key regulatory instrument to encourage innovation. Sub-sectors in some countries are still mainly operated by public authorities and others are dominated by a few large companies which are often former public monopolies. Thus, some investors feel that greater competition would improve the speed and implementation eco-innovations.

6.5.6 Innovation and Entrepreneurship policy reforms

Some financial actors pointed out that access to finance is related to access to a good deal flow for investors and thus a **well-functioning entrepreneurship eco-system** is important. The logic is that if the EU in general can produce more and better qualified entrepreneurs with more good ideas, then there will also be more and better qualified entrepreneurs and a better deal flow available within eco-innovation.

The **ability to commercialise R&D from European universities** has been pointed out as a key issue by investors during interviews. Therefore **increased focus on commercialisation efforts** and framework that gives universities and researchers **incentives to commercialise research** is important.

The ability to commercialise research is often highlighted as a general problem for Europe. Since aspects of eco-innovation are derived from technical fields and cutting edge research, commercialisation of university-based research is seen by some as an issue of special relevance to eco-innovation. However, not all the investors interviewed agree that the problem is worse for eco-innovation than other highly innovative sectors.

Increased efforts to **promote a culture that supports entrepreneurship** in the EU in general is another issue raised by several interviewees. In many countries, entrepreneurs are still regarded with some scepticism and the citizens of many countries value employment over entrepreneurialism. While some countries might glorify the traditional independent small merchant, policies to leverage innovative entrepreneurs for job creation and growth are lacking. In relation to this, the **introduction of entrepreneurship in schools** is pointed out as an effective means to change the culture

Last but not least, several of the people interviewed have pointed out that the ***de minimis* rules are a hurdle for start ups**. State aid rules, to which the *de minimis* rules belong, were established by the Commission to "avoid Member States getting locked into a contest where they try to outbid each other to attract

investment."[75] Under the rules, MS are able to provide state aid in the form of grants, subsidies, preferential financing conditions that foster growth of companies or industries, and other advantages up to the value of EUR 200,000 for a three year period. If a company receives state aid from several sources, the state aid cannot total more than 200,000. Under the *de minimis* rules, Member States may grant aid to a company of up to EUR 200,000 over a period of three years, without notifying the Commission.

Some financial actors, especially those in direct contact with public programmes, state that the process for assessing compliance is so difficult that many SMEs do find that the benefits of the programme outweigh the costs. This has also been pointed out in relation to non-profit organisations in that they often received some support from the state but it can often be difficult to judge if this shall be counted as state support. Moreover, the state aid received through a debt risk sharing finance instrument – called the state aid equivalent – must be added to state aid received already by the eco-innovative SME. This creates a risk that eco-innovative SMEs are not eligible for risk sharing finance instruments because they have already used their state aid quota. As it is today, the *de minimis* rules can limit access to risk sharing financing instruments because the small innovative SMEs are under the same restrictions as large SMEs.

6.5.7 Financing Eco-innovation mechanisms and initiatives

The main focus of this report is on financial instruments directly related to financing eco-innovation and will be examined in the following section. Many issues in relation to eco-innovation are generic, some are unique to the sector. Some barriers can therefore be addressed through generic programmes, if relevant with a special allocation to eco-innovation, and some might be addressed better through risk-sharing arrangements tailored to the specific challenges of eco-innovation. More detailed proposals are found in Chapter 7, which offers a range of recommendations related to the financing system.

Access to debt financing is mentioned by several providers of finance as a challenge for eco-innovative SMEs. As already mentioned representatives from the banks focused on sustainability have pointed out that banks are often reluctant to provide debt financing to an emerging sector like eco-innovation that they might have limited knowledge of the sector and little history and statistics to base their risk assessment on. If a bank can assess the risk related to a loan application they are inclined to turn it down. Even though this is a challenge for eco-innovative SMEs in general it is considered by some providers of finance as bigger challenge for eco-innovative SMEs because the banks are more familiar with sectors like ICT or biotech than eco-innovation. Subsectors like energy and organic farming have been around for longer than most types of eco-innovation, and are familiar sectors to some banks.

The difficulty obtaining debt finance is supported by the interviews with venture capital fund managers and business angels. They also underline that it is often difficult for their portfolio companies to obtain debt financing when they reach a stage where they need working capital. They also find that this is due to limited familiarity with eco-innovation and a lack of understanding of the new solutions and markets.

In order to increase access to debt financing the banks interviewed points to risk sharing instruments in order to allow them to share the risks with public authorities. However, they also point out that they will never be able to take the risks that venture capital funds take and that they cannot provide risk capital.

Several interviewees from **venture capital funds and business angels** have pointed to co-financing measures as a relevant instrument to improve access to finance.

Business angels interviewed for this project call for co-financing mechanisms to increase investments from Business Angels. The High Growth and Innovative SME Facility (GIF) has an envelope for co-investing in funds and other investment vehicles promoted by business angel networks. However, despite the demand

[75] Europa Press Release on State Aid rules:

http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/06/482&format=HTML&aged=1&language=EN&guiLanguage=en

voiced by business angels for such an instrument, it is currently not used. A revised version of the current instrument is therefore in demand.

The European Investment Fund plays an active role as fund-of-funds and has invested in several cleantech venture funds. While the role of EIF is highlighted for its positive effect on the financing system some investors have suggested a broader range of co-financing mechanisms.

One of the concrete proposals to emerge from the interviews with venture capital fund managers is to give early stage eco-innovative SMEs access to guaranteed **loans to leverage equity investments** from venture capital funds or business angels. The British Capital for Enterprise is an example of funding mechanisms that builds on these principles.[76]

Another suggestion is to **replicate the American SBIC programme** where early stage venture funds can obtain a state guaranteed loan to supplement the private capital raised. SBIC is a fund-of-funds instrument which leverages private investments from investment funds (called Small Business Investment Companies) in SMEs. The SBA does not make direct investments. The Small Business Investment Companies are in reality investment funds managed by experienced management teams that in turn invest in SMEs. The capital invested under the programme is raised by the SBA through the sale of state guaranteed debentures to private investors in the public markets. In reality the programme is therefore an opportunity for investment managers participating in the SBIC program to leverage their own private investment capital with funds borrowed at favourable rates through the federal government. This helps distribute risk across a larger number of participants while increasing the pool of investment funds available. It also places decision-making under experienced private-sector investors who are incentivised to invest carefully, as their own resources are being leveraged.[77]

Tax instruments have been pointed out by banks, business angels and venture funds as an effective instrument to improve access to finance for eco-innovative SMEs. However, tax is not regulated at the EU level and is therefore less relevant to the study. Still, the ideas related to tax that have come up as part of the interviews are presented below.

In the interviews, several investors have expressed a belief that finance will be made available to eco-innovative SMEs as long as the return is comparable to what investors can get from other investments. Tax is a direct, fast and highly visible way to regulate the return on the finance provided.

Business Angels point out that tax deductions could encourage more wealthy individuals to become business angels. France has introduced a 75% tax deduction on wealth tax for wealthy individuals who invest in SMEs. This has generated a large inflow of capital to the early stages of the venture capital markets. Total venture capital investments generated by the tax deductions are estimated to be around 500 million euros.

Venture funds also point to tax deductions as a way to increase access to finance. If investors in venture funds get a preferential tax treatment, they would be more likely to invest in venture funds.

The issue of how to improve access to finance for eco-innovative SMEs is explored further in the concluding chapter.

[76] See British Capital for Enterprise homepage: http://www.capitalforenterprise.gov.uk/

[77] The Urban Institute (2008) Evaluation of the Small Business Administration's Loan and Investment Programs: http://www.urban.org/projects/sba/

6.6 Subsector differences across eco-innovation

This section outlines the evidence available to discern differences in access to financing across sub-sector of eco-innovation. The chapter finds that while there is some anecdotal evidence that there are differences according to subsector, the heterogeneity of the technologies and innovations as well as the lack of firm categories results in differences being blurred. Indeed, subsectors within eco-innovation are not as clearly delineated as in other innovative fields.

As pointed out in chapter 4 most venture capital investment is made in energy generation and energy efficiency. Other sectors receive little attention in comparison. However, it is difficult to say whether this is due to little attention to these sectors from investors or whether it is due to little opportunities and few start-ups in these sectors.

According to the recent survey from Norton Rose and Cleantech Investor the focus on energy generation and energy efficiency is likely to continue.[78] In the survey 446 respondents comprising cleantech investors, cleantech companies and experts were asked to give their view of the future developments within cleantech. Around 705 of the respondents where based in Europe. The investors were asked which three sub-sectors of the cleantech market they see as being the most likely beneficiaries of investment over the next 18 months. Energy efficiency was ranked as most likely to benefit from investments being selected by 77% of respondents. Energy generation was selected by 73.7% of respondents. Energy efficiency and energy generation were followed, at some distance, by waste recycling (32.4%), energy storage (29.1%) and water (24.4%). All of the remaining sub-sectors were chosen by less than 20%

Subsectors within eco-innovation vary according to capital intensity and developed knowledge base. This is often seen in **renewable energy** but can also be present for teams from **transportation, water and new materials**. This is not unique for eco-innovation since other areas like biotech is also very research focused but it is different from such industries as ICT and other technologies, where the commercial skills are often much stronger.

Eco-innovation is not the only sector that tends to be capital intensive. This is also the case biotech or life science. But investors point out that there are often **exit points for the investors along the way** if a new product looks promising. This is not yet the case for a technology like wave energy where the models are still quite far from being commercialised and it is still unknown whether the technology will ever become a new important type of renewable energy.

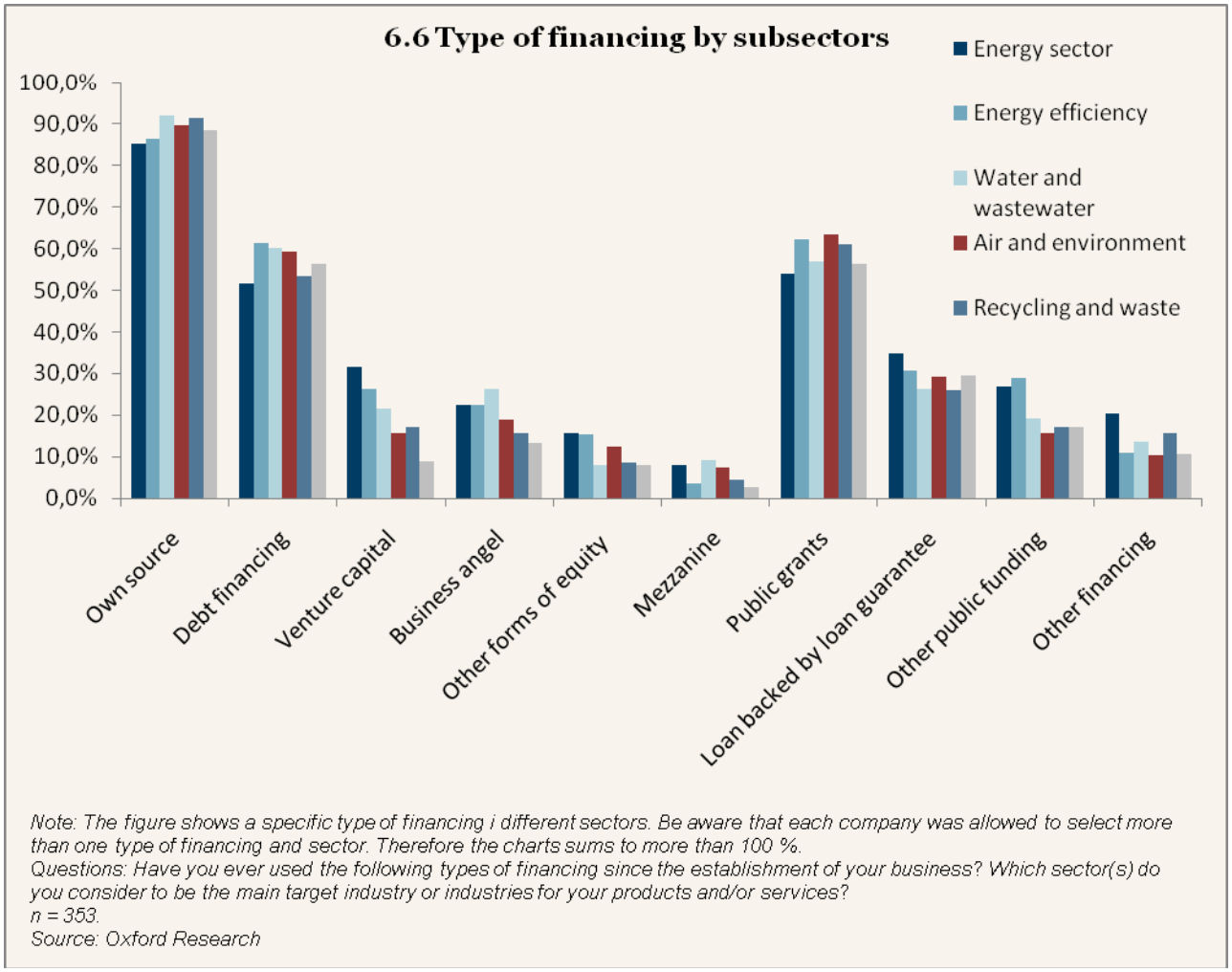
Many new solutions compete against **conventional technologies that are not priced according to their total cost** because the pollution they create is not or only to a limited extent included in the price. Therefore new solutions compete against solutions which are "too cheap" because the negative externalities they generate are not reflected in their price. This is especially true for **energy, transportation, agriculture, air and environment, recycling and waste**.

6.6.1 Subsector differences are present but are neither clear nor consistent

Figure 6.6 shows the different types of financing used to finance SMEs according to which sectors they target. There are only minor divergences between the sectors and their type of funding. For example, own source provide between 85 percent and 92 percent of businesses with funding across the different sectors. However, there are a couple of digressions. Venture capital for building and construction only comprises 9 percent, while it for the energy and energy efficiency is above 25 percent. This is not surprising since ven-

[78] Norton Rose and Cleantech Investor (2010). Cleantech investment and private equity: An industry survey.

ture capital data also shows that the largest portion of venture capital go to energy related sectors.[79] The interviews with investors have also confirmed that almost all investors have a strong or partial focus on energy and energy efficiency while building and construction was not among the focus areas pointed out.



Note: The figure shows a specific type of financing i different sectors. Be aware that each company was allowed to select more than one type of financing and sector. Therefore the charts sums to more than 100 %.
Questions: Have you ever used the following types of financing since the establishment of your business? Which sector(s) do you consider to be the main target industry or industries for your products and/or services?
n = 353.
Source: Oxford Research

The underlying subsectors that comprise eco-innovation exhibit market characteristics that influence the opportunities for investment in eco-innovation. It should be noted that the field work research conducted focused heavily on uncovering these sector differences. Ultimately, the interviews revealed characteristics but clear and systematic differences are difficult to obtain, for several reasons. First, as was explained by at least two venture funds, even within subsectors the eco-innovations are very difficult to categorise. For example, in manufacturing the innovation could be a cleaner and more efficient process, the application of a new technology, or a new business model. And even when the product is a technology aimed at achieving the same goal, the innovative nature of eco-innovation means that technologies can be very different from one another. For example, one venture fund pointed to recycling, where there are a number of 'low-tech' and 'high-tech' approaches to the extraction of precious metals from electronic components. Categorisation of these differences is not clear-cut.

Eco-innovation is different from other highly innovative sectors such as ICT and biotech in that it is not built around a single technological platform. Examples from the interviews point to different technologies within the same subsector. Within water one SME might deal with small scale membrane technology for water filtration and another might deal with desalination of water. Within energy efficiency one might develop enzymes for chemical processes, another might produce LED lightning, another might produce energy efficient

[79] Please refer to the data presented in the literature review for a distribution of VC investments on sub sectors.

technology for refrigerators and yet another might develop smart grid solutions. These SMEs will face highly different markets and customers and the concrete challenges for the SMEs will be different even though they belong to the same sub sector. But even for SMEs that seem to produce the same type of products the challenges might be different (see also section 6.3.5). While the survey was not able to identify clear differences across the various subsectors of eco-innovation, the interviews pointed to several qualitative difference in the underlying market characteristics of each subsector that would likely act as barriers to investment. These differences across subsectors were outlined in section 6.3.2.

6.7 Barriers to investment: Characteristics of SMEs and underlying market

This section examines the barriers to investing in eco-innovation. Specifically, this section draws on evidence derived from literature and field research to determine the reasons why financial actors avoid providing financing to eco-innovative SMEs.

6.7.1 Business competence continues to be a barrier

Experts at a DG Enterprise and Industry workshop on access to finance for eco-innovative SMEs noted a barrier relating to the fact that there may be **too few good projects to invest in**. If new entrepreneurs want to raise finance for a company, they need to build robust business plans making the link between technology and business development. From investors' view point, poor risk assessment and management and its impact e.g. on the financial continuity within the firm's R&D process play a large part in preventing companies bringing their products to the market. This is particularly the case for exchanging IP and/or a share in the company for financial backing little attractive.[80]

The article on "The emergence of green venture capital" from *Business Strategy and the Environment* supports this view as the authors identify **the lack of a 'good' business plan** as a central barrier to funding for eco-innovative SMEs.[81] According to some venture capitalists, funding for start-ups is often refused because entrepreneurs submit a 'bad' business plan. For venture capitalists, a 'bad' plan reflects an incomplete or inconsistent business concept, a lack of essential data (e.g. expected revenues), or too much irrelevant data (such as an overemphasis on world environmental problems). This is supported by the British Forum for the Future report "Clean Capital – Financing clean technology firms in the UK", saying that many cleantech firms tend to **emphasise environmental advantages instead of focusing on a sound commercial case and potential returns**. Venture capital investors are driven by return and any environmental arguments are an add-on.[82] This is the case also for investors with an explicit focus on sustainability and environmental responsibility.

Furthermore, according to the *Business Strategy and the Environment* article, venture capitalists have the opinion that eco-entrepreneurs lack the business skills, such as marketing, management or financial competences, which are necessary to run their businesses.

Contrary to this view, the Eurosif study on VC4S finds that the surveyed investors had largely found adequate deal opportunities where to place their capital. However, the report notes, it will be interesting to gauge whether the expected growth of available capital will result in too few deals where to place it.[83]

[80] DG Enterprise and Industry (2007)

[81] Randjelovic et al. (2003)

[82] Chapple et al. (2007)

[83] Eurosif (2007)

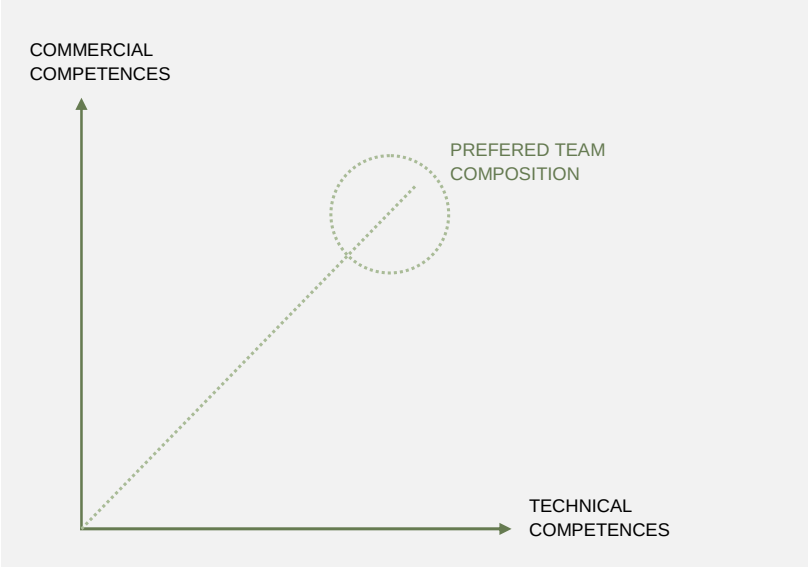
6.7.2 SME characteristics and composition influence investment decisions

The venture fund looks for **teams** with a diverse background, including both technical skills and commercial skills. These teams are often hard to find.

In eco-innovation new solutions are often very technical and sometimes developed by people with a research background. For these types of businesses, commercial skills are often a weakness. As was explained in section 5.6.3., there is some disagreement about the extent of the problem or whether eco-innovation tended to be more often characterised by a lack of business competence than other fields. Nevertheless, business competence is a fundamental pre-condition for investment and the lack of business competence was frequently mentioned as a potential barrier to investment in eco-innovation.

Having said this, the venture funds interviewed had different views on how easily commercial skills can be added to the team if they are not present initially (see section 5.6.3). Some funds put strong emphasis on the team and others put more emphasis on the solution and are willing to invest as long as the founders are willing to bring in people with commercial skills. However, all of the venture funds and business angels interviewed as part of the field research agree that it is important to have a mix of commercial and technical skills as the business develops.

Figure 4.2 Preferred team composition



Source: Oxford Research 2010

In addition, some of the larger venture funds state that they often look at whether the teams are well connected in the sector. If not, the venture funds consider whether their own network can be brought in to make up for the entrepreneurs' lack of a network.

6.7.3 Factors that discourage investment

Again, as it is difficult to be precise about the differences between markets due to the heterogeneity of eco-innovative fields and solutions, the field research has focused on the market characteristics (presented in section 6.3) To sum up the risk associated with an investment is in general lower if an innovative solution is characterised by:

- Low capital intensity
- Short time to market

- No dependency on regulation or subsidies
- Known market and proven technology
- High degree of competition among customers
- Many potential customers

Therefore an SME with a new solution that has these characteristics will have a better chance of obtaining finance than a solution that has the opposite characteristics if the likely return on investment of the solutions is the same. This is true for all sectors but due to the nature of eco-innovation these dimensions have been pointed out as being of particular relevance. **It appears that the market structure works against eco-innovative SMEs. When combined with a lack of business competency, these market structures discourage investment in eco-innovation.**

6.8 Deal flow constraints: lack of information and commercially-oriented eco-innovation

This section examines the quality of the deal flow for investors, which is a proxy of the underlying innovation system that produces investment opportunities for financial actors. The section seeks to understand if problems in the financing system are merely reflections of an underlying problem in the innovation system that manifests itself in a reduced level of investment.

6.8.1 Lack of ideas and entrepreneurialism is not the source of low investment

As mentioned, a survey conducted by the European Private Equity & Venture Capital Association (EVCA)[84] in 2007 revealed that deal flow was not a major barrier to investment in eco-innovation. The survey asked respondents who had not invested in environmental technologies about their absence from the field. Only 5 % stated that they did not see enough business potential in the field. Supporting this view, the Eurosif study on VC4S finds that the surveyed investors had largely found adequate deal opportunities where to place their capital. However, the report notes, it will be interesting to gauge whether the expected growth of available capital will result in too few deals where to place it.[85]

The Norten Rose survey[86] asked the following question to 205 active investors in the cleantech the following question: What do you regard as the single biggest risk factor in the development of the cleantech sector in attracting investment? The responses indicate that neither the number of investment opportunities nor the availability entrepreneurs acted as risk factors in cleantech. The responses are as follows:

- Competition from oil and other established energy companies (12.3%)
- Number of investment opportunities available (5.7%)
- Lack of entrepreneurs (4.3%)
- Lack of genuine technological experience in the industry (8.1%)
- Stability of the technology not being proven (20.9%)
- Change of government agenda and market shift in focus (40.3%)
- Other (8.5%)

[84] EVCA Barometer Issue 49 (2007)

[85] Eurosif (2007)

[86] Norten Rose. 2010. Cleantech investment and private equity: An industry survey

It could be that gaps in information explain, in part, some of the limited identification of potential deals. A recommendation from the DG Enterprise and Industry workshop relating to this issue is to create for investors and potential investees a new **information portal** or central internet data base to have access to thorough analyses related to eco-innovation issues.[87] A pilot survey of potentials and barriers of SMEs' eco-innovations development in the Czech Republic also suggests that a common platform is created as a contact mediator between eco-innovative companies and VCs as well as a platform for dialogue between companies, public services, and other actors of the eco-innovation environment.[88]

6.8.2 Distortions in the deal flow: continued lack of market orientation within eco-innovation

Some business angels and venture capital funds point out that the problem of deal flow is affected by the **wide availability of public grants** to research, development, demonstration and commercialisation. This means that many solutions can advance very far in the development of new solutions before they need private finance. Therefore, the focus on research is not combined with a strong commercial focus until quite late in the development. According to some venture funds, especially in such countries with well-financed research as France and the Nordic countries, the availability of public grants can shield some researchers from developing a market orientation to their research. Thus, some innovations are technically advanced but lack a target market. This can, in some instances, defer business angels and venture capitalists to invest.

Some business angels and venture capital funds also point out that the availability that public money means that the teams behind are not as committed as if the founders have invested their own money. Some investors believe that "soft money creates soft companies" and avoid investing in these types of companies. This "soft companies" effect is perceived to be common to sectors where public funds are used to support start-ups. However, there is a perception among those interviewed that is more often seen in eco-innovation because there is more public money than in most other sectors. As was pointed out by all business angels, the field is becoming much more popular now than it was even five years ago, and the level of public funding appears to be increasing as public authorities begin to couple eco-innovation with economic growth initiatives. One business angel in France mentioned that the amount of money being injected into the eco-innovation venture market was more than the underlying innovation system could manage and that, from the perspective of this business angel, diminishing returns to public funding were beginning to set in. He pointed to anecdotal evidence, such as a colleague who moved to Germany because of the wider set of opportunities to identify high-growth companies.

On the topic of information and the identification of potential investments, a Spanish investor stated that a major barrier had to do with the organisation of the industry. Specifically, information networks are loosely developed in some countries and it is difficult for investors to identify potential eco-innovators. This is especially difficult in eco-innovation because many companies tend to be very small organisations and the innovations themselves come from a variety of fields. There is a high burden on both the investors and the SMEs to establish contact with each other. The Spanish investor recommended establishing a **searchable web portal** that would allow companies and investors to find each other. The portal would reduce costs and provide a standardised template upon which SMEs could present their information, and this template would be based on investors' information needs.

The naivety of certain SME management team is also a concern. There is a difference between being naive and being ambitious, management teams need to understand that there technologies cannot instantly revolutionise the way things are done. They must be aware that this takes time and money. Therefore, many SMEs do not have a logical commercial plan, which more generally deters investments. The testing of technologies is very important to try and predict commercial cycles.

[87] DG Enterprise and Industry (2007)

[88] Integra Consulting Services s.r.o. (2008)

Also, some venture funds and business angels state that improvements in the entrepreneurial culture in Europe are needed. One weakness in the field is the ability to commercialise. This can be brought forward by introducing entrepreneurship in schools and improve commercialisation from universities, especially the role of technology transfer offices located at major research universities.

One major promotional bank indicated that for every hundred applications received, about ten will be appropriate for a loan. To improve the quality of the sector and increase the deal flow, there is a need to learn more about the eco-innovation sector. This same bank stated that there should be also be stronger emphasis on **tailored business development programmes in the field of eco-innovation**. These business development programmes should help SMEs adopt a more commercial orientation while preparing them to accept financing, which has a higher administrative burden than many companies expect. Business development programmes are especially relevant for those SMEs without business experience. Furthermore, there should be **more support of early-stage financing and financing demonstration plants**. In this context, there is also the thought that the bank could take over higher risks in selected cases.

One SME believed that public grants and subsidies were an effective way of supporting innovative companies until they were ready to secure financing on their own. Grants and subsidies should be used to help bridge financing gaps until the company develops a secure enough product or market.

Another SME stated that stronger networks need to be developed to facilitate links between the industry and the financial markets. In some cases, the deal flow could be improved by addressing the knowledge gaps in the market. One SME pointed to the fact that marketing determined attention from investors. Without a solid track record, due to the relatively recent emergence of the field and the young age of many companies in the industry, companies would need to increase their capacity to be seen by investors. This relates closely to the suggestion from DG ENTR and supported by a Spanish investor, that electronic information portals need to be developed that would reduce the transaction costs of networking and identifying potential

6.9 The European investment market remains fragmented

The current investment pattern in Europe reflects a fragmented financing market for eco-innovation. This section examines the reasons why investment continues to be constrained by borders and whether or not there are implications to a fragmented investment market.

There is limited data available to determine if eco-innovative SMEs look outside of their own country when seeking capital. Nevertheless, the single study that was that was identified found that SMEs rarely obtain funding from outside their own country. According to a series of Finnish surveys, almost none of the SMEs surveyed had acquired funding outside Finland. In 2009, about 1 % of micro companies had acquired funding abroad, 3% of small companies and about 5 % of medium-sized companies (and 20 % of large companies).[89]

The FUNDETEC report found that some SMEs sought funding from the EU, but that the barriers to doing this were high. There are risks involved in spending time putting together a consortium and proposal, with a chance that the application could be rejected.[90] Many of the firms interviewed had experienced difficulties in securing venture capital or even often modest amounts for research and development (R&D) purposes. The problem extended to locating grant aid from European sources. Bids often escalated into complex, bureaucratic and unwieldy projects involving other partners far beyond the scale of the resources originally required.[91] As firms moved from one phase to another, **the fragmented system at the demonstration**

[89] Conf. of. Finnish Industries (2009)

[90] FUNDETEC (2008)

[91] Smith (2001)

and commercialization phases might deter investment at the start-up phase because of the uncertainty the overlapping funding sources cause.[92]

6.9.1 SMEs generally seek local financing

A key implication of a fragmented market is that SMEs rarely look for financing outside their own country. Of the SMEs in the survey undertaken as part of this study, almost all eco-innovative SMEs have received their funding from providers of finance based in their home country or from EU programmes. Only 12 percent of businesses have sought financing from other EU countries, and only 8 percent have been successful (see section 5.8).

6.9.2 Investors view European investment market as fragmented as a result of knowledge barriers

Based on the interview findings, it is unsurprising that there is a fragmented European financing market for eco-innovation. A key finding of the interviews is that investment is often tied to proximity. Several investors, especially those that are most knowledgeable about eco-innovation, characterize themselves as being 'hands on' investors, meaning that they have maintain close contact with the companies in which they invest.

One major investor stated that a key difference between the United States and Europe is that the European market is highly fragmented and thus the scale of investments in the United States is significantly larger. This is especially relevant in the case of project financing, where the volume of capital is most significant.

According to several investors, especially the business angels, there is a deep knowledge required at the earliest stages of development. This knowledge includes not only knowledge of finance and business strategy, but local market conditions and regulatory hurdles that could be faced.

While the standard approach is to work within home markets, some venture capital and business angels actively seek to invest Europe-wide. An implication of the fragmented market for finance is that only big funds can invest across borders, according to those interviewed. This is due mainly to the requirements that several investment managers be available for maintaining contact with companies across Europe. Moreover, there are significant administrative factors that need to be taken into account when investing across borders. Generally, only larger funds (EUR 100 million) are able to sustain a genuine European scope of activity.

In spite of the capacity of larger funds to pursue a Europe-wide investment strategy, the interviews suggest that the larger funds tend to recruit local investors to handle the more hands-on aspects of venture capital and to provide knowledge of local market conditions and regulation. Thus, while it might appear that a Europe-wide venture capital market in eco-innovation is emerging to a small degree, it is likely to be limited by the availability of local knowledge. In a similar development, some large funds that invest in more than one country have offices distributed across their target markets (see section 6.2.1).

There appears to be an exception when it comes to some less developed markets. Some venture capital funds from more mature markets target the developing markets because of an unmet demand. This is linked to another implication of the fragmented market. Some venture funds pointed out that when it comes to investing in foreign markets, there is a significant role for European-level instruments. One investor stated that because other markets are unknown, there is a need to seek out 'market signals' from leading institutions, and European institutions have a high degree of credibility.

[92] Chapple (2007)

Ultimately, it appears that financing continues to be local because investors feel they offer the greatest value when they are able to combine market knowledge with financing. As a result, the deep knowledge required to invest successfully is often local in nature and thus tilts investment decisions in favour of local opportunities.

6.10 Summary

From the perspective of financial actors, investing in eco-innovation appears to be limited by market barriers and lack of clarity about the field itself. As in any other investment field, financial actors are motivated by the potential for high returns. Eco-innovation is a highly innovative field surrounded by growing interest from governments and consumers. While the decision-making process that underpins investment in eco-innovation is the same as for any other innovative field, certain market characteristics preclude higher investment.

Investment in eco-innovation continues to be hampered due to market failures. The most common example of this is the so-called 'double externality' problem where the public good nature of both environmental sustainability and innovation are combined to produce a level of investment in eco-innovation that is less than socially optimal. In addition to the market failures, there are more specific barriers that constrain investment into eco-innovative fields.

The eco-innovation market itself is characterized by a number of factors that appear to work against eco-innovation. Many of these barriers are outlined throughout the section, but the ones that stand out are those related to the relative recent emergence of the field as well as the lack of innovation in some segments of the target market for eco-innovation.

However, it is not only the market that constrains investors. One aspect that needs to be overcome is the capacity of the investment community to understand the field. As eco-innovation is an emerging field, and one that has thus far failed to engage with the financial community, there is a **knowledge gap** that constrains investment in eco-innovation. The interviews revealed several developments in the field, as financial actors attempt to overcome their own limitation through a number of diverse approaches. Some of these approaches include the retention of specialists into the fund itself, while others build networks and partnerships to better understand the field.

Another feature of the financing landscape is that the European venture market remains fragmented. The effect of the fragmentation is that neither investors nor eco-innovative SME look consistently outside their own borders for financing opportunities. The interviews revealed several reasons for this situation. Many investors in eco-innovation see their role as being able to add value to the companies in which they invest. This value is often tied to market knowledge or the ability to participate actively in the companies' operations. This value tends to decline in proportion to the investors' knowledge of the local market, which remains tied to regulation and specific details of national or regional markets. Overcoming this local bias in investing is difficult, though some funds do appear to be addressing this. Opening branch offices or teaming with local investors appears to be a valid solution for smaller funds. For larger funds, it has been suggested that a EUR 100 million threshold needs to be achieved before pan-European investment is possible.

Even if the financing system is optimized, some investors expressed skepticism about the deal flow. According to some investors, some eco-innovations appear to be constrained by the wide availability of public money, which tends to shield innovators from having to orient their products to the market. One feature linked to this is that even impressive technology might not be able to find a target market. This "perception" contradicts the evidence of the survey, which demonstrated that more than half of eco-innovative SMEs are currently looking for funding to market their innovations.

Public authorities have a role to play, according to the financial actors. It has been suggested that consistency is key to any initiatives that public authorities undertake, as a market built on unpredictable regulatory or financing systems is subject to high levels of risk which tends to discourage investment. Moreover, financing solutions devised by public authorities need to be flexible, simple, and well understood by stakeholders. As it stands, there appears to be a lack of awareness of European instruments, complemented by a perception

that European financing instruments are unduly complex. Any future initiatives need to be structured to take this perception into account.

In all, while the field appears to be maturing, there remain several areas where the recent emergence of eco-innovation and the market characteristics produce systematic biases that constrain access to finance for eco-innovative SMEs.

7. Conclusions

This chapter will sum up the conclusions from the previous chapters. The conclusions form the basis for the central recommendations to emerge from the study.

Data on cleantech venture capital investments show that most venture capital is invested in energy generation and energy efficiency. Energy generation has, since the beginning of the nascent eco-innovation industry, been a popular investment area while energy efficiency has become popular since the outbreak of the financial crisis and the shift of focus towards less capital intensive investments. The data also demonstrates that the cleantech venture capital market has is on an upward trend, quadrupling since 2004. However, growth has stagnated as a direct result of the financial crisis. The American market for venture capital is significantly larger than in the EU and the cleantech venture capital is likewise significantly larger. In spite of this larger overall size, estimates indicate that a larger share of venture capital in the EU (20-25 %) is invested in cleantech than in the US (15-20 %).

Cleantech investments in Central and Eastern Europe is limited. In 2008 Venture capital investments in Central and Eastern Europe accounted for 186 million Euros or 2.7 % of the total European venture capital market. Most of the investments were made in Poland, Czech Republic, Hungary and Romania. In 2007 and 2008 the share of venture capital invested in cleantech was around 5 % of total investments.

Data on the financing structure of eco-innovative SMEs illustrates that **debt financing is an important source of financing for eco-innovative SMEs – even at the early stages. For early stage eco-innovative SMEs, 48 % of the SMEs in the present study have received debt financing (either as a normal loan or a loan backed by a loan guarantee) and 67 % of eco-innovative SMEs at the later stages have used debt financing/loan guarantees.** In comparison, 27 % of early stage eco-innovative SMEs have received venture capital and 24 % indicate they have received funding from business angels. Venture capital funds and business angels are often regarded as funding the most risky and innovative SMEs so they undoubtedly provide an important funding stream. In spite of this, they can only fund a limited number of eco-innovative SMEs with very high growth prospects. Many more eco-innovative SMEs use debt financing.

7.1 Barriers to accessing finance

The increasing focus on eco-innovation and perception that the future markets will be very large has recently attracted providers of finance to the field of eco-innovation. However, there are challenges related to providing finance to eco-innovative SMEs, which were revealed by the interviews conducted as part of the field research.

18 internal and external barriers to access finance were identified in the literature and their significance was tested in the survey of the eco-innovative SMES. Internal barriers tend to be general SME-barriers external barriers tend to be related to eco-innovation.

The most significant barriers, as pointed out by the SMEs in their early stages, are that:

- **financing is not tailored to small scale financing needs**[93]
- **potential suppliers of finance are insufficiently engaged with eco-innovative industries**
- **there continues to be uncertainty towards government regulation.**

The most significant barriers are all external and in general the external barriers are perceived to be more significant than the internal barriers. Thus, the most significant barriers are predominantly related to the industry or target market in which the eco-innovative SMEs operate.

The important role of small scale financing is confirmed by the financing structure of the eco-innovative SMEs. The survey of eco-innovative SMEs shows that 42 percent of the businesses surveyed have had less than €500.000 injected into their business. Moreover, 31 percent have received financing of between €500.000 and €5.000.000, while 17 percent of businesses have received over €5.000.000 in total financing. Looking only at the early stage eco-innovation SMEs, 55 % percent have received less than €500.000. Obviously these might need more financing later but the results suggest that many eco-innovative SMEs start out with relatively small amounts of financing.

Interviews with private providers of finance have shown that the incentives and the investment rationale of most financial actors are the same as for investments in other sectors. Investments are primarily made to make the highest possible profit. Investors might have concerns in addition to generating returns, but those are secondary. Banks focused on sustainability are exceptions. They have a mandate to focus on sustainability and this is as important as profit. Further, state promotional banks are different in that they are established to support innovation and create growth and employment and not to generate a profit. However, **environmental concerns continue to be secondary, as the instruments do not differ from those without a green mandate.**

Interviews with banks, business angels, and venture funds showed that **the investment criteria used by financial actors was the same for eco-innovative SMEs as the criteria used to assess investments in other sectors.** Still, the dynamics of the eco-innovative markets reveal some characteristics that significantly influence how providers of finance assess finance requests from eco-innovative SMEs. **The market characteristics make eco-innovation a difficult sector for attracting investment. The market characteristics are not unique to eco-innovation but appear to be more pronounced than in most other sectors.** The identified characteristics include:

- The double externality problem. Eco-innovations produce positive externalities both in terms of innovation and environmental effects. There are also market distortions caused by high-carbon fuel pricing that does not reflect the environmental and social costs they impose.[94] In fact fossil fuels are often subsidised, distorting the market even more. **As long as markets do not punish environmentally harmful impacts or reward environmental improvements, competition between environmental and non-environmental innovation is distorted and a socially sub-optimal amount of investment occurs.**
- **The double externality problem is one of the main justifications for subsidies to promote eco-innovation**. Regulation creates opportunities but also poses a risk if the profitability of solutions depends on regulation, which is out of the scope of control for SMEs and investors. This is especially a risk for long-term investments.
- Eco-innovation also stands out because it is not focused around a common technological platform. Instead of a sector in conventional terms, it is more accurately conceived of as a theme or an umbrella term covering a range of technologies, products, services, business models, and potential target markets. **This makes it difficult for potential investors to evaluate funding opportuni-**

[93] In the literature this is often defined as financing of less than €300.000 for eco-innovative SMEs but the SMEs have not been asked how they understood "small scale financing".

[94] Reid (2008)

ties and asses the risks than if all investment opportunities where built around a common technology platform.

- This is combined with **sub sectors, mainly non-energy, of eco-innovation still being immature. Often, technologies and business models are unproven, markets are unknown and many investments have not yet been exited.**
- Lastly, some target markets for the eco-innovative SMEs operate in markets with weak competitive conditions. In some cases, the industry or target market is highly regulated or because there is a high degree of public sector involvement. In other cases, the entry barriers are high because the market is dominated by a few large companies and because the established players prioritise supply security as opposed to new risky solutions.

It should also be noted that most interviewees did not believe it was more difficult for eco-innovative SMEs in general to obtain financing than for other highly innovative SMEs. This is most likely due to the high expectations investors have for eco-innovation, in particular to the sub sectors related to energy which attract most of the funding and attention. However, investors have stated that they can be reluctant to fund eco-innovative SMEs if the characteristics outlined above influence the risk assessment.

What can be concluded for certain is that a very large share of eco-innovative SMEs is currently seeking financing. 75 percent of the early stage eco-innovative SMEs in the survey indicate that they are currently seeking financing and 53 percent of businesses in the later development stage are seeking financing.

Clear and systematic differences between eco-innovation sub sectors are difficult to discern. This is most likely due to the diversity of technologies, products and service within the sub sectors. The heterogeneity of eco-innovation means that technologies can be very different from one another within the same sub sector. Recycling is just one example. Here there are a number of 'low-tech' and 'high-tech' approaches, ranging from scrap metals to the extraction of precious rare earth materials from electronic components.

Nevertheless, energy stands out in some respects. It includes a number of more mature technologies, like wind and photovoltaic, it includes a number of very capital intensive technologies, like wave power, bio fuels and fuel cells, and the market has reached a stage where a large market for suppliers of components and wind turbines has been established. **Due to the consistent focus on energy and energy related technologies over the past decades, it is the area that providers of finance are most familiar with and where they have the most experience and knowledge to base their investment decisions on. If decision makers would like to improve access to finance and uptake of non-energy related eco-innovations, additional risk sharing finance instruments could be employed to address the market failures and legitimate hesitation. Sharing the risk with private providers of finance would speed up the process where providers of finance become familiar with a new area and build knowledge and statistics to assess risk and base financing decisions on.**

7.2 Recommendations

The field work has confirmed that government regulation and subsidies are seen as key drivers of eco-innovation and access to finance. In this respect it is crucial that the regulation is stable. Investors make investment with 5-10 year time horizon and therefore look for long term regulatory stability.

Ambitious targets for the environment and eco-innovation in order to increase demand for new improved solutions and foster innovation is likewise seen as key. Targets for the reduction of greenhouses gasses and use of renewable energy are the best known examples but standards for energy efficiency in buildings, reduction of particle emission and fuel efficiency in transport are other areas where regulation has been used to drive innovation and create a market for eco-innovations. Green public procurement and taxation of conventional solutions which create negative externalities are other regulatory instruments that promote eco-innovation and access to finance.

Deregulation and privatisation of markets is also seen as a key regulatory instrument to encourage innovation in subsectors where this has not yet happened. Promotion of innovation, entrepreneurship as well as technology transfer are also important elements in supporting a highly qualified deal flow of new eco-innovations and thereby also attract financing.

In spite of the range of policy ideas derived from the field research, the main focus of this study is on financial instruments and how they can be used to improve access to finance for eco-innovative SMES.

There is a strong political wish to support eco-innovative SMEs in order to protect the environment. Further, as demonstrated in the conclusions summarized above there are clear market failures in eco-innovation which justifies public intervention. In order to reap the full potential benefits of eco-innovation it is important to correct market failures and ensure that eco-innovative SMEs have access to finance. To achieve this, public organizations must be willing to share the risk with private providers of finance.

When talking about eco-innovative SMEs and risk sharing instruments, venture capital attracts a lot of attention. However, venture capital can only fund a limited number of eco-innovative SMEs with very high growth prospects. A much larger share of eco-innovative SMEs rely on relatively small scale debt financing. This big group of eco-innovative SMEs has a significant potential to create green jobs and economic growth and they are an important part of the solution to environmental problems. And one of the main barriers to emerge from the field research is that there is a need to promote instruments tailored to small scale financing needs.

The development of flexible risk-sharing instruments for this group is consequently very important to engage more financial actors and bring eco-innovations to markets. This is one of the central conclusion to emerge from this study. Small scale risk sharing financing instruments, in terms of debt financing and financing from business angels, will therefore be the main focus in the remaining part of the conclusions

A number of risk sharing financial instruments already exist. The programmes are explained in more detail in appendix B and summarized briefly below.

The EU both provides support in forms of grants (the receiver does not repay support) and financial instruments (the receiver fully or partly repays the support).

The **Enterprise and Innovation Programme (EIP)** provides a grant for eco-innovation pilot and market replication projects. The granting instrument has an explicit focus on SMEs and aims to provide direct funding for relevant innovative enterprises, allowing them to demonstrate eco-innovative techniques, products, services or practices. This instrument targets eco-innovative SMEs and aims to close the gap between research, innovation, and market uptake. The innovations supported by eco-innovation pilot and market replication projects have already been technically demonstrated with success but continue to have an unknown market potential. Thus, the grants are aimed at bridging the commercialisation 'valley of death' by helping raise market and investor awareness of the applicability of new, highly-innovative technologies.

Another granting instrument used to support eco-innovation is the **LIFE+ Action Grants**. The LIFE+ grants are targeted largely at public-sector application of innovative policies or programmes, some of which include the development or application of innovative technologies or solutions. The grant supports demonstration projects of up to three years and is explicitly aimed at promoting environmental sustainability. The purpose of these granting measures is to raise awareness about the potential solutions and assist in capacity development for public-sector organisations that manage environmental resources.

Under the 2007-13 **Competitiveness and Innovation framework Programme (CIP),** several financial instruments exist. The total budget to facilitate access to loans and equity finance for SMEs is over €1bn. CIP should benefit up to 400 000 SMEs.

The CIP financial instruments are implemented for the Commission by the European Investment Fund (EIF). The two main facilities under CIP are the High Growth and Innovative SME Facility (GIF) and SME Guarantee (SMEG) Facility.

Under the High Growth and Innovative SME Facility (GIF), EIF invests in venture capital funds to increase the supply of venture capital for innovative (including eco-innovative) SMEs. The facility is divided between early stage investments (GIF1) and expansion stage investments (GIF2). Under GIF 1, EIF can

usually invest 10 to 25% of the total equity of the intermediary venture capital fund. For venture funds focused on eco-innovation, EIF investments may represent up to 50% of fund size. Under GIF2, EIF can invest 7.5 to 15% of the total equity of the intermediary venture capital fund. For venture funds focused on eco-innovation the financing cap is 25%. Under GIF, €200 million is dedicated to venture-capital funds with an eco-innovation focus.

Under the SME Guarantee (SMEG) Facility EIF provides capped guarantees partially covering portfolios of financing to SMEs. The most relevant type of guarantees for this study are loan Guarantees. EIF provides direct guarantees to intermediaries that provide finance directly to SMEs and Counter-guarantees to Intermediaries that issue guarantees for the benefit of lending institutions. Most guarantee programs target SMEs in general and only one guarantee programme with a specific focus on SMEs in the eco-industries has been identified. This is the programme run by Credit Cooperatif in France and the programme is targeted at SMEs in the eco-industries in general and not eco-innovative SMEs. EIF also provides micro-Credit Guarantees, equity Guarantees and securitization under SMEG.

The European Commission and the European Investment Bank (EIB) have also created the **Risk-sharing finance facility (RSFF).** The RSFF aims to improve access to EIB debt finance for participants of European R&D and innovation projects. The RSFF produces additional loans for R&D and innovation projects and allows the EIB to consider projects with a higher risk profile than would otherwise be possible. The Facility is open to eco-innovation projects. Most of the projects within eco-innovation that have attracted financing under RSFF are within energy, which make up around 15 percent of the projects.

7.3 Debt financing risk sharing instruments

Given that banks charge rather limited interest rates and normally do not profit from the upside of a successful SME, only a small share of loans in a given portfolio can be allowed to collapse if the bank is to be profitable. The risk banks can take is limited, making it difficult for banks to finance eco-innovative SMEs. But because of the role banks play, it is important that they do more. In order to allow banks to take larger risks some countries have developed finance instruments where public institutions and private banks share risk in high priority industries. These instruments address the challenge pointed out above – lack of access to small scale debt financing (up to €300.000).[95]

In many countries, risk sharing debt finance instruments are operated by state promotional banks through intermediaries. The intermediaries are most often private banks. A number of debt financing instruments under state promotional banks are presented in appendix A which can serve as inspiration for future risk sharing instruments. The promotional elements of risk sharing debt financing instruments can consist of one or more of the following elements:

- **Assumption of risks or guarantees**. The public body will guarantee part of a loan portfolio that a bank provides to an SME. The guarantee percentage can vary depending on the risk of the loan. The more risky the loan the higher the guarantee rate. A guarantee is especially relevant if the SME does not have sufficient collateral. In these cases, the guarantee serves as collateral for the bank. The guarantee rates for the loans researched for this project have typically been 50 to 75 %. The loan guarantees typically also have a guarantee cap, which specifies a pre-set amount that the provider of the guarantee can pay at the most. For the Business Angel + loan (see annex A for more details) the cap rate is for example 6 % of the loan volume and for the loans provided by Credit Cooperatif it is 4.9 %. If this amount is reached no further payments shall be made from the provider of the guarantee to the bank providing the loans.
- **Lower interest rate** (interest subsidies). Loans can be offered to SMEs with an interest rate below the market rate. It is especially relevant for SMEs which generate a relatively small profit and therefore will be running at a loss if it has to pay a high interest rate. This can be the case for SMEs in the social sector and sometimes also for eco-innovative SMEs because it "sometimes take a little

[95] Small scale financing should not be confused with micro finance which is typically below €25.000. Given that the focus is eco-innovative SMEs and not just traditional SMEs in the eco-industries micro finance is regarded as less relevant.

longer if you want to do things in a sustainable way" as one bank said. Sometimes loan guarantees can support a lower interest rate. This is the case for the loans provided to SMEs in the eco-industry. Credit Cooperatif has a smaller risk due to the guarantee from the EIF and has therefore agreed with the EIF to lower the interest rate.

- **Grace period**. The SME does not pay instalments and/or interest rate on the loan for the initial years. It is especially relevant for SMEs that does not yet have a positive cash flow and is not able to finance instalments and interest payments. Therefore the grace period will typically be longer for start ups than established companies which already have other activities to generate a positive cash flow. Among the examples in appendix A that allow grace period are the ERP innovation programme under KfW Bankengruppe, which is aimed at established SME has a grace period of two years, the ALMi Innovation Loan for both start ups and established SMEs has a grace period of three years, and KFW's capital for start ups aimed at start ups has a grace period up to 7 years.
- **Subordinate loans**. Debt which ranks after other types of debt if a company should be unable to pay its obligations. It is termed subordinate because such debt providers (the lenders) have subordinate status in relation to the normal debt. Subordinate debt can be used to leverage traditional bank loans because traditional bank loans will be paid back before subordinate loans. The risk for the banks' investment is reduced because they only provide part of the capital and still recoup the financing they have provided back before the provider of the subordinate loan. Thus, simply put, if a bank has provided half of the financing and the assets used as collateral has depreciated less than 50 % the bank would still recover its loan despite default.

Also, banks can offer non-monetary services, for example advisory services, to enterprises as a supplement to the above mentioned elements.

There is a **need for a wide range of flexible debt risk sharing instruments to overcome market failures**, lower barriers to finance and fulfil the political objectives of creating a thriving eco-innovation industry in Europe.

The elements set out above can be combined in various ways to create risk sharing instruments that balance the risk between public bodies, private banks and the eco-innovative SMEs. Examples in appendix A demonstrate various combinations. The instruments must be adapted to the specific situations in which they are being applied; i.e. the types of business and activities they target.

Among the existing EU loan guarantee programmes, only one bank, Credit Cooperatif, has established a loan instrument targeted at environmental SMEs. The target group for this programme are traditional environmental SMEs and not eco-innovative SMEs. However, the study of existing instruments illustrates that there are a number of guarantee programmes that are open to eco-innovative SMEs. Still, access to small scale debt finance is a challenge. Few of the risk sharing debt finance instruments have been evaluated and it is difficult to point to one combination and/or type of instrument as being more effective than others. Based on interviews from financial actors and SMEs, and drawing on the examples in Appendix A, recommendations for future risk sharing debt finance instruments include:

- Allowing for **more flexible conditions for eco-innovative SMEs**. Under the current loan guarantee facility created under CIP (funded by the European Community) and operated by the European Investment Fund the guarantee rate is up to 50 % and the standard guarantee cap rate is up to 10%. In duly justified cases, such as start-ups, the guarantee cap rate can be up to 20%.[96] More flexible conditions if relevant would be in line with the current High Growth and Innovative SME Facility (GIF) under EIF which has added flexibility for co-investments in venture capital cleantech funds.
- **Ensuring that risk sharing instruments benefit all relevant sub-sectors of eco-innovation**. Today, energy is the sub-sector which is most mature, which banks are most familiar with, and which receives the largest share of eco-innovation venture capital. Financial instruments can – unlike grants - be difficult to target at certain sectors or sub sectors

[96] For more details please refer to appendix B.

because they are dependent on financial intermediaries and/or SMEs applying for them. But flexible conditions could be designed to help target instruments better at a high priority sector like eco-innovation.

- **Encouraging banks to build solid knowledge and statistical registers** of eco-innovation which in the long run will improve their competencies and allow them to assess risks better. Statistical information about eco-innovative SMEs is in general difficult to obtain because eco-innovative SMEs span a wide range of traditional industry classifications.

Loan guarantees and risk sharing can also help banks keep the interest rate on loans down despite high transaction costs involved in providing small scale financing.

At the same time as focus should be on how to assume part of the risk for the banks and the eco-innovative SMEs focus should also be on not assuming too large a share of the risk. The intermediary banks must still have a strong incentive to evaluate loan applications thoroughly. The risk assumed by the private bank must not be so high that the bank does not want approve any loan applications, and not be so low that the bank takes in every project regardless of whether it is promising or not. The risk balance between must be tailored to the target group.

7.4 Small scale equity financing – co-financing of business angels

On the equity side, business angels provide smaller scale financing than traditional venture capital funds. Compared to the US, the EU has few high net worth individuals with the experience and financial capacity to act as business angels. Assuming the role of a business angel calls for solid industry and investment experience and a significant financial volume. In order to diversify risk, a business angel will generally try to build a portfolio of companies and must therefore have financial resources to invest in more than just one or two companies. To reach the desired volume, business angels will often form networks or investment clubs. To increase investments from business angels further, a number of public private-partnerships have been founded where public bodies co-invest with business angels. **The impact of co-investment mechanisms such as those in place in the UK have been found to be significant, leading to an estimated doubling of the amount invested in companies thanks to these public/private partnerships**. Interesting examples of such co-financing instruments are described in appendix A.

In broad terms, the co-financing instruments seem to take three forms.

- **Equity co-financing of SMEs.** The (eco-)innovative SME obtain a co-investment from a public body at the same time as securing an investment from a business angel. Often, the business angels that the public body will co-invest with are pre-approved and the **due diligence is done on the business angel and not the individual deal**. Due diligence on the business angels and not the individual deals keep the transaction costs low. High transaction costs are otherwise often an obstacle to small scale investments. The co-investment will often be around the same size as the investment from the business angel. Some co-financing instruments have additional promotional elements. This type of co-investment scheme can either allow business angels to spread their investments on more companies and or/allow the companies to raise more capital. This will increase their chances of reaching the phase where they can introduce their solution to the market and become profitable.
- **Equity co-financing of business angel funds**. Business angels which have established an investment fund can receive a co-investment in the fund. Typically the investment will be up to the same amount and often on the same conditions. The co-investment scheme facilitates fundraising and help funds reach a critical size which allows them to spread their investments and risk on more companies.
- **Loan co-financing of SMEs.** Typically the (eco-) innovative SME can obtain a loan from a public body of up to the same size as the investment from a business angel. The loans can run up to 10 years and might also have a low interest rate and a grace period before the repayment of capital starts. Like the first instrument, the direct target is SMEs, which will be able to leverage financing raised from business angels.

- **Loan co-financing of business angels**. The co-financing can also take the form of a loan to business angels they can invest as equity alongside their own resources. Typically the loan will be of the same size as the amount provided by the business angel. If the business angels can generate a higher return on their investments than the amount they have to pay in interest, this instrument will not only improve the amount of financing available but also the return on investment for business angels. The loans can have flexible payback arrangement as an additional promotional element. For example the business angel will get the majority of the revenues generated until the investment has been earned back. The loan co-financing instrument is the less typical type of instrument.

Business angels are, compared to venture funds, more difficult to co-finance because they are single individuals or a group of individuals investing their own money. Investment procedures and oversight is therefore normally less formalised than venture funds, as fund managers invest other people's money and rely on formalised procedures.

The European Investment Fund plays an active role as co-financing instrument at the venture capital market and has invested in several cleantech venture funds. While the role of EIF is highlighted for its positive effect for venture funds the role is significantly less on the business angel market. The High Growth and Innovative SME Facility (GIF) has an envelope for co-investing in investment vehicles promoted by business angel networks. However, despite the demand voiced by business angels for such an instrument, the uptake has been very limited. Instead the examination of business angel co-financing instruments shows that various sources at regional and national level have provided the funding for the instruments.

Few, if any, of the business angel risk sharing instruments have been evaluated and it is difficult to point to one instrument as being good practice.

Findings and recommendations for future risk sharing finance instruments for business angels include:

- There is a need for **a wider range of co-financing instruments for business angels at EU level**. As was made clear in the interviews, instruments are in demand but what is currently being offered suffers from limited uptake. A revision of the current instrument is therefore needed.
- In line with this it is key to **support business angel networks**. Without networks where a larger group of business angels partner up under a more formalized set-up it is very difficult to establish co-financing mechanisms.
- To support the business angel segment, the EU could play a larger role as co-financer. Within venture capital the EIF play a key role for the establishment of many new funds as a provider of co-financing. The instruments examined show that there is not an established pattern of business angel co-financing, as it is provided by various authorities that happen to have taken an interest in the area. A highly visible European player providing co-financing to competent business angel networks would represent a significant improvement. In order to take on a more prominent role in co-financing business angels and improve funding to eco-innovative SMEs from European business angels, the EU could consider:

    - How the EIF can build an understanding and position of co-financing business angel instruments that corresponds to the position the Fund has in the formal venture capital market
    - How business angels networks focused specifically on eco-innovation such as the ones established in France and Italy can be supported in order to secure finance to eco-innovative SMEs and encourage business angels to invest in eco-innovative SMEs.
    - How more information about well-functioning business angel networks and co-financing instruments can be collected in order to build evidence-based co-financing instruments at the EU level, which has a fair distribution of risk between the SME, the business angel and EU institutions. This could only be achieved to a limited extent in the current study.

  In terms of incentivising business angels to invest more in eco-innovation, the business angels themselves mention fiscal incentives as a very strong influence on their behaviour. Favourable tax treatment will increase the return on investments for business angels investing in eco-innovation and since potential investors compare their likely return from different assets classes such arrangements make equity

investments in eco-innovation more attractive. Such incentives can motivate more high net worth individuals to invest in eco-innovation. These investments can be made either as active business angels or as passive investors allowing more experienced business angels or fund managers to invest on their behalf. Fiscal incentives are regulated by member states and not by the EU. It is therefore an instrument member states which would like to strengthen investments from business angels in eco-innovation can consider. As mentioned in chapter 6, fiscal incentives were also highlighted by banks and venture capital funds as an efficient national instrument.

8. Appendix A. Examples of relevant financial instruments

This section describes a number of financing instruments, which have served to inspire the conclusions and recommendations of the report.

The financing instruments are divided into two sections. Section 8.1 focuses on debt financing and section 8.2 focuses on co-financing by business angels. Instruments for debt financing and co-financing of business angels have been selected because the conclusions calls for a wider use of these instruments.

Very few of these instruments have been evaluated. It is therefore difficult to point out the instruments that have the biggest effect and which could be pointed out as best practice. Instead a number of different instruments have been selected in order to highlight the variety of risk sharing financing instruments which can be employed in order to improve access to finance for eco-innovative SMEs.

Most instruments are general risk sharing instruments for all types of innovative SMEs. Only a few are dedicated to eco-innovative SMEs. Up until very recently, there has not been sufficient early stage eco-innovative SMEs to create sufficient volume for programmes dedicated to eco-innovative SMEs. This is the case to an even greater extent in the smaller countries. However, the growth of eco-innovative SMEs, the political wish to promote eco-innovation and the market failures related to financing of eco-innovative SMEs might lead to an increase in the number of programmes dedicated to eco-innovative SMEs in the future. Alternatively general programmes with a specific share of the budget dedicated to eco-innovative SMEs can be employed.

8.1 Debt financing instruments

The types of financing problems that SMEs experience are connected to their levels of innovation and their development stage. Financing innovative, and also eco-innovative, projects is regarded as complex and risky by a majority of commercial banks. This is due to three inherent reasons:[97]

1. Banks face an **information asymmetry** between themselves and the eco-innovative company. Providers of funding such as banks do not have the same level of understanding of technical aspects of innovative projects, thus, they are less likely to assess the risks associated with complex technologies.

2. It is difficult to estimate the **market risk** of new products that have not previously been introduced to the market as acceptance is hard to calculate and cannot be verified.

3. Eco-innovative projects, in general, **lack collateral** due to high level of soft investments such as salaries, which makes banks more reluctant to provide financing.

These difficulties in accessing financing for eco-innovative SMEs arguably increase with the level or intensity of innovation involved.[98]

[97] NEFI 2005

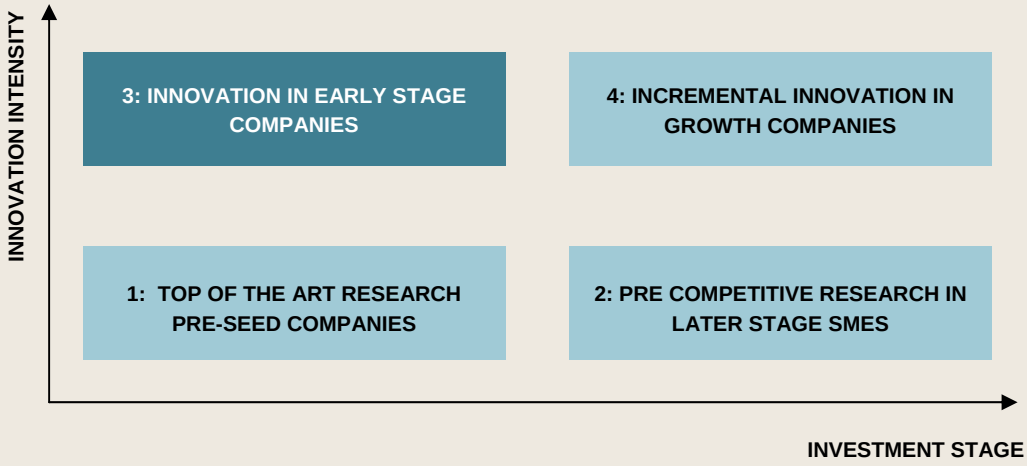
[98] Ibid.

It is also important to distinguish between development stages of SMEs. The financing challenges faced by early stage and later stage SMEs differ. In general, early stage SMEs have difficulties providing investors with a track record and banks with collateral, while later stage SMEs, on the other hand, are more likely to be eligible for bank loans. Nevertheless, collateralisation with eco-innovation remains difficult for banks irrespective of SMEs' development stage.[99]

Figure 8.1 illustrates that four different types of categories of eco-innovative SMEs can be identified depending on whether they are engaged with R&d or Innovation or whether it is early stage or later stage: Categories 1 and 2 target research intensive projects and category 3 and 4 target innovation projects; category 1 and 3 target early stage projects and category 2 and 4 target later stage SMEs.

Given that the focus of this report are innovative early-stage SMEs, the main focus will be on instruments that target category 3.

Figure 8.1: The target group and financing challenges



Source: Oxford Research 2010 based on NEFI 2005

The focus of this section is on debt financing provided by state promotional banks through risk sharing instruments. The objective of promotional banks is to support innovation entrepreneurship, job creation, and economic growth. For this purpose they have developed a range of risk sharing and financing instruments. They have many years of experience with risk sharing instruments and improving access to finance and they have therefore been a natural source of inspiration.

Six promotional programmes have been selected and are presented in the following sections. Table 8.2 shows the elements of these promotional programmes. Twelve elements have been identified and they have been arranged in three groups of four: the first group of *financial instruments* is formed by equity, mezzanine, senior loan, and guarantee; the second group comprises the *promotional elements*, which are grant, interest subsidy, risk adoption, and advisory services; technical assistance, external know-how, upside participation, and fostering of networks make up the final group, which is labelled *miscellaneous*.

[99] Ibid.

Table 8.2: The elements of the promotional programmes

		ALMI Innovation Loan	ERP Capital for start-ups	ERP Innovation Programme	BMU Environmental Innovation Programme	AWS Eco-Bonus	ICO Sustainable Economy Facility
Financial instruments	Equity						
	Mezzanine	X	X	X			
	Loan	X	X	X	X		X
	Guarantee						
Promotional Elements	Grant				X	X	
	Interest subsidy		X	X	X		
	Risk adoption	X	X	X	X		
	Advisory Services	X					
Miscellaneous	Technical assistance	X					
	External know-how						X
	Upside participation						
	Fostering of networks						

Source: Oxford Research 2010 based on NEFI 2005

8.1.1 ALMI Innovation Loan

ALMI is owned by the Swedish state and has 17 subsidiaries, which are 51% owned by ALMI. The remaining percentage is owned by county councils, regional authorities, and municipal cooperative bodies. Innovation Loan is a conditional loan, which focuses on innovation projects that are at an early stage and will be used to develop a project to commercialization. Conditional loan means that SMEs have to apply to the loan and will have to meet a number of conditions before they qualify for the loan.

ALMI Innovation Loan was initiated in 2005 and provides around SEK 63 million in funding each year spread on around 250-300 different loans. Some SEK 30 million of this is provided by the Swedish government. The percentage of loans that are provided to eco-innovative SMEs is estimated to be 15-20% of all loans. This percentage has increased since 2005 and it is expected to rise even more during the next years. Approximately 30% of the loans granted are not paid back.

The demand for the ALMI innovation loan far exceeds the current budget. However, ALMI are in dialogue with the Swedish government to increase the budget, but it is still unclear whether this is going to happen. Furthermore, ALMI has had discussions with the European Investment Bank, which have so far declined to

provide additional security for the ALMI innovation loan. This is due to the depreciation of the loan in the case of bankruptcy of the borrower, which means that the lender takes a large risk (see further below).

Target

ALMI's task is to promote the development of competitive SMEs and to stimulate new enterprises with the aim of creating growth and innovation in Swedish business life. ALMI provides loans to companies that develop innovation projects, the primary targets are innovation project in their early stage.

The innovation loan is only given to companies with an acceptable economic standing and capacity in order to carry out the project. Financing can be used to develop new technologies or improve existing technologies in order to introduce these to the market.

Aim of programme

The aim of ALMI is to promote the development of competitive SMEs and to stimulate new businesses with the aim of creating growth and renewal in the Swedish economy. By means of supplementary financing and business development for innovators, new businesses and SMEs, ALMI tries to promote new enterprises and competition in companies and a more dynamic economy.

The aim of the ALMI Innovation Loan is to provide financing for developing and commercialising innovative projects. The financing can be used for product development, protection of intellectual property rights, or market research.

Instruments

ALMI Innovation Loan can provide financing up to SEK 400,000. The maximum financing provided by ALMI for project are 50% of the total expected financing. The ALMI Innovation Loan is conditional and is paid out in rates, provided that the prearranged milestones are met.

The loan period is divided into two phases with a maximum total loan period of eight years:

1. The project period, up until commercialization i.e. maximum three years
2. The payment period (when the project is commercialized), maximum five years.

The interest rate is variable and is at the same level as ALMI's basic interest during the project period. During the payment period the interest rate is ALMI's basic interest rate plus three percentage points.

The ALMI Innovation Loan has a grace period of maximum three years during the project period. Repayment starts after the project period and runs for maximum five years.

Loans granted to companies cannot be less than €5,000 (SEK 50,000). For loan amounts above €33,000 (SEK 300,000) at least half of the financing has to be co-financed either by self-payment, additional bank loans, or other external funding.

The risk associated with the innovation loan is taken by ALMI by default. This risk is directly related to the loan, hence, in the case of bankruptcy, the borrower is able to write-off the loan, which means ALMI takes a relatively large risk. Furthermore, ALMI can use the borrower's patents (or other assets) as collateral. This does not divert from what regular banks do; however, ALMI is willing to accept a higher level of risk associated with the collateral provided.

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8.1.2 KfW Mittelstandsbank financing instruments

Three programmes have been selected from Germany: the ERP Innovation Programme, ERP Capital for start-ups, and BMU Environment Innovation Programme.[100]

All three programmes are run by KfW, which is the state promotional bank of Germany. Therefore, the following paragraph will include a short description of some of the central conditions that apply to all three programmes.

The KfW Mittelstandsbank acts via intermediaries such as banks. This business models entails that KfW Mittelstandsbank is distant from the applicant SMEs; KfW Mittelstandsbank receives financing application documents from the intermediaries and if formally correct and reasonable in its content, refinance these banks.

The intermediary banks monitor the development and success of the enterprises they have provided loans to. Once a year, KfW gets information on how the enterprises are developing. As long as the enterprise pays the loan redemption and interests, KfW does not act. When problems arise, e.g. delay of payment, the intermediary banks are obligated to direct the enterprise to the restructuring department of KfW.

The instruments that KfW Mittelstandsbank uses do not specifically target eco-innovation, but innovation in general. The reason for this is that KfW regard the barriers for innovation in the market as the same for all types of SMEs despite their technological focus.

A central element of KfW Mittelstandsbanks' point of view is the incentive compatibility between KfW and the intermediary banks. Accordingly, the programmes have to be structured in a way that ensures that the intermediary banks have enough incentive to scrutinise the loan application thoroughly. If KfW takes too much risk the intermediary bank has less incentive to scrutinise the loan applications. From KfW Mittelstandsbank's point of view a good incentive structure divides risk fifty-fifty between kfW and the intermediary banks.

All of KfW programmes have a ten year financing period and come with a two year grace period in which only interest is paid.

With regards to the interest rate of the programmes, it is an individual process in which each SMEs is assessed individually according to nine different risk categories. These risk categories determine the interest rate the SMEs will pay.

The share of lending to eco-innovative SMEs is very small approximately around 5%. The average percentage of newly established innovative enterprises that file for insolvency is around 30%.

ERP Innovation Programme

The ERP Innovation Programme is targeted at established medium-sized enterprises located in Germany with a maximum turnover of €500 million. For enterprises with a turnover between €125 million and €500 million the project has to be innovative in a German context, which is assessed by KfW in cooperation with external experts. Furthermore, the innovative core of the project has to be conducted by the enterprise itself i.e. their own R&D department.

The ERP Innovation Programme provides loans for companies. Part 1 of the programme provides funding for the R&D phase of up to 100% of the investment costs but not more than €5 million per project. Part 2 of the programme provides financing for the market introduction, which comprises up to 80% of the investment costs for project in Eastern Germany and Berlin. The amount financed cannot exceed €2.5 million per project. For projects in Western Germany the loan comprises up to 50% of the investment costs eligible for financing. The maximum amount financed is €1 million. The share of eco-innovation projects financed is around 5%.

[100] ERP is the European Recovery Programme based in Austria. BMU is the German Federal Ministry of the Environment.

Target
The targets of the ERP Innovation Programme are self-employed professionals and SMEs, which have been active in the market for more than two years and pursue innovative projects in Germany or contribute towards such a project by an innovative contribution. Annual sales of the SME may not exceed €125 million.

Aim of programme
Part 1 of the programme aims at providing financing for R&D measures, while part 2 provides financing for the introduction of new products, processes or services to the market.

Instruments
The programme is a mix of debt capital and subordinate loans (mezzanine). For the debt capital no guarantee is required, the programme has a grace period of two years, and the duration of loan is ten years. For the subordinate loans no guarantee is necessary and KfW assumes 100% of the risk for 50% of the project. The grace period is seven years, and the duration of loan is ten years.

Application for loans through the ERP Innovation Programme is done in cooperation with the bank of the company. The loans has an additionally reduced interest rate for small companies the bank of the company is exempt from the liability of the subordinated tranche.

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ERP Capital for start-ups

ERP Capital for start-ups provides subordinate loans for start-ups and companies that are less than three years old. There are two primary targets of the programme: 1) For the establishment or takeover of an enterprise, for the purchase of an interest in an enterprise. 2) For the consolidation of a young enterprise in the first three years.

Target
The targets of the programme are individuals with residence in Germany who set up businesses, are freelance, or have the required technical and commercial qualifications. Furthermore, stabilisation measures within three years after starting up in business can also be subsidised.

Aim of programme
ERP Capital for start-ups is available for co-financing investments in fixed assets and business capital as well as market development expenditure customary in the respective industry. ERP Capital for start-ups provides a maximum loan sum of €500,000. The transmitting bank is released from liability for the junior loan.

Instruments
The programme provides a subordinate loan for companies that have been in business less than three years and which do not have enough equity. The instruments include:

- Repayment free period. The subordinated loan is available for seven years before repayment begins.
- Subsidised interest rate. For the first ten years the interest rate is subsidised, of which the first three are heavily subsidised.

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BMU – Environment Innovation Programme

The BMU (the German Federal Ministry of the Environment) Environment Innovation Programme works to promote demonstration projects on a large scale: i.e. exemplary projects that have so far been implemented in the market. They show how new technological methods to protect the environment can be used and combined. The Environmental Innovation Programme is a loan with interest subsidy for large scale demonstration projects. In 2009 the total volume of the programme was €84 million, which compared to the other KfW programmes is relative small.

Target
The BMU Environment Innovation Programme targets non-energy eco-innovation. Financing for major industrial project that demonstrate for the first time in what ways advanced technological procedures and combinations of procedures can be put to use to reduce pollution. The beneficiaries of the programme are:

- National and international private companies or mainly public sector dominated companies
- Municipalities, municipality associations, owner operated municipal enterprises, administration unions and county administrations

The programme has priority in promoting SMEs. R&D projects are not eligible.

Aim of programme
The target of the programme is non-energy eco-innovation. The programme finances major industrial projects that demonstrate how to reduce pollution by producing technological breakthroughs.

Instruments
The projects benefit from long-term, low-interest loans which are repayment-free for up to five years. The interest rate is risk-adjusted, which means that it is fixed by the ultimate borrower's bank on the basis of the borrower's credit standing and the value and recoverability of the collateral provided for the loan. The bank then assigns the ultimate borrower to one of the credit categories and collateral categories defined by KfW. By combining the credit and collateral categories, the bank assigns the promotional loan to one of the price categories defined by KfW. Each price category covers a range ending at a fixed interest rate ceiling (maximum interest rate). The individual interest rate may be fixed below the maximum interest rate for the respective price category.

Furthermore, support for projects is carried out either with an interest rate subsidy to reduce the cost of a loan or in exceptional cases (such as high federal interest) with an investment grant. The programme provides up to 70% of the financeable costs (no maximum amount).The instruments include:

- Long-term financing at an attractive interest-rate.
- Grant from the Federal Ministry of the Environment to pay the interests on the KfW loan.
- In exceptional cases grant covering up to 30% of the financeable costs.
- 100% disbursement.

From 2000-2009 97 operations benefited from the instrument.

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8.1.3 AWS – Eco-bonus (Öko-Bonus)

Austria Wirtschaftservice (AWS) is the business development bank of Austria and is solely owned by the Austrian government. AWS carries out a multitude of business development programmes on behalf of different ministries. AWS offers a wide range of enterprise-specific investment promotion programmes and services such as financial assistance and consultancy for companies. AWS has a specific focus on environmental technology since it is perceived to provide higher growth rates than other branches in the production sector. In general AWS provide loans with favorable conditions to all types of enterprises irrespective of sector or branch. However, Eco-bonus is a special funding initiative for eco-innovations. The programme is initiated by the Austrian Ministry of Economics, Family and Youth in 2010 it is carried out by AWS and has a budget of €10 million. So far about 10 projects have received the eco-bonus.

Target
The target groups are SMEs in the field of commercial goods production that want to expand their business and safeguard jobs. Examples of products include recycling products, products which enhance energy-efficiency and products in the field of renewable energy.

Aim of programme
The aim of the programme is to promote investments that have favorable ecological consequences.

Instruments
All SMEs that have received funding for their company can apply for the eco-bonus grant. The AWS assess whether the investment of the SMEs is having ecological implications and whether it is creating green products or green jobs. If the application is approved by AWS, a green bonus (Eco-Bonus) on top of the existing funding is awarded.. The size of the bonus varies according to size of the company: Small enterprises get a bonus of 10%. Medium- and large enterprises get a bonus of up to 7%. There is a maximum limit of €400,000 per project.

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8.1.4 ICO – Sustainable Economy Facility

The Instituto de Creditó Oficial (ICO) is the financial agency of Spain. ICO's financing activities seeks to boost certain sectors and encourage technological innovation and renewable energy projects. ICO tries to establish better conditions for innovative projects in sectors that are perceived as important for the Spanish economy. This includes providing loans to enterprises that do not have easy access to normal financing channels such as SMEs and first-time entrepreneurs. The ICO Sustainable Economy Facility (SEF) promotes sustainable innovation by providing loans to self employed and companies in eco-innovation.

Target
The target groups of SEF are self-employed and companies, which amongst other carry out investments in the eco-innovation sector. Investments financed must not have commenced prior to January 2009 and must be executed within 24 months of signing of the loan.

Aim of programme
SEF backs investments by self-employed and companies in, among other, the environmental sector that are characterised by a high level of innovation.

The maximum amount that companies get depends on whether they are:

- Tranche I: Self-employed, small and micro-businesses and other enterprises similar in size, and individuals can get up to €2 million in financing.
- Tranche II: Medium-sized businesses and other enterprises similar in size can get up to €50 million in financing.

Instruments
ICO uses external know-how (Centro para el Desarrollo Technológico Industrial) in order to assess and make sure that the projects financed meet the level of innovation necessary to get the loan.

The company that gets financing may choose from a range of repayments terms and grace periods: i.e. a repayment period ranging from three to twenty years with a grace period up to three years.

For tranche I, there are two options with regards to interest rate:

- Fixed-interest rate in accordance with the fortnightly quote announced by ICO plus up to 1,65%.
- Variable interest rate, six-month Euribor plus Differential in accordance with the fortnightly quote announced by ICO plus up to 1,65%.

For tranche II, there are two options with regards to interest rate:

- Fixed-interest rate in accordance with the fortnightly quote announced by ICO plus up to 2,00%.
- Variable interest rate, six-month Euribor plus Differential in accordance with the fortnightly quote announced by ICO plus up to 2,00%.

No fees or commission is charged by ICO for opening credit, examination, or credit availability.

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8.2 Business angel co-financing instruments

Co-financing instruments of business angels address the need for smaller scale financing and have been highlighted as a central element for improving access to finance in many interviews with business angels. This section describes a number of co-financing instruments which illustrate how co-financing instruments can be structured and how the risk can be shared in public private partnerships.

A number of business angel co-investment instruments exist in the EU. In 2009 the European Business Angel Network (EBAN)[101] made a compendium including 48 co-investment funds that illustrate the different types of European funds co-investing alongside business angels. 34 are public-private-partnerships, 11 are private, 2 are others (fund of funds, etc.) and 1 is a public fund. 65% have a national investment focus, 16% have a regional focus and 19% make investment across Europe.

The average size of co-investment funds and business angels investment funds, in the compendium, is EUR 27.2 million. 74% are smaller than EUR 10 million. The average deal size per investments is EUR 0.57 million and 44% of the funds invest less than EUR 0.4 million in each deal. This confirms that business angels have significantly less capital under management than formal venture funds and that they make smaller investments (from €50.000 up to €3 million).

The following section describes five business angel co-financing instruments, which illustrate how the risk can be shared between public bodies and private investors and how risk sharing instruments can be used to leverage private investments. For some of the instruments the public co-financing takes the form of loans and for others they are equity investments. Also for some the public investments are made on the same conditions as the private investments and for others the private investors are given preferential treatment compared to the public investors.

Very few instruments have been formally evaluated. The selection of instruments should therefore be seen as illustrative examples that can inspire the development of further risk sharing instruments rather than an illustration of best practice.

8.2.1 The Business Angel+ loan

The Business Angel+ loan is a loan which can be obtained by SMEs to supplement an investment from a business angel. The Business Angel+ loan programme is managed by the "Participation Fund" which is a public credit institution in Belgium. The fund supports self-employed, professional people, and entrepreneurs.. The Business Angel+ loan is one among a number of different initiatives under the fund..

Target
The Business Angel+ loan is intended for entrepreneurs whose is launching a new company, or who has a company that has reached a strategic important stage for the future of the business. Further the loan is for companies that do not have access to traditional bank credit because of the innovative or technological nature of the project, but which has secured an investment from one or more Business Angels.

Aim of programme
The objective of the Business Angel + loan is to improve SMEs access to finance and enable Business Angels to extend their investment activity This loan is intended for the financing of tangible, intangible and financial investments, or for the financing of the working capital requirement accompanying the launch of a business or the implementation of a investment project.

Instrument
The Business Angel+ loan match investments from business angels with loan to the SME. The loan is of the same size as the investment from the business angel or smaller. The loan is a subordinate loan, which means that other creditors receive priority over the loan from the "Participation Fund" if the company is unable to pay its debt. A subordinate loan therefore decreases the risk for other investors and makes it easier to obtain loans from ordinary banks because a bank loan has higher priority than the business angel + loan. BA + loans can also be combined with other loan types offered by Fonds de Participation.

[101] http://www.metutechban.org/panel/upload_file/EBAN_COMPENDIUM_OF_CO-INVESTMENT_FOR_BUSINESS_ANGELS_AND_EARLY_STAGE_FUNDS_IN_EUROPE.pdf

The central features of the loan is:

- The loan can vary from €7,500-€125,000. The investment from the business Angel and the founder must be greater or equal to the loan.
- The loan can run for 5, 7 or 10 years, depending on the nature of the investment.
- The loan has a fixed interest rate. The Participation Fund applies its standard interest rate for loans of 5, 7 or 10 years, to which a margin of 1% is added. If the grace period is more than a year, the margin will be increased to 1.25% for the entire period of the loan
- The receiver of the loan can wait 1-3 years before starting capital repayment (grace period), depending on the nature of the project
- The loan can have constant or variable payments on a monthly or quarterly basis

The Participation Fund works closely with the Business Angel Network (BAN). Potential investment projects are preselected by Business Angel Networks, which propose them to potentially interested Business Angels. The Participation Fund gets involved in the process only when the business angel investment in the SME is near a conclusion.

The Participation Fund decides whether or not to grant the credit on the basis of the following criteria:

- The project's chances of success, at the financial, economic and technical levels alike;
- The applicant's business and managerial competence and his or her worthiness;
- The business's quality and policy;
- The company's viability and capitalisation;

The "Participation Fund" is flexible with regards to collateral for the loan. The collateral needed to secure a loan depends on the credit risk and refer only to the elements relating to the project.

The Business Angel + loan benefits from a guarantee provided within the Competitiveness and Innovation Framework Programme of the European Community and managed by EIF. EIF guarantees the BA+ loans in as part of their co-financing portfolio, which also includes other loans that are granted by the Participation Fund. The guarantee rate is 50% with a cap rate of 6%.

In its initial two and a half years of operation, the Business Angel + loan received close to 70 applications, of which just over 20 have been rejected. Whether the programme is expected to have any public cost is regarded as internal information and not made public.

Date of creation	**2002**
Size of fund/programme (mio €)	**N/a**
Number of investments	**108 (2011)**
Investments made since inception (mio €)	**1.6 (average per year for the period 2003-2007)**
Average deal size (mio €)	**N/a**
Number of companies closed as percent of deals	**App. 25% of the loans experience reimbursement difficulties**

Further information:
http://www.metutechban.org/panel/upload_file/EBAN_COMPENDIUM_OF_CO-INVESTMENT_FOR_BUSINESS_ANGELS_AND_EARLY_STAGE_FUNDS_IN_EUROPE.pdf

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8.2.2 Seed Fund Vera Ltd.

Seed fund Vera Ltd is a seed stage venture fund which primarily makes co-investments with business agels. Seed Fund Vera Ltd, is managed by Veraventure Ltd which is responsible for the fund's investments and for the development of target enterprises. Veraventure is a government backed venture capital investment Fund owned by Finnvera. Finnvera is a specialised financing company owned by the State of Finland, which provides financing for the start, growth and internationalization of enterprise operations.[102]

The establishment of Seed Fund Vera Ltd in 2005, was part of the Ministry of Trade and Industry's strategy to revise the seed funding and service system of starting innovation enterprises. The fund has 73,6 million euros under management. Other investors in Seed Fund Vera Ltd are Sitra (the Finnish Innovation Fund), TEK (The Finnish Association of Graduate Engineers), Ilmarinen Mutual Pension Insurance Company, Fennia Mutual Insurance Company and Mutual Insurance Company Pension-Fennia.

Target
Finnish early stage innovative technology companies. Investments are targeted to companies with less than 50 employees.

Aim of programme
Veraventure's immediate goals are to increase access to financing for SMEs and reduce the gap in the market between product development funding and private equity investments. The fund's ultimate goal is to enable, facilitate and accelerate the growth of enterprise and develop the enterprises to become interesting investment targets for other investors and industrial partners.

Instrument
Seed Fund Vera Ltd makes capital investments in innovative enterprises at their early stages. Veraventure takes an active part in the development of target enterprises. Decisions on investments in funds are made by Veraventure's Board and Veraventure is always represented on the Boards of the target funds to support the enterprise in strategic planning and development.

The majority of the investments are syndications with business angels. When the fund was established in 2005, none of the investments were made as syndications. The situation changed quickly, and by 2008 over half of the investments were made as syndications with either business angels or VC funds. Currently, three out of four investments are made as syndications (50 percent co-financing), with 80 percent of the syndicated investments made in conjunction with business angels and the remaining 20 percent with VC. The reason for this growth is a combination of the general direction of government strategy, which is to foster the growth of the private investment market, and the presence of the network of investors (InvestorExtra) that was established by VeraVenture in 2008.

In order to be a suitable investment target, the enterprise should have a business plan that is credible and feasible. The enterprise"s product or service should have clear, preferably international market potential. Moreover, the product/service should have a significant innovation aspect compared with rivaling products or services. Preferably, it should be possible to obtain a patent for the innovation. In addition, the eligible enterprise should be: - growth oriented; - a small or medium-sized enterprise registered in Finland; - orgarnised as limited company; and - at an early stage of its development. The fund receives more than 200 investment proposals a year from all industries. Generally, the fund is approached directly by the SME with an idea. Once the fund deems the idea to be sound, VeraVenture seeks out co-investors. There is a small but growing tendency for the process to be reversed; as the fund grows in popularity within the investment community in Finland, more investors are approaching VeraVenture with ideas. According to the interview conducted as part of the present report, a key factor to the success of the fund is that VeraVenture is proactive in developing its network (managing the network and coordinating events and networking opportuni-

[102] http://www.finnvera.fi/eng/

ties). The result of the proactivity is that VeraVenture has a high degree of control over the quality of the deal flow, rather than relying on others to identify opportunities.

Due diligence is undertaken on the investment project on a case-by-case basis, and no formal assessment or approval process is undertaken on the co-investor. This is due primarily to the small size of the investment community in Finland, but also because VerVenture tends to the party seeking out partners.

The fund seeks a return of five to ten times the initial investment, which is a standard rate and varies depending on the investment. As the investments are syndications, there is not a higher tolerance for loss. However, there is a higher tolerance for risk, which allows the fund to invest in early stages of an SME's development.

VeraVenture invests up to EUR 500,000 as an initial investment, and up to EUR 2,500,000 in total, including follow on investments. In addition to equity investments the fund can provide subordinate loans and convertible bonds, bonds with equity warrants and capital loans.

Date of creation	**2005**
Size of fund/programme (mio €)	**96.1**
Number of investments	**130**
Investments made since inception (mio €)	**41**
Average deal size (mio €)	**0.32**
Number of companies closed as percent of deals	**7.7**

Note: the figures above cite data from 2008, the most recent available.

Further information
http://www.metutechban.org/panel/upload_file/EBAN_COMPENDIUM_OF_CO-INVESTMENT_FOR_BUSINESS_ANGELS_AND_EARLY_STAGE_FUNDS_IN_EUROPE.pdf

Website: http://www.veraventure.fi/investors
Tel.: +358 20 460 3988

8.2.3 Seed Facility

Seed Facility provides loans to new venture funds and is managed by TechnoPartner. The TechnoPartner Seed facility arises from the government's objective to improve the economic climate for technostarters in the Netherlands. At present, the lack of risk capital during the early stages, the so-called equity gap, hinders technostarters in their attempts to develop their enterprises. Lenders are reluctant to invest in technostarters because the risks are too great and the revenue too low, given the relatively long investment period.

TechnoPartner is a joint initiative of the Ministry of Economic Affairs and the Ministry of Education, Culture and Science in The Netherlands. TechnoPartner helps people on the basis of a technical invention set up a business.

Target
The direct target is closed-end venture capital funds which invest in high-risk technology start-ups. The indirect targets are the high-risk technology start-ups which receives the funding from the venture capital funds.

Aim of programme
The TechnoPartner Seed facility aims to improve the risk-return ratio for investors and to increase the chance for "technostarters" to get financing. The objective of the TechnoPartner Seed facility is to encourage

and mobilise the very early stage of the Dutch risk-capital market in such a way that technostarters are able to obtain the required capital..

Instrument
Closed-end venture capital funds are eligible for a loan from the Seed Facility. The funds must invest in high-risk technology start-ups. The loan equals the amount deposited in the fund by private investors, up to a maximum of EUR 4 million.

In order to encourage seed stage investments, the Seed Facility reduces the risks for private investors in order to improve the risk-return ratio. From the instant revenue is generated, the venture capital fund will only have to pay back 20 % to TechnoPartner until the investors in the fund have earned back their investment. After that, the venture fund will have to turn over 50% until TechnoPartner has earned back its investment. If the fund keeps receiving revenue, the additional income is again divided between the investors and TechnoPartner on an 80%-20% basis.

Per 2010 30 funds have received loans from TechnoPartner and 15 funds are set up by business angels with a total investment budget of 86.2 mio. Euros. In another 8 funds business angels are involved as co-investors.

TechnoPartner has the following conditions that have to fulfilled when applying for the seed facility:

- At least three shareholders or partners must participate in the fund created
- The fund has the form of a public or private limited company, partnership or limited partnership
- The aim of the fund must be to eliminate the 'equity gap'
- Investments must be made during the fund's first six years. The fund must be liquidated at the latest 12 years after its inception

Each year, there is a three-month period in which start-up funds can apply for a loan. The applications are not only assessed against the formal requirements, but also with regards to a number of other essential criteria. The articles of association and similar documents must show that the fund is structured in a transparent manner and there must not be indications that fund parties are not reliable. Further, the fund's management must also have relevant experience and expertise as well as access to a relevant network, for acquiring, managing and disposing of participating interests as well as for supervising the technostarters concerned.

The policy of the fund must be laid down in a business plan for the fund plan. Among other things, the business plan must specify the target group in which the fund wants to invest (the technological area of these technostarters, their stage of life and geographical focus), the investment strategy (how are technostarters approached and, following an investment decision, supervised; the extent to which subordinated loans are provided in addition to share capital), the exit strategy, the structure and costs of the fund management and the guarantees of proper conduct. The plan is assessed for feasibility and effectiveness with respect to the target group.

An advisory committee advises the Minister as to whether applications are up to standard, and if so, how to rank the various applications.

The funds which the Seed Facility has provided loans to all expect a positive return on investment. The average internal rate of return (IRR) for the funds is 19.2 %. The Seed Facility itself does not have an IRR target but the Seed-facility aims to be revolving and should therefore not have any direct public costs.

Date of creation	**2004**
Size of fund/programme (mio €)	**120 (207-2011)**
Number of investments	**30 funds (2010)**
Investments made since inception (mio €)	**N/a**
Average deal size (mio €)	**N/a**
Number of companies closed as percent of deals	**N/a**

Further information:
http://www.metutechban.org/panel/upload_file/EBAN_COMPENDIUM_OF_CO-INVESTMENT_FOR_BUSINESS_ANGELS_AND_EARLY_STAGE_FUNDS_IN_EUROPE.pdf

Website: www.technopartner.nl
Tel.: +31 88 602 5444
E-mail: info@technopartner.nl

8.2.4 Scottish co-investment Fund

The Scottish Co-investment Fund (SCF) match investments from private partners in SMEs. It is a £67 million equity investment fund established by Scottish Enterprise in 2003[103], to invest from £100.000 to £1 million in company finance deals of up to £2 million. By January 2011 the fund invested for the total of £69 million in 216 companies. The investments comprised £27.5m from SCF and £41.5m from SCF private sector partners. The fund is a Public-private partnership.
The Fund was set up on the assumption that within Scotland there were sound investment propositions that, because of market failures, were unable to obtain the capital they needed to help them set up and grow. It aimed to fill this "equity gap" by making funds available. However, the "model" adopted (working through private sector partners) was intended to grow both capacity and capability in the market so that it would act as a catalyst for long term change.

Target
The fund makes investment in following sectors; Technology, creative businesses, electronics, manufacturing, pharmaceuticals, and biotechnology.
In order to be eligible for investment for the SCF, the investee company must:

- have less than 250 employees;
- have net assets less than £16 million;
- be doing a deal which involves the sale of an equity interest;
- Fall within the EU definition of a Small to Medium sized Enterprise (SME).
- be predominantly located in Scotland

Only VC fund managers, business angels and business angel syndicates which are approved as partners of SCF can receive co-investments from the fund.

Aim of programme
The immediate aim of the Co-Investment Fund is to work with private sector partners to increase capacity and capability in the venture capital market in order to increase the supply of early stage equity funding to Scottish based small and medium sized enterprises (SMEs) that have high growth potential. The ultimate objective of the fund is to make Scotland more globally competitive by helping innovative companies in key industry sectors and to improve the business environment for these.

Instrument
The Fund operates by recruiting formal and informal investors from the private sector to become partners. These include banks, venture capitalist, corporate investors, angels and angel syndicates.

Unlike a standard venture capital (VC) fund or a business angel, the SCF does not find and negotiate investment deals on its own; instead it forms contractual partnerships with active VC fund managers, business angels and business angel syndicates from the private sector (the SCF partner). An essential condition to become a partner of the SCF is that VC fund managers, business angels and business angel syndicates are able to demonstrate experience in early stages and more hands-on investments where company creation, expansion and business development skills are critical.

[103] £67m represents the fund capital value for the current 2007/13 period. The fund made additional investments from 2003-2006.

The SCF partner finds the opportunity, negotiates the terms of the deal and offers to invest its own equity cash. If the opportunity needs more money than the SCF partner can provide, it can call on the SCF to co-invest alongside on equal terms. The SCF partner determines how much the SCF can invest in any new deal; however, the SCF cannot invest more than the SCF Partner.
Key rules for the operation of the fund include:

- The SCF investment in a company must not exceed £1million in one tranche or in multiple rounds.
- The total deal size should not exceed £2million (including any debt component).
- The investment must be at least matched pound for pound by the SCF partner.
- The terms obtained must be pari-passu with the SCF partner.
- Scottish Enterprise cannot hold in aggregate more than 29.9 per cent of the voting rights of a company.
- Public money cannot account for more than 50 per cent of the total risk capital funding in a deal.

SCF is partly funded by the European Regional Development Fund (ERDF). SCF received £55m from ERDF towards the SCF fund capital value over 2 successive Programming periods: 2000/6 and 2007/13 SCF received ERDF funding by way of grant contribution. When a Programming Period closes and if here is any uninvested fund capital, then the ERDF portion must be repaid to the EC. SCF was fully invested during the 2000/6 Programmes and expects to be fully invested well before the end of the 2007/13 Programmes.

The SCF expects the fund to make a profit. The expectation is based on historic performance data supplied by the private sector investors' at the time when they applied to become SCF Partners. Since the fund is aimed at early stage innovative companies SCF does not expect to realise significant exits until 10 years after original investment. The fund started investing in 2003 so SCF doesn't expect to be able to calculate profit/loss or IRR for fund level performance until 2013.

The Fund was evaluated in 2008. The evaluation found that the fund was held in high regard by all parties – partners, investees, non-partner intermediaries and non-partner investors – and the model being used was widely praised. The Fund was also having a positive impact upon the performance of the investee SMEs and upon the wider Scottish economy. Turnover, gross value added (GVA) and employment have grown and are generally forecast to grow further as the companies develop.

Date of creation	**2003**
Size of fund/programme (mio €)	**72**
Number of investments	**216 (Jan 2008)**
Investments made since inception (mio €)	**32,5 (Jan 2011)**
Average deal size	**0.1-2.0**
Number of companies closed as percent of deals	

Further information:
http://www.metutechban.org/panel/upload_file/EBAN_COMPENDIUM_OF_CO-INVESTMENT_FOR_BUSINESS_ANGELS_AND_EARLY_STAGE_FUNDS_IN_EUROPE.pdf
Website: www.scottish-enterprise.com/invest-scottish-coinvestment-fund.htm
Tel.: +44 0141 248 2700
E-mail: enquiries@scotent.co.uk

8.2.5 Business Angels Co-Investment Fund, SAFPRI

In 2009, Portugal launched a new business angel co-investment program. The Business Angels Co-Investment Fund (SAFPRI) provides loans to new investment funds established by at least three business

angels. It is inspired by the Dutch TechnoPartner Seed Facility. The fund is managed by COMPETE, and COMPETE[104] is, in turn, managed by the Portuguese government.

SAFPRI is a public-private partnership. 35% of the capital is provided by private investors and 65% by the Portuguese Government. The size of the fund is EUR 43 million, with a commitment of EUR 27 million provided by the Portuguese government and EUR 16 million provided by business angels. The programme will run until 2012.[105]

Target
The direct target of the programme is business angels seeking co-investment to invest in SMEs. These business angels must form a limited joint venture for the purposes of acquiring the financing. This new joint venture then receives the loan. Ultimately, the intended indirect target group (downstream recipients) is SMEs located in Portugal within the following sectors; Industry, energy, construction commerce, tourism, transportation and logistics services.

Aim of programme
The fund aims at improving access to finance for SMEs and improving the return on investment for business angels by providing co-financing to business angels and assuming a considerable share of the financial risk related to the investments.

Instrument
The loan instrument is directed at joint venture formed by at least three business angels.

SAFPRI requires that least three business angels form a joint venture company with the purpose of risk investment, namely seed and start-up financing. The business angels must 35% of the necessary funds into the new company while COMPETE will make a 10 year (maximum) loan of 65% of the necessary funds, **up to EUR 500,000**.

The loans have a maximum duration of 10 years, at which point the loans are to be paid back based on the following repayment ratio between business angels and COMPETE occurring in 3 different phases:

- Phase A – Until business angels recoup their investment. The repayment ratio is 80-20%(BA/COMPETE),
- Phase B – Until COMPETE receives its loan back. The repayment ratio is 50-50% (BA/COMPETE)
- Phase C – After COMPETE and BAs have received their investment. The repayment ratio is 80-20%(BA/COMPETE),

Due to this repayment model the Business Angels recover their entire investment at 43.75% (35% / 0.8) return rate of the investment value of EV.

In order to qualify for loans under the business Angel co-investment Fund the investors must have status of a Business Angel. COMPETE recognizes FNABA (National Federation of Associations of Business Angels) and APBA (Portuguese Association of Business Angels) as competent authorities to verify the quality of a Business Angel. The minimum required by the APBA and FNABA are:

- Being a member of an Association of Business Angels;
- Compliance with the Code of Conduct of the Association of Business Angels;
- Minimum 5 years experience as an entrepreneur or business manager.

[104] www.pofc.qren.pt

[105] Source: Direct Communication- Ricardo Banha, Coordenador- FNABA

The first round of contracts was signed in December 2010 with 54 business angels companies, composed of more than 200 individual business angels. It is estimated that the investments will reach approximately 200 SMEs.

Date of creation	**2009 (first round Dec 2010)**
Size of fund/programme	**EUR 27 million plus EUR 16 million from Business Angels**
Number of investments	**200 (estimated)**
Investments made since inception (mio €)	**N/a**
Average deal size	**N/a**
Number of companies closed as percent of deals	**N/a**

Further information:
http://www.metutechban.org/panel/upload_file/EBAN_COMPENDIUM_OF_CO-INVESTMENT_FOR_BUSINESS_ANGELS_AND_EARLY_STAGE_FUNDS_IN_EUROPE.pdf
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9. Appendix B. Existing EU instruments

9.1 Competitiveness and Innovation Framework Program (CIP)-EIP

CIP was implemented in 2006 with a budget of EUR 3.621 billion for the period 2007-2013. The total budget will facilitate access to loans and equity finance for up to 400.000 SMEs. CIP is a result of different programs that are brought together to increase their visibility and to relate them more clearly to the wider competitiveness and innovation objectives of the EU.

Target population

The main target of CIP is small and medium-sized enterprises (SMEs). The Framework Program supports innovation activities (including eco-innovation), provides better access to finance and delivers business support services in the regions.

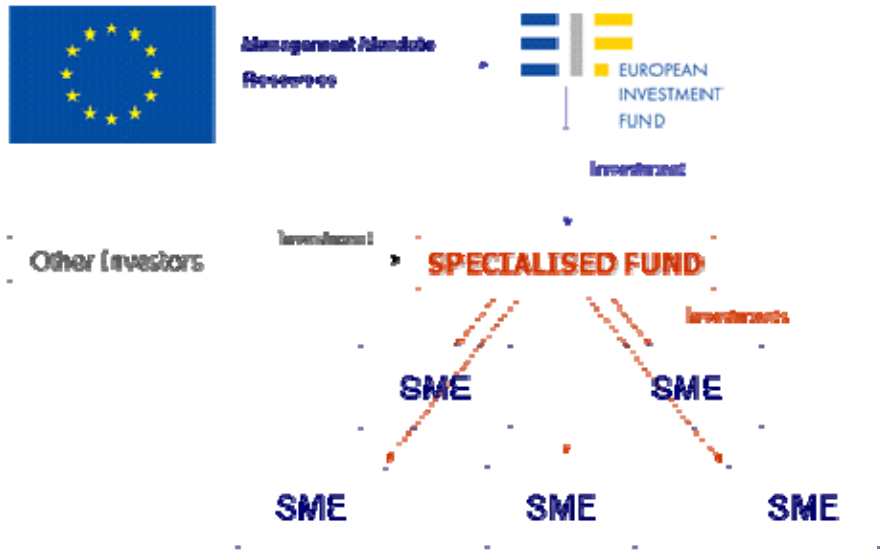
Problems addressed and aims of the program

The objective of CIP is to further competitiveness and innovation within the EU. The purpose of CIP is to promote increased use of renewable energies and energy efficiency. CIP provides a common framework for specific Community support in fields that are essential for strengthening productivity, innovation capacity, and sustainable growth in Europe, while addressing additional environmental concerns. It contributes to the development of effective EU policy and legislation e.g. by supporting analytical work that results in well-conceived legislation; it influences national / regional policy making (and policy orientation). The total EU financial resources for CIP are limited and the activities within the framework program are designed to both generate results directly; and to act as a 'Catalyst' for further investment and to lever changes in policies and practices more generally. The limited budget attached to CIP means that it is not an expenditure-orientated program.

Instruments

CIP is managed by five Directorates-General in the European Commission: DG Enterprise and Industry; DG Economics and Financial Affairs; DG Environment; DG Information Society and Media; and DG Energy and Transport. Implementation of parts of CIP is delegated to the Executive Agency for Competitiveness and Innovation, the European Investment Bank (EIB) and the European Investment Fund (EIF).

The two main facilities under CIP are the SME Guarantee (SMEG) Facility and the High Growth and Innovative SME Facility (GIF). Under GIF 200 million Euros is dedicated to venture-capital funds with an eco-innovation focus.



- GIF 1 covers early stage (seed and start-up) investments investing in specialized venture capital funds and co-investment in funds and investment vehicles promoted by business angels is also permitted. Under GIF 1, EIF can usually invest 10 to 25% of the total equity of the intermediary venture capital fund. For venture funds focused on eco-innovation, EIF investments may represent up to 50% of fund size.

- GIF 2 covers expansion stage investments by investing in specialized risk capital funds, which in turn provide quasi-equity or equity for innovative SMEs with a high growth potential in their expansion phase avoiding buy-out or replacement capital for asset stripping. Under GIF2, EIF can invest 7.5 to 15% of the total equity of the intermediary venture capital fund. For venture funds focused on eco-innovation the financing cap is 25%.

In terms of the SME Guarantee (SMEG) EIF provides guarantees partially covering portfolios of financing to SMEs. SMEG provides counter-guarantees or, where appropriate, co-guarantees for guarantee schemes operating in the eligible countries in addition to providing direct guarantees for any other appropriate financial intermediary. No specific part of the budget is dedicated eco-innovative SMEs.

The SMEG Facility has four business line described in the following:

- Loan Guarantees. EIF provides direct guarantees to intermediaries that provide finance directly to SMEs and Counter-guarantees to Intermediaries that issue guarantees for the benefit of lending institutions.
- Micro-Credit Guarantees. EIF partially guarantees portfolios of micro-credits to encourage financial institutions to provide financing to microenterprises, especially start-ups. Similar to the loan guarantees, EIF can provide both direct guarantees and counter guarantees.
- Equity Guarantees cover portfolios of investments in SMEs in the seed and start-up phases; Equity and Quasi-Equity Guarantees aim to help SMEs improve their financial structure.
- Securitization. Guarantees to support securitization structures to assist financial intermediaries in mobilizing debt finance for SMEs.

Partners may approach EIB either individually or through joint legal entities. Beneficiaries may thus include large companies, SMEs, public and private research organizations and public-private partnerships.

Since this report has a special focus on small scale debt financing it is worth mentioning **the loan guarantee facility in more detail.**

The loan guarantees programmes are run by intermediaries (banks or other financial institutions). Intermediaries are selected in conformity with best business and market practices. On the basis of a call for expression of interest, proposals are examined by the EIF, on a continuous basis taking into account the Guarantee Policies and Operational Guidelines. Proposals will be considered for approval by the EIF and the Commission, after satisfactory evaluation and pre-selection by the EIF, within the constraints of the available Community budgetary allocations.

The objective of the Loan Guarantee Window is to reduce the particular difficulties SMEs face in accessing finance either due to the perceived higher risk associated with investments in certain knowledge-related activities, such as technological development, innovation and technology transfer, or to lack of sufficient collateral. EU Guarantees are provided by the EIF on behalf of the European Commission and cover a part of the risk of the financial intermediary relating to the relevant loans or lease transactions.

Each EU Guarantee will provide partial cover to the commitment of the relevant Intermediary (directly or indirectly) with regard to individual debt financing included in the relevant Portfolio ("Guarantee Rate").
The Guarantee Rate shall be determined individually for each Portfolio having regard to the risk-sharing arrangements and the maximisation of the effect of the Community funds in increasing the availability of debt finance to SMEs. The Guarantee Rate will not exceed 50% of the commitment by the Intermediary.

The obligation of the EIF to pay a portion of the losses relating to a specific Portfolio will be capped to a preset amount (the "Guarantee Cap"). The standard guarantee cap rate shall not exceed 10% of the guarantee commitment under the relevant EU Guarantee. In duly justified cases, such as when financing start-ups, the guarantee cap rate can be up to 20%. The guarantee cap rate shall be determined by the EIF individually for each Portfolio, having regard to:

- the expected loss rate of the Portfolio, taking into account the expected default rate and expected recovery rate of the Portfolio, to be established and documented on the basis of historical data and/or forward-looking estimations;
- the risk premium charged by the relevant Intermediary; and
- the requirements as to enhanced access to finance as detailed above.

EU Guarantees will be provided without charging a guarantee fee. Contrary to GIF 1 and 2 there are no favourable conditions for eco-innovative SMEs.

Assessment
CIP was in March 2010, evaluated by Technoplis Group[106]. The evaluation described different strengths and weaknesses in the program.

Sources:

http://ec.europa.eu/cip/files/docs/interim_evaluation_report_march2010_en.pdf

http://webcache.googleusercontent.com/search?q=cache:TSU6Hl-QFvkJ:www.eif.org/what_we_do/equity/resources/european_commission/index.htm+CIP+EU+GIF1+and+GIF2&cd=1&hl=da&ct=clnk&gl=dk

http://ec.europa.eu/cip/files/docs/interim_evaluation_report_march2010_en.pdf

[106] http://ec.europa.eu/cip/files/docs/interim_evaluation_report_march2010_en.pdf

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:310:0015:0040:en:PDF

9.1.1 LIFE+ - Action Grants

LIFE+ - Action Grants is a program under the LIFE+ regulation (1992) and the specific funding is action grants. The LIFE + regulation contain three programs[107] where LIFE+ Action Grants is the largest funding instrument with a budget of 78% of the total funding instrument under LIFE+[108].

The LIFE+ Program - Action Grants[109], is created to fund projects that focuses on supporting environment policy development and implementation.

Target population
The LIFE+ grants are targeted mainly at public-sector application of innovative policies or programs, some of which include the development or application of innovative technologies or solutions.

To qualify for the Life+ grants a project has to be:

- Of community interest by contributing to the development, implementation and updating of Community environmental policy and environmental legislation.
- It has to be technically and financially coherent and feasible and provide value for money; as well as satisfying at least one of the following criteria: either be best-practice or demonstration projects concerning the protection of wild birds or habitats, or be innovative or demonstration projects relating to Community environmental objectives, or be awareness-raising campaigns and special training for agents involved in forest fire prevention or be projects for the development and implementation of Community objectives relating to the broad-based, harmonized, comprehensive and long-term monitoring of forests and environmental interactions.

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107 **The LIFE+ Programme** - Action Grants, funding projects to support environment policy development and implementation.
The NGO Programme – Operating Grants to fund the participation of NGOs in dialogue on environment policy.

Public Procurement (excluding NGO Programme) – funding the purchase of services by DG Environment to support policy development and implementation.

108 LIFE+ budget: €2.143 billion (2007-2013)

109 The funding is consolidated by two previous programs. The programs are described in the following.
Forest Focus - comparison of previous and current objectives and activities suggests that there may be a loss of effectiveness as a result. Although funding of forest monitoring has been maintained, the previous Forest Focus Regulation required MS involvement and engagement, which is now missing. This is likely to
Mid-Term Evaluation of the LIFE+ Regulation Final Report viii undermine the purpose and quality of the current activities. In addition a component of the previous programme is now funded separately by the European Parliament to 2010, leading to some fragmentation of co-ordination and uncertainty over future funding. The initial FUTMON forest monitoring project under the LIFE+ Regulation is nearing completion and will require evaluation.

Sustainable Urban Development - there was an evaluation of the Programme that suggested that the activities carried a risk of duplicating those activities funded by the LIFE Programme, and risks of double funding. It recommended the consolidation. Comparison of previous and current urban environment activities and funding levels suggests that there has been little change in the level of activity. There has been a change in the nature of beneficiary and type of activity, with less involvement of public authorities in networking activity. This may reflect the current levels of activity of this type and the limited need for any further funding of this type of networking activity.

Problems addressed and aim of program

The LIFE+ Action Grants is focused on working together with community instruments to improve delivery at national or local levels, to achieve community goals or to provide for community-wide exchanges of information. Action Grants seek to secure this objective through co-financing the work of beneficiaries in the member states, comprising in the main public authorities, research institutes and NGOs, but also businesses.

The grant supports demonstration projects of up to three years and is explicitly aimed at promoting environmental sustainability. The purpose of these granting measures is to raise awareness about the potential solutions and assist in capacity development for public-sector organizations that manage environmental resources. The general objective of LIFE+ is to contribute to the implementation, updating and development of Community environmental policy and legislation.

Instruments

The maximum rate of co-financing of action grants is 50% of eligible costs. However, for projects concerning the protection of priority habitats or priority species, LIFE+ may finance up to 75% of eligible costs. At least 50% of the funds allocated to action grants for projects are reserved for nature conservation and biodiversity. In addition, at least 15% of the funds allocated to action grants for projects are reserved for cross-border projects. Project costs are typically in the order of 2 million Euros and run for around 3 years.

Co-financed projects must be distributed proportionately by the Commission. The Commission has established indicative annual allocations for the periods 2007-2010 and 2010-2013 based on the total population and population density of each Member State, and the area of sites of Community importance in each Member State and the proportion of a Member State's territory covered by sites of Community importance. Additional funding may be allocated to land-locked Member States.

The Action Grant Program is based on an annual call for projects by Commission services. The call sets out the broad aims to which projects should be directed. Applications are appraised by Commission Services using an agreed and published appraisal framework. Submissions that meet or exceed the relevant criteria are awarded an Action Grant as co-finance.

Successful projects receive advice and support in the management and dissemination of their project, throughout the project from Commission services, with technical assistance secured through open tender. This technical assistance also allows the Commission to monitor and report on the progress of projects.

Assessment

In April 2010 a mid-term evaluation of the implementation of the LIFE+ Regulation was conducted[110]. The conclusions of the evaluation highlighted the added value of the LIFE Program. However, the evaluation also shed light on some challenges in the program.

One of the challenges mentioned, is how Article 1(2) of the LIFE+ Regulation and the Financial Perspectives has been interpreted. It is implying that all activities financed under the instrument must be for the benefit of the EU and its Member States. For action grants, this is particularly likely to affect nature projects requiring the co-operation of third countries to protect certain species that have trans-boundary patterns, as well as limiting the possibilities for the creation of corridors and stepping stones. Projects can no longer have partners situated outside the EU. For NGOs, this means that they are no longer able to fund offices situated outside of the EU, which can have possible impacts on partnership working and co-operation on certain international projects.

110

http://ec.europa.eu/environment/life/publications/lifepublications/evaluation/documents/LIFEplus_mte_report.pdf

Another challenge is that Annex II of the Regulation defines the priorities of the Regulation. This represents a high level summary of the 6EAP. However as a result, the Action Grant Program is constrained from introducing further definition and detail of the needs and priorities, and can not reflect changes in these priorities through time. As a result, the calls for proposals are less well defined than in previous programs and cannot focus on or target specific needs.

Sources:

http://ec.europa.eu/environment/life/publications/lifepublications/evaluation/documents/LIFEplus_mte_report.pdf

http://europa.eu/legislation_summaries/agriculture/environment/l28021_en.htm

9.2 CIP-EIP (Entrepreneurship and Innovation Program) Market Replication and First Application Projects

The initiative CIP Eco-innovation First Application and Market Replication Projects, also called CIP Eco-innovation, is part of the EIP which seeks to support innovation and competitiveness of SMEs, and aims to provide access to finance for SMEs. The EIP is part of the Competitiveness and Innovation Framework Program (CIP), which aims at encouraging the competitiveness of European enterprises. With SMEs as its main target, CIP also work to promote the increased use of renewable energies and energy efficiency.

The first call, of the CIP Eco-innovation, was held in 2008, with the first project launched in 2009. CIP Eco-innovation focuses on the promotion of entrepreneurship and innovation. The current EIP allocation for eco-innovation pilot and market replication projects has an indicative budget 195 million Euros to provide direct financing for relevant innovative enterprises.

Target population
CIP Eco-innovation is oriented towards SMEs. The instrument is concerned with the first application or market replication of eco-innovative techniques, products, processes or practices, which have already been technically demonstrated, but due to remaining risks need incentives to penetrate significantly the market. The projects have to aim at reducing environmental impacts, increasing resource efficiency or improve environmental performance of enterprises.

Problem addressed and aim of program
The three main aspects of CIP Eco-innovation are:

1. Environmental benefits
2. Economic benefits (including wide replication)
3. Contribution of projects to innovation

CIP Eco-innovation aims to bridge the gap between research and technological demonstration and promotion on one hand and commercialization on the other hand. Market demonstration and market uptake of eco-innovative solutions as well as their exploitation and replication are at the core of CIP Eco-innovation.

Instruments
The initiative tries to contribute to remove obstacles in the development and wide application of eco-innovation, create or enlarge markets for related products and improve the competitiveness of EU enterprises on world markets by increasing the market and by removing the barriers to market penetration. The initiative provides support for innovation grants. The grants are used to support 50 percent of the costs of eco-innovation pilot and market replication projects. The grants fill in the gap left by private sector venture capi-

tal and debt financing, the latter of which is normally provided by banks. As was explained in the previous sections, many eco-innovative SMEs are unable to attract risk-capital and are often unsuccessful when seeking debt financing. Thus, the grants are used as a bridging mechanism but also as a tool to help diffuse eco-innovations into new markets.

Sources:

http://ec.europa.eu/environment/eco-innovation/application_en.htm

http://ec.europa.eu/environment/eco-innovation/docs/call10/call10_text_en.pdf

http://ec.europa.eu/cip/eip/index_en.htm

http://www.mete.gov.al/upload/Eco-Innovation%20call%2009_Info%20day3_%20Tirana_10052010.pdf

http://ec.europa.eu/enterprise/dg/files/evaluation/final_report_eip_interim_evaluation_04_2009_en.pdf

9.3 Risk sharing finance facility

In 2007, the European Commission and the European Investment Bank (EIB) established the new risk-sharing finance facility (RSFF) to support research & innovation in Europe. Both the EU, through a new tool of the 7th Framework Program[111], and the EIB contributes with 1 billion Euros each.

Target population

The program is targeted at private and public organizations involved in research and innovation of any size and ownership, including corporations, midcaps, small and medium-sized enterprises, special purpose companies, public-private partnerships and joint ventures, research institutes, universities and science and technology parks. RSFF aims to improve access to debt financing by creating additional financing capacity for private companies or public institutions.

The facility is implemented through EIB. To be financed by the EIB, projects need to be technically, economically, financially and environmentally feasible according to the Bank's project evaluation criteria. The EIB will make available risk sharing credit facilities to its network of partner banks in all Member States and Associated Countries. Such facilities will increase the bank's lending capacity in support of eligible RDI projects.

Problems addressed and aims of the program

Today, investment in RDI is increasing in importance as a percentage of company budgets and is increasingly vital to many companies' long term survival. RDI is identified as a key factor to improve competitiveness and ensure long term economic growth and employment in Europe. Financial markets and financial institutions are traditionally reluctant to invest in RDI projects. This is due to the higher uncertainty and risks related R&D projects, compared to more traditional business projects.

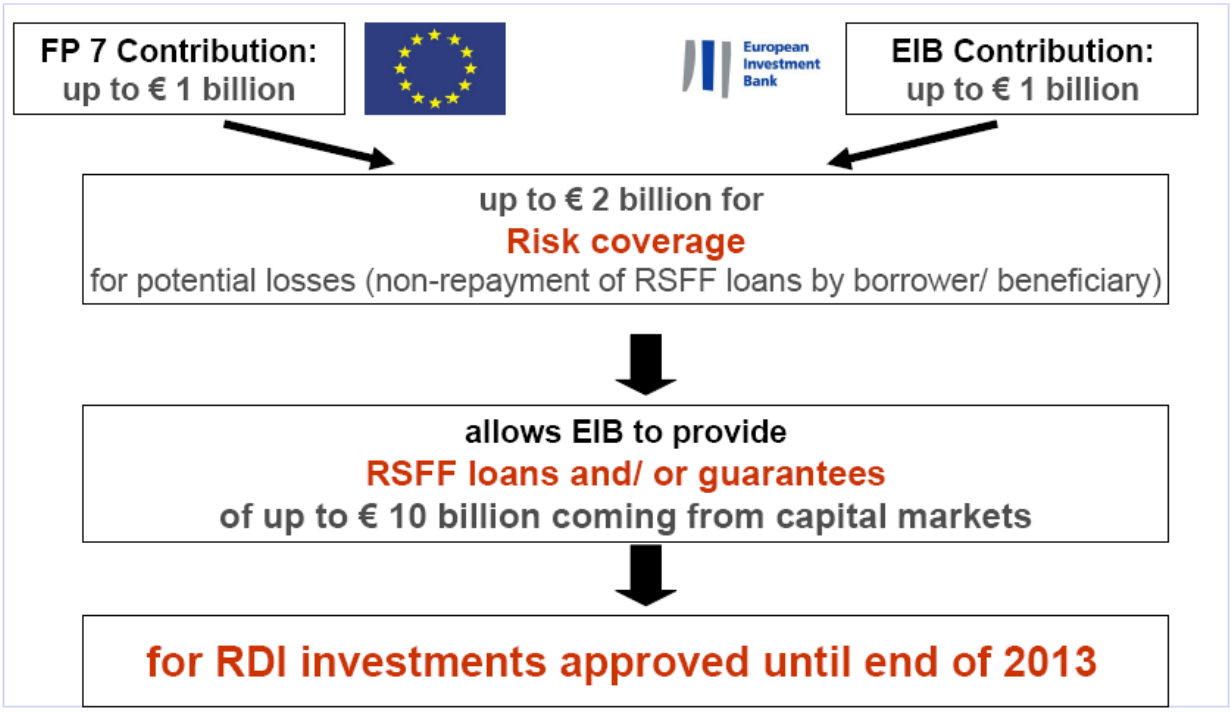
[111] The **Seventh Framework Programme (FP7)** bundles all research-related EU initiatives together under a common roof playing a crucial role in reaching the goals of growth, competitiveness and employment; along with a new Competitiveness and Innovation Framework Programme (CIP), Education and Training programmes, and Structural and Cohesion Funds for regional convergence and competitiveness. It is also a key pillar for the **European Research Area (ERA)**. The broad objectives of FP7 have been grouped into four categories: **Cooperation**, **Ideas**, **People** and **Capacities**. For each type of objective, there is a specific programme corresponding to the main areas of EU research policy. All specific programmes work together to promote and encourage the creation of European poles of (scientific) excellence.

http://cordis.europa.eu/fp7/understand_en.html

The program focuses on promoting activities in the field of investments in research, development and innovation (RDI)[112].

RSFF is built on the principle of credit risk sharing between the European Community and the EIB and extends therefore the ability of the Bank to provide loans or guarantees for investment with a higher risk and reward profile. The RSFF will partially cover the financial risks assumed by the EIB when financing this type of activity.

The RSFF has a 2 billion Euros capital cushion, 1 billion Euros from the EIB and the same amount from the Commission's 7th Research Framework Program (2007-2013), enabling the Bank to lend more than 10 billion Euros for this kind of investment.

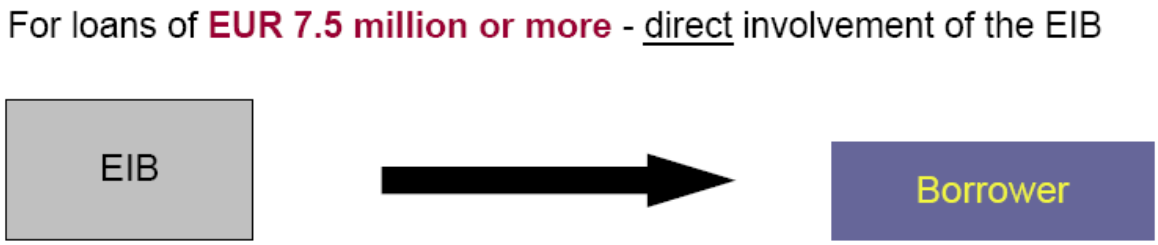


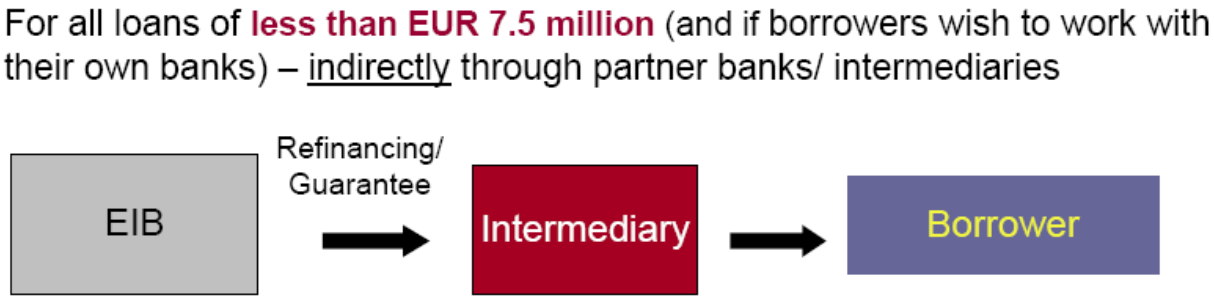
Instruments

RSFF is a loan guarantee of up to 2 billion Euros. RSFF will increase the EIB's capacity to finance more R&D and innovation projects, and thus enable it to provide loans and guarantees with higher risk profiles. By reinforcing the financing capacity of the EIB in the area of research and innovation, RSFF will facilitate and leverage the efforts of a large number of European financial institutions in RDI financing, thus increasing banking and capital markets financing in that sector. RSFF financing will either be provided directly to the promoter or via a financial intermediary (e.g. one of the promoter's house banks). The EU and the EIB will

- [112]Basic or Fundamental Research
- Applied or Industrial Research
- Experimental or Pre-competitive development
- Definition stage or feasibility studies
- Pilots and Demonstration activities.
-

be reimbursed for the risks taken. EIB financing is always subject to the Bank's satisfactory assessment of the project's technical and economic viability and the borrower's bankability.





The Facility is open to eco-innovation projects. Most of the projects within eco-innovation that has attracted financing under RSFF are within energy, which make up around 15 percent of the projects.

Assessment
RSFF has been evaluated in 2010[113]. The evaluation described different strengths and weaknesses in the program.

Strengths

- EIB can strengthen the promoter's financial profile, thereby increasing the capacity to attract additional funding for an investment.
- Risk sharing with the banking sector will ease the existing risk management related to lending money. The financial community's overall capacity to support RDI activities particularly in the area of Small and Medium sized Enterprises will thereby be improved.
- RSFF will improve the Bank's ability to develop new financial products in order to overcome the market's weakness in terms of financing the target group.
- Partners may approach EIB either individually or through joint legal entities. Beneficiaries may thus include large companies, SMEs, public and private research organizations, public-private partnerships.
- In addition to benefiting riskier projects, the RSFF aims to having a demonstration effect: R&D stakeholders and financial institutions will learn to work together, paving the way for further R&D loans in Europe.

Weaknesses

One of the main challenges is how to reach the target groups (SMEs, Research Infrastructures) more sufficiently (through change of risk-sharing and specific approaches).

[113] http://www.eib.org/attachments/ev/ev_rsff_en.pdf

Sources:

http://www.eib.org/products/loans/special/rsff/index.htm

http://www.europarl.europa.eu/document/activities/cont/201011/20101119ATT96306/20101119ATT96306EN.pdf

http://ec.europa.eu/invest-in-research/funding/funding02_en.htm

http://www.eubusiness.com/topics/finance/risk-sharing-finance.qa/

http://www.eib.org/attachments/ev/ev_rsff_en.pdf

10. Appendix C. Financial actors interviewed

United Kingdom – 3 interviews	
1. Enterprise Ventures, Ltd. (EV Tech)	VC Fund
2. Amadeus	VC Fund
3. Frog Capital	VC Fund
Denmark – 5 interviews	
4. Seed Capital	VC Fund
5. Merkur	Bank
6. Bank Invest	VC Fund
7. North Capital	VC Fund
8. Vækstfonden	Public VC Fund
Germany – 5 interviews	
9. KFW Mittelstandsbank	State Supported Development Bank
10. Siemens VCGMBH	Corporate Venturing
11. High-Tech Gruenderfonds Management GmbH	VC Fund
12. Hellmut Kirchner	BA
13. WHEB	VC Fund
France – 5 interviews	
14. Veronique Castelo	BA
15. Credit Cooperatif	Bank
16. Michael Sandager	BA
17. Demeter Partner	VC Fund
18. Arnaud Delattre	BA
The Netherlands – 5 interviews	
19. Rabobank	Bank
20. Triodos	Bank
21. Tendris	Company with eco-innovation corporate

	venture activity
22. Start Green Sustainable Innovation Fund	Public VC Fund
23. Het Agentschap NL	Public Funding Scheme
Czech Republic – 2 interviews	
24. 3TS Capital Partners	VC Fund
25. Ira Rubenstein	BA
Finland – 4 interviews	
26. VeraVenture Oy	VC Fund
27. Ari Hyppönen	BA
28. TEKES	VC Fund
29. VNT	VC Fund
Italy – 3 interviews	
30. Banca Etica	Bank
31. Salvatore Scagliarini	BA
32. Intesa Sanpaolo Atlante Ventures	VC Fund
Poland – 2 interviews	
33. Polish Investment Fund	VC Fund
34. Euro Centrum	Public Venture Fund
Slovenia – 1 interview	
35. RSG Capital d.o.o.	VC Fund
Austria – 2 interviews	
36. Austria Wirtschaftservice (AWS)	Public funding scheme
37. Pontis Capital	VC Fund
Spain – 3 interviews	
38. Axon Investment	VC Fund
39. ICO	Public funding scheme
40. SI Capital	VC Fund
Belgium- 1 interview	
41. Capricorn	VC Fund

Further, representatives of the following organisations have been interviewed:

- European Investment Fund (EIF), Dr. Matthias Ummenhofer, Head of Venture capital.
- European Business Angela Association (EBAN), Claire Munck, Managing director.
- European Venture Capital Association (EVCA), Thomas Meyer, Director (Limited Partners Platform) and Emma Fau Sebastian, Head of Public Affairs Venture.

11. Appendix D. Case studies

Ten case studies were completed as part of the field research for the overall project. These are listed in the table below.

Case study	Type of actor / Country
Austria Wirtschaftsservice	Public financing instrument- Austria
Visedo	SME- Finland
Corso Magenta	SME- France
Michael Sandager	Business Angel- France
Terrawater	SME- Germany
Protix Biosystems	SME- Netherlands
Triodos bank	Bank- Netherlands
Envit D.O.O.	SME- Slovenia
Novacem	SME- UK
Frog Capital	Venture Fund- United Kingdom

12. Appendix E. Questionnaire for survey of SMEs

Q1

Q1. How many employees does your business have, including management, in full time equivalents?

1-4
5-9
10-49
50-249
250 or more
Don't know **[Do not read]**

Q2

Q2. What type(s) of eco-innovation(s) is your business developing?

[Definition of eco-innovation: all forms of innovation activities resulting in or aimed at significantly improving environmental protection. Eco-innovation includes new production processes, new products or services, and new management and business methods, whose use or implementation is likely to prevent or substantially reduce the risks for the environment, pollution and other negative impacts of resources use, throughout the life cycle of related activities.]

[Read out, more than one answer possible]

Product innovation
Process innovation (a new production method applying an existing technology)
Service innovation
Organisational/ management/ business model innovation
Any innovation applying a new technology
Other innovation (please specify)

Not an eco-innovative firm
Don't know **[Do not read]**

Q3

Q3. To which economic sector does your business belong?

[Read out]

Agriculture, forestry, and fishing
Manufacturing and mining
Construction/building
Trade
Transport and storage
Accommodation and food services
Business services
Others (please specify)

Q4

Q4. Which sector(s) do you consider to be the main target industry or industries for your products and/or services? Please select up to three.

[Read out, more than one answer possible]

Energy generation
Energy storage
Energy infrastructure
Energy efficiency
Transport
Water and wastewater
Air and environment
Materials
Agriculture
Recycling and waste
Building/construction

Food and drink manufacturing
Other manufacturing
Other, please specify

Don't know [Do not read]

Q5
Q5. In which year was your business established?
[Please state year, reasonable estimate will do]

Don't know [Do not read]

Q6
Q6. In which stage of development would you consider your business to be?
[Definition of terms:
Seed: Main activities include research, assessment and development of an initial concept before a business has reached the start-up phase.
Start up: Main activities include product development and initial marketing. Businesses may be in the process of being set up or may have been in business for a short time, but have not sold their innovation commercially.
Expansion: An innovation has been launched or implemented and the main focus is on growth and expansion of the business, which may or may not break even or trade profitably.
Later: Business is established and the main focus areas include replacing capital or preparing for exit, such as by preparing to be bought out.]

[Read out]

Seed stage
Start up stage
Expansion stage
Later stages
Don't know [Do not read]

Q7
Q7. Has your business already launched or implemented an eco-innovation?

No
Yes

Q8
Q8. How many eco-innovations has your business implemented or launched?

1
2-4
5 or more
Don't know [Do not read]

Q9
Q9. Has your business ever implemented or launched another innovation (not focused on eco-innovation)?

Yes
No
Don't know [Do not read]

Q10
Q10. How experienced do you consider your management team to be?

	Very Experienced	Somewhat experienced	Inexperienced	Don't know
Technical experience				
Business experience				

Q11
Q11. What is the total amount of financing in <%~Currency%> that has been injected into your business since its foundation, including own-source, public, and private sources of finance?

less than 100.000 euro
100.000 to 500.000 euro
500.000 to 1.000.000 euro
1.000.000 to 2.000.000 euro
2.000.000 to 5.000.000 euro
5.000.000 euro or more

Do not know [Do not read]
Information withheld

Q12

Q12. Have you ever used the following types of financing since the establishment of your business?
[Mezzanine financing: A hybrid of debt and equity financing that is typically used to finance the expansion of existing businesses. Mezzanine financing is basically debt capital that gives the lender an extra payment if the business is successful.]

	Yes	No	Don't know	Information withheld
Own source (friends, family, founders)				
Debt financing				
Venture capital				
Business angel				
Other forms of equity than venture capital and business angels (for example buyout)				

	Yes	No	Don't know	Information withheld
Mezzanine				
Public grants				
Loan backed by loan guarantee				
Other public funding				
Other financing				

Q13

Q13. Please state the percentage of the total financing it comprised.
[INT: please be aware that combination of answers is reasonable, i.e. if only three answers: 3 times 80-100%, or three times 0-20% is not possible (not adding to 100%).]

	0-19	20-39	40-59	60-79	80-100	Don't know	Information withheld
Own source (friends, family, founders)							
Debt financing							
Venture capital							
Business angel							
Other forms of equity than venture capital and business angels (for example buyout)							

	0-19	20-39	40-59	60-79	80-100	Don't know	Information withheld
Mezzanine							
Public grants							
Loan backed by loan guarantee							
Other public funding							
Other financing							

Q14

Q14. Is your business currently seeking finance?

Yes
No
Don't know [Do not read]
Information withheld

Q15

Q15. What are the three most important sources of information you do/did consult when seeking finance?
[Investment readiness programme: a programme that aims to prepare business to seek investment by providing mentoring, advice, or assistance with business plan development, proposal writing, networking, presentation skills, or understanding financing options.]

Other innovators in your industry
Industry newsletter

Investment readiness programmes
Industry/ cluster associations
Banks or other financial institutions
Government publications
Internet search
Informal network
Business adviser
Other (please specify)

Do not have specific source
Don't know [Do not read]

Q16
Q16. Have you ever sought financing but been unsuccessful? If yes, please state the stage(s) at which you were unsuccessful.
[More than one answer possible]

Yes, seed stage
Yes, start up stage
Yes, expansion stage
Yes, later stages
No, never
Don't know [Do not read]
Information withheld

Q17
Q17. Has your business ever sought financing from the following providers of finance?

	Yes, successfully	Yes, but not successful	No	Don't know/information withheld
European Union programmes				
Providers from other European Union countries				
Providers from non-EU countries				

Q18
18. Please specify home countries of providers of finance, whether or not you were successful.

Country 1	Don't know/not applicable
Country 2	Don't know/not applicable
Country 3	Don't know/not applicable

Q19
Q19. At which stage of development did you first start looking for these international providers of finance?

Seed stage
Start up stage
Expansion stage
Later stages
Don't know [Do not read]
Information withheld

Q20
Q20. How significant are the following <u>external</u> barriers for your business when seeking financing?

[A demonstration site is a small-scale implementation of an eco-innovation on a trial basis and is used to prove a concept under real-world conditions.]

	Very significant	Somewhat significant	Not significant	Not applicable	Don't know
Insufficient market demand for innovation					
Limited market information (unknown number or type of customer)					
Difficulty meeting certification or regulatory requirements					
Protecting intellectual property rights is difficult and expensive					
Potential financial suppliers insufficiently engaged with eco-innovative industries					
Financial suppliers' expected returns are different from your business goals					
Financing available not tailored to small-scale investment needs					

	Very significant	Somewhat significant	Not significant	Not applicable	Don't know
Difficulty with public-sector customers					
Lack of contacts within your industry					
Uncertainty of government policy or regulation					
Lack of available demonstration sites					
Other 1 (Please specify)					
Other 2 (Please specify)					

Q21
Q21. How significant are the following internal barriers for your business when seeking financing?

	Very significant	Somewhat significant	Not significant	Not applicable	Don't know
Financial supplier requested an unacceptably high level of control of your business					
Lack of technical experience in your business as perceived by financial supplier					
Lack of business experience in your business as perceived by financial supplier					
Insufficient amount of collateral available					
Difficulty recruiting skilled professionals					

	Very significant	Somewhat significant	Not significant	Not applicable	Don't know
High administrative burden					
Limited resources dedicated to seeking or securing finance					
Lack of knowledge of financing options					
Other 1 (Please specify)					
Other 2 (Please specify)					

Q22
Q22. In your estimation, how do you expect your access to finance to be 12 months from now?

Better than today
Same as today
Worse than today
Don't know **[Do not read]**

Q23
Q23. In your estimation, is accessing finance more difficult for eco-innovative businesses than for other innovative businesses?

Yes
No
Don't know **[Do not read]**

13. Appendix F. interview guide for investors

The interviews will be semi-structured interviews. A semi-structured interview is flexible, allowing new questions to be brought up during the interview based on interviewee responses.

The interview guide should be considered as a grouping of topics and questions that the interviewer can ask in different ways for different participants. Not all questions are relevant for all types of financial actors and the questions will be tailored to the interview context/situation, and to the people being interviewed. Therefore, the guide should be considered as a framework of themes to be explored. The specific topics to explore during each interview will be decided in advance.

1. Background – general

- Background on company/organization in general
    - Structure, capital under management, number of funds, operations, and funding/investment history
    - Who has provided the capital for the fund(s)

- Background of management team
    - Education and experience

2. Background – investing in (non-energy) eco-innovation

- How many years of experience do you (the management team) have in investing in eco-innovation?
    - How has the experience been gained?
    - What is your experience with raising venture capital funds focused on eco-innovation?

- Rationale for investing in eco-innovation
    - Why do you invest in eco-innovative SMEs?
    - What types of eco-innovative SMEs do you invest in? Why these?
    - Where (subsectors) do most funds currently focus? Why?
    - Operations in more detail: your focus, strategy and position in market?

- How have you experienced the demand for and supply of eco-innovation financing in the past years?
    - Is it more difficult to raise funds within certain areas, e.g. waste or water?
    - Are there particular financing gaps for eco-innovative SMEs?

- What are the main barriers/obstacles when trying to raise capital for new funds focused on eco-innovation from institutional investors (and other potential investors)?
    - What are their motives to supply capital? Their main concerns? What are their conditions for providing financing?

3. Investment opportunities

- What is your process of scouting eco-innovative SMEs?
    - Differences according to industry/sub-sectors?
    - Due diligence process

- What are the criteria you use when evaluating eco-innovation investment opportunities?

- Are the investment criteria different for funds focused on eco-innovation compared to funds focused on innovative industries such as ICT, life sciences – e.g. more difficult or requires different/more specific skills?

- Are the investment criteria different for sub-sectors within eco-innovation (waste, water, materials, transportation)?

- What are the characteristics of a good investment opportunity in eco-innovation?
    - Risk/return, growth and exit perspectives?
    - Preferred experience of SME management team?
    - Concrete examples?
    - Differences according to industry/sub-sectors?

- What are the typical weaknesses and barriers you see when assessing investment opportunities in eco-innovative SMEs?
    - Related to the stage of investment (seed, start up, expansion, later stage)
    - Related to the entrepreneur(s)? (for example business and technical skills of entrepreneurs, drive, ambitions)
    - Related to the product/service?
    - Related to framework conditions? (tax and legal concern, importance of regulation and subsidies)
    - Concrete examples?
    - Differences according to industry/sub-sectors?

- How do you consider the development in investment opportunities (i.e. availability of interesting eco-innovative SMEs)?
    - Differences between industries/subsectors?

- In your opinion, are some eco-innovation industries (sub-sectors) more promising than others and why?

- In your opinion is there a lack of financing for eco-innovative SMEs or a lack of good investment opportunities?

- Is it in your opinion more difficult for eco-innovative SMEs to get financing than other innovative SMEs? Why/why not?

4a. Managing investments

- How do you manage your portfolio of eco-innovative SMEs?

- Use of criteria and milestones?
- How would you describe your role as investor in relation to eco-innovative SME, e.g. with regards to management decisions, strategy, etc.?
- Differences compared to other innovative investments? More or less hands on?
- Differences according to industry/sub-sectors?

- What are the characteristics of your portfolio and their current challenges? Are there any recurring challenges you face in developing and growing the SMEs you have invested in?
  - Differences compared to other innovative investments like ICT, life sciences etc.?
  - Track record and exits compared to other innovative areas?
  - Differences according to industry/sub-sectors?

- Is the equity capital you provide typically combined with other types of financing?
  - In what instances? At which stage of development? What other types of financing?
  - What are the criteria the SMEs most fulfill to be eligible for other types of financing?
  - Difference to other innovative SMEs and within sub-sectors

- Considering your current experience with investing in eco-innovation, what are the most important lessons you have learned?
  - E.g. need for specialization of investors? Public/private partnerships? Experiences with specific instruments?
  - Differences according to industry/sub-sectors?

5. A national or transnational market of eco-innovation finance

Do you invest outside the country where the fund is based?

- Why/why not?
- If yes, what type of companies abroad would you consider (stage of development, subsector, co-financing involved) and from which countries? why?

- Is there in your opinion an EU wide market for eco-innovation finance?
  - Is there an EU market for equity financing in general?
  - If yes, please explain why you consider such a market for eco-innovation finance to be present?
  - If no, why not? What are the barriers?
  - What are the consequences?
  - What could be done to create an EU wide market?
  - Are there any good practice examples of cross border tools or instruments which have facilitated cross border investments in eco-innovative SMEs? Which subsectors do they apply?

- For investors with a European/international perspective: In your opinion, in which countries are the markets most mature with regards to eco-innovation financing?
  - What are the central lessons from the most mature markets?
  - What has been done to develop these markets?

- Could similar initiatives/programmes be implemented in other countries with similar results?

6. A thriving eco-innovative industry in the future

- What are your thoughts on how to improve the pipeline of non-energy eco-innovative SMEs?
  - What could be done in which subsectors?

- What are your thoughts on how to improve the supply of finance for eco-innovative SMEs – especially at early stage?
  - What framework conditions should be improved to facilitate more investments in eco-innovative SMEs

- What is your knowledge of current policies, financial instruments and support schemes for eco-innovation in [*financial actor's home country*]?
  - How would you evaluate the efficiency of these policies, instruments and schemes?
  - Differences according to industry/sub-sectors?

- What is your knowledge about current European policies, financial instruments and support schemes for eco-innovation (i.e.: GIF, SMEG, Risk sharing finance facility etc.)
  - How would you evaluate the efficiency of these schemes, instruments and policies with the aim of leveraging access to finance of eco-innovative SMEs?
  - Differences according to industry/sub-sectors?

- Do you know of any other examples of successful eco-innovation financing instruments?

- In your opinion, what are the decisive framework conditions for a thriving non-energy eco-innovation industry?
  - Are you satisfied with the role of the EU and EIB in supporting eco-innovation financing when compared to other actors (national, regional, local)?
  - If not, how do you think it should improved (more active, less active, different type of activities, provide finance through national funds or directly, programmes are too bureaucratic, programmes are not known by enough SMEs)?

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14. Appendix G. Interview guide for loan providers

The interviews will be semi-structured interviews. A semi-structured interview is flexible, allowing new questions to be brought up during the interview based on interviewee responses.

The interview guide should be considered as a grouping of topics and questions that the interviewer can ask in different ways for different participants. Not all questions are relevant for all types of financial actors and the questions will be tailored to the interview context/situation, and to the people being interviewed. Therefore, the guide should be considered as a framework of themes to be explored. The specific topics to explore during each interview will be decided in advance.

1. Background – general

- Background on company/organization in general
    - Structure, operations, types of lending provided and the total volume?
    - Share of lending to eco-innovative firms?
    - Why interest in lending to eco-innovative firms?
    - Does the company/organization focus on sustainability in general?

- Background of management team
    - Education and experience of consulting professionals/lending specialists?

2. Background – investing in (non-energy) eco-innovation

- For how many years have your company/organization had a special focus on lending to eco-innovative SMEs?

- Rationale for investing in eco-innovation?
    - What types of eco-innovations do you lend to and why?

- Describe relevant products offered to eco-innovative SMEs?
    - Are they for all SMEs vs. only for eco-innovative SMES?
    - For all eco-innovative SMES vs subsectors?
    - For new businesses versus established business?
    - For high technology businesses vs. traditional business?
    - For high vs. low risk borrowers?

- How many of the businesses obtaining loans are traditional eco-SMEs and how many are eco-innovative SMEs? How many are new businesses? How many are established businesses?
- How have you experienced the demand and supply of debt financing for eco-innovative SMEs in the past years?

- How has the total loans provided for eco-innovative SMEs by your organization developed
- Are there particular financing gaps for eco-innovative SMEs? If yes,why?

3. Assessing eco-innovative SMEs

- Which criteria do you apply when assessing applications for loans from eco-innovative SMEs?
  - Use of credit scoring systems
  - Differentiation between high risk vs. low risk borrowers
  - Differences according to industry/sub-sectors?

- What types of security/collateral does the Bank typically require
  - What is the preferred (or most common) form used when providing loans to eco-innovative SMEs?
  - How does this differ within eco-innovation (sub-sectors) and from other innovative SMEs

- Are the criteria applied when assessing loan applications from eco-innovative SMEs different than the ones applied to other innovative SMEs/industries –
  - Is the price of credit different?

- What are the characteristics of a good loan application in eco-innovation?
  - Risk, growth and possible future relationship?
  - Collateral, own funds invsted, assets, cash flow, revenue generation, profitability?
  - Known business model, qualify for loan guarantee?
  - Preferred experience of SME management team?
  - Differences according to industry/sub-sectors?

- What are the typical reasons for rejecting applications for loans from eco-innovative SMEs?
  - Lack of credit history, collateral, experience of management team, (small) size of loan application and cost of lending to SMEs?
  - Are the reasons different according to subsector or different from other other innovative SMES

- In your perspective, are some eco-innovation industries (sub-sectors) more suited for receiving loans than others and why?

4. Providing loans

- Do you provide loans to eco-innovative SMEs which have already received equity financing?
  - If so, what are the criteria a business must meet to obtain a loan?
  - What are the characteristics of the businesses that seek to supplement equity financing with debt financing? How far are they in the development of innovation(s)?

- What are the characteristics of the eco-innovative SMEs you have provided loans to and what are their current challenges?

  - Are there any recurring challenges you experience when monitoring the eco-innovative SMEs you have provided loans for?

  - Do you also see these for other innovative SMEs?

- Differences according to industry/sub-sectors?

- How do you monitor the eco-innovative SMEs you provide loans to?

- Considering your current experience with lending to eco-innovative SMEs, what are the most important lessons you have learned?
  - E.g. need for specialization of organisations? Experiences with specific instruments?
  - Differences according to industry/sub-sectors?

5. A thriving eco-innovative industry in the future

- What are your thoughts on how to improve the supply of debt finance for eco-innovative SMEs?

- What is your knowledge of current policies, financial instruments and support schemes for eco-innovation in [*financial actor's home country*]?
  - How would you evaluate the efficiency of these policies, instruments and schemes?
  - Differences according to industry/sub-sectors?
  - Suggestions for improvements?

- What is your knowledge about current European policies, financial instruments and support schemes for eco-innovation (i.e.: GIF, SMEG, Risk sharing finance facility etc.)
  - How would you evaluate the efficiency of these schemes, instruments and policies in terms of leveraging access to finance of eco-innovative SMEs?
  - Differences according to industry/sub-sectors?

- Do you know of any other examples of successful eco-innovation financing instruments?

- In your opinion, what are the decisive framework conditions for an efficient debt financing market for eco-innovative SMEs?
  - Are you satisfied with the role of the EU and EIB in supporting eco-innovation financing when compared to other actors (national, regional, local)?
  - If not, how do you think it should change (more active, less active, too bureaucratic, different type of instruments)?

15. Appendix H. Bibliography

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