



The Role of Business Development Organizations in Supporting Sustainable Entrepreneurship and Eco-innovation

Work package 4

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Executive Summary

Eco-innovation continues to gain support as a driving force for sustainable development. In this regard, pressing questions include how to stimulate the widespread development, diffusion and use of eco-innovations. Often, firms engaged with eco-innovation need to connect to intermediary organizations (e.g. universities, financiers, incubators, business development organizations, regional clusters) to get hold of necessary resources to tackle the challenges in the innovation process. This work package analyses the functions of such intermediary organizations for eco-innovation by focusing on public-owned business development organizations and cluster initiatives in the Region Skåne, Sweden and North Rhine Westphalia, Germany. We synthesis at least eight functions of intermediaries for eco-innovation as: (i) forecasting and road mapping (ii) resource mobilization (iii) networking and partnerships (iv) commercialization (v) technical consulting (vi) information scanning and distribution (vii) sector branding and legitimation (viii) prototyping and piloting. The support functions often take a “one-size-fits-all” approach with few initiatives particularly tailored for eco-innovations. This can be explained by the market complementarity roles of public intermediaries, their resource constraints and the across-sectoral nature of eco-innovation. Even though, intermediary functions are often appreciated by clients and financiers, it is often difficult to establish a causal relation between the support and eco-innovation outcomes, a challenge which undermines the existence of intermediaries themselves. Despite these challenges, potential good practices point to a mix between general “one-size-fits-all” and tailored support activities for different types of eco-innovations and firms. Furthermore, interaction between various types of intermediaries is important since there are often numerous actors and initiatives working with eco-innovation which can confuse firms. When it comes to stimulating radical eco-innovations, a proactive approach to intermediation is particularly important.

1 Introduction

Experience from supporting small enterprises in environmentally driven business development demonstrates the importance of a Triple Helix approach that involves different Business Development Organisations (BDO; Hjelm, 2011). A small company often lacks some competences needed for sustainable entrepreneurship and eco-innovation, and is therefore dependent on different actors in the innovation system for support. Using the Triple Helix model, the innovation system is described to consist of three different types of actors; industry, academia and supportive organisations (see e.g. Etzkowitz and Leydesdorff, 2000). Business development organisations mainly belong to the supportive organisations. This work package (WP) focuses on the activities and functions of public owned business development organizations including cluster initiatives¹ in the development, diffusion and use of eco-innovations in small and medium size companies.

1.1 Aim and research questions

This WP aims at *identifying relevant business development organisations including cluster initiatives and examines their potential* in supporting eco-innovation, identification of best practices and conclusions for a paradigm shift of the support system. This work package focuses only on public-owned organizations because of their role in sustainability related activities and also the practicability of being studied compared to private actors (see Kivimaa, 2014).

Referring to (Fichter et al., 2013) who elaborate a general approach for analysing business support systems which covers supply (organizations that support businesses) – demand (firms and entrepreneurs) and a gap that might exist between these two, we have formulated complementary research questions to study BDOs and small and medium sized companies (SMEs) and the potential gaps between supply and demand. We intend to answer the following research questions:

- (1) Which kind of support is provided by BDOs to SMEs seeking advice in eco-innovation?
 - How is the support activities performed?
 - How is the support activities followed up?
- (2) What are challenges with current support activities of BDOs to SMEs in eco-innovation?
- (3) What could be “good” practices with the support activities of BDOs in eco-innovation?

The purpose of this report is mainly to document the empirical data that was collected as part of work package 4 which focused on business development organizations including cluster initiatives. An overview analysis of the empirical data is also provided in-line with the guiding research questions but a more elaborate analysis of the empirical data is planned for the scientific publications which are planned outcomes of this work package. This report is part of a bigger SHIFT project which has a goal to analyze how public, intermediary and private support systems for entrepreneurship have to be changed in order to systematically boost the development and implementation of eco-innovation.

¹ A cluster initiative is defined as “...collaborative actions by groups of companies, research and educational institutions, government agencies and others, to improve the competitiveness of a specific cluster [... for example] by raising the awareness of companies within a cluster and creating more effective platforms for interaction [... or providing] a platform for a better dialogue between the private and the public sector when making decisions about how to improve the cluster-specific business environment.” (Ketels & Memedovic, 2008, 384) (cited in Fichter et al., 2013 p. 97).

2 Background literature

An extensive discussion on relevant theoretical frameworks and concepts was provided in work package 1 which serves as the departing point for the entire SHIFT project (see Fichter et al., 2013). Participants in work package 4 have contributed in the writing of work package 1 and thus this work package 4 report uses WP1 as a theoretical backbone while introducing new and more specific theories as at when necessary in this report. Otherwise, this section of the report highlights relevant previous literature to which this work package connects.

Conventional knowledge suggests that young and new firms including entrepreneurs are important candidates for developing innovations needed to tackle the challenges of sustainability (Keskin et al., 2013). However, the development of sustainability driven innovations is stifled by externalities in the innovation and diffusion phases (Jaffe et al., 2005). In addition, sustainability driven entrepreneurs pursue multiple goals (e.g. environmental and economic ambitions) in a diverse set of personal objectives, face challenges when translating sustainability goals into offering that have customer value and are unable to internalise all elements of the innovation process (Keskin et al., 2013). This peculiarities aside, sustainability driven entrepreneurs also encounter the frequently mentioned challenges faced by SMEs in general i.e. resource constraints – lack of time, personnel knowledge and financial capital (Klewitz et al., 2012). A small company will often lack some the competence needed to tackle the challenges related to sustainable entrepreneurship (Hjelm, 2011). Hence linkages are needed with external actors to get hold of the required resources and capabilities to exploit innovation in an effective way (Hjelm, 2011; Keskin et al., 2013).

Interaction with external public, private and non-governmental actors is deemed important to increase the innovative capacity of SMEs (Klewitz and Hansen, 2013). In particular, consistent government support is regarded as a significant enabler for developing sustainable technologies and diffusing them into society (Boons et al., 2013). Previous literature recognises financial institutions, universities, incubators, public funders, cluster initiatives, local authorities and business development organizations as important governmental actors which help to achieve the desired objectives of eco-innovation in firms (Fichter et al., 2013). Business development organisations belong to governmental actors in the triple helix configuration of an innovation system (Hjelm, 2011). Though business development organisations may be difficult to identify perhaps because their activities intersect with other actors in the public support system, how and what support they offer can often be elaborated. In order to bring some structure to the support offered by business development organisations, their activities can be divided into two broad categories as ‘hard’ and ‘soft’ or configuration oriented and process oriented support respectively (Norrman, 2008). The hard support includes provision of infrastructure, proximity to universities and science parks, and other in-kind funding. The soft kinds of support include business advice, coaching, education and networking activities. This categorisation is by no means absolute and several BDOs combine various types of support. Another categorisation is between general BDOs with focus on supporting all kinds of SMEs and BDOs with a specific focus on a particular industry sector e.g. environmental technology.

A systems approach to innovation emphasises the role of actors, networks and institutions as comprising the innovation system (Boons et al., 2013). Different varieties of the innovation system concept have been proposed e.g. sectoral innovation systems, technological innovation systems,

multi-level perspective and regional innovation systems. This work package is anchored in the technological innovation systems literature and bounded by a regional scope. The technological innovation systems literature serves as a backbone for at least two reasons: first, the emphasis on functions as a basis for analysing the dynamics of technological innovations, and second, that the number of actors, networks, and institutions to analyse are relatively smaller than in other relevant approaches, thus reducing the complexity with greater possibility to analyse system dynamics. A regional scope is motivated by the understanding that BDOs often operate with a regional scope based on proximity to target companies and allocation of resources e.g. funding in a broader national context is often distributed to regions. A regional focus on innovation systems has attracted both academic e.g. (Etzkowitz and Klofsten, 2005) and policy attention at UNIDO, OECD and EU levels (Cooke, 2008). The success of the approach in both academic and policy circles is explained by its flexibility which avoids a 'one-size-fits-all' type of thinking. This approach recognises the diversity of regions and advocates for different approaches to innovation based on the characteristic of a particular region. The university-industry-government –i.e. triple helix interaction is also regarded as an important factor which promotes collaborative entrepreneurship needed for regional development (Etzkowitz and Klofsten, 2005).

3 Research method

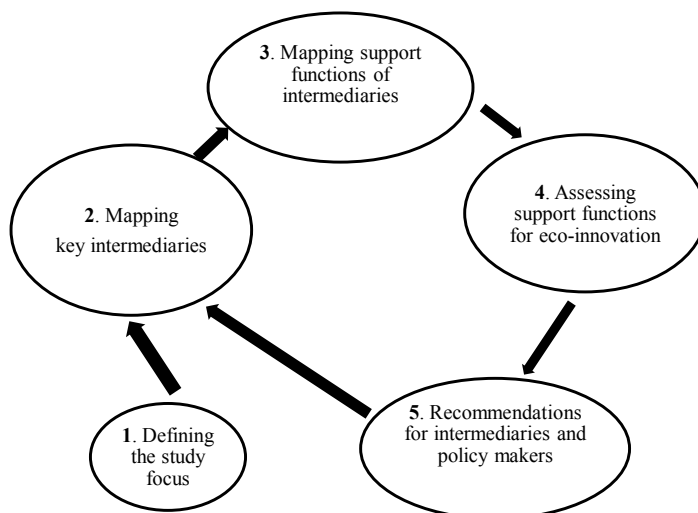
The research reported in this work package is based on case studies on the support activities of business development organizations including cluster initiatives in Region Skåne, Sweden and North Rhine Westphalia, Germany.

3.1 Analytical approach

To undertake data collection in the selected regions we developed an analytical approach based on the technological innovations systems literature. A brief overview of the approach and how it has been used in the work package is presented below.

An overview of the important steps in the analytical approach is presented in Figure 1 below. The analytical approach builds upon technological innovations systems literature (e.g. Bergek et al., 2008) and also eco-innovation characteristics (Carrillo-Hermosilla et al., 2009; OECD, 2009). In Step 1, we defined the boundary of the study in terms of the geographic scope (i.e. regional focus) and also which kinds of actors and innovations to investigate (public-owned BDOs including CIs and eco-innovations). As discussed in previous literature (see Coenen and Díaz López, 2010), a boundary between the system and its environment could be (1) geographic (2), or on the basis of technological fields, (3) product areas or (4) activities. A careful scope definition is important in at least two ways. First it helps to avoid an over explosion of possible explanation factors for an observed phenomenon and also it allows for the comparison of different studies. We adopted a regional focus to reflect how SMEs seeking support are assisted on a regional basis and also how resource allocations for such support activities are undertaken.

Figure 1: An approach for analysing the roles of intermediaries in eco-innovation



Source: author’s elaboration, inspired by (Bergek et al., 2008)

Thereafter, in step 2, we identified key BDOs and CIs within both regions using a snowball sampling approach. This approach involves existing research subjects suggesting future subjects from among their acquaintances. We uncovered the actors, their networks and also institutions backing their operations where possible. To be able to select a number of BDOs and CIs to study as cases one has to have an overview of the different kinds of such actors from which to choose since it is practically impossible to cover all relevant actors in any particular region. The scientific literature provides a diverse number of such organizations generally referred to as intermediaries in innovation. In the innovation intermediary literature there is terminology redundancy and sometimes confusion as to the types of actors and their functions (Klerkx and Leeuwis, 2008). These organizations are commonly understood as third parties that help firms to achieve desired innovation objectives by providing necessary external impulse, motivation and advice to initiative and continue with for example eco-innovation. Literature provides various classifications and typologies of such organizations. For example various types of such intermediaries mentioned include: governments and local authorities, NGOs, universities and consultancies (Klewitz and Hansen, 2013), while (Kolk et al., 2008) groups them into three categories as public, non-profit and private. Lopez-Vega and Vanhaverbeke (2009) provide a typology of intermediaries and a synthesis of their functions based on a comprehensive review of literature on intermediaries in innovation. This typology is relevant for this work package since it provides a broad classification of different kinds of innovation intermediaries which fits the various BDOs and CIs under consideration. This typology is presented in **Table 1** below. We have not approached the selection of cases to study from this typology of intermediaries but rather by talking to industry experts, academics and companies we were able to identify which key BDOs and CIs to focus on.

Table 1: Groups and functions of intermediaries

Groups	Functions
1. Connecting group	1. Gatekeeping and brokering
	2. Middle men between science policy and industry
	3. Demand articulation
2. Collaboration and support group	4. Knowledge processing and combination
	5. Commercialisation
	6. Foresights and diagnosis
	7. Scanning and information processing
3. Technological services group	8. Intellectual Property
	9. Testing and training
	10. Assessment and evaluation
	11. Accreditation and standards
	12. Regulation and arbitration

Source: adopted from Lopez and Vanhanverbeke, 2010

In order to uncover and understand the content of the support activities of these BDOs and CIs in eco-innovation, their support functions were under scrutiny in step 3. This covered what support actions and activities they delivered to SMEs seeking advice in eco-innovation and also how the support activity was delivered. Since a core aspect in this analysis was to provide practical recommendations both for the BDOs and CIs and policy makers, an assessment of their functions is

prioritised in step 4. The support activities are assessed as to how well they assist firms to reach eco-innovations objectives. On measuring eco-innovation at the micro-level a particular challenge crops up in establishing a clear relation between the support functions provided and the eco-innovation activities in firms. Nonetheless the OECD suggests a combination of different methods for measuring eco-innovation. This covers at least the **(i) input** e.g. research and development expenditure, **(ii) the output** e.g. number of innovations, number of patents and scientific publications and **(iii) the impact** e.g. changes in resource efficiency and productivity of the eco-innovation. In this work package, different possibilities existed in collecting relevant data to assess the usefulness of the support activities on SMEs' eco-innovation. One possibility was to conduct a survey among SMEs to collect data and measure the impacts of support activities on the dimensions highlighted above (i.e. input, output and impact). However, we had to rely on a second option i.e. secondary data in our case from BDOs and CIs on how the SMEs which receive support perceive the usefulness of the support they receive in eco-innovation. This was due to two major reasons, some BDOs had already conducted similar surveys among their clients and found it as a bother to do another such survey, and some BDOs were not willing to have external actors checking on their support activities. Nonetheless, the secondary data we received on the SMEs satisfaction provided us with some insights as to how they access, utilise and perceive the effectiveness of the support activities provided by the studied BDOs and CIs. This data in some cases covered input (e.g. number of meetings, number of consulting activities, eco-innovation projects realised), impact (e.g. resource savings in terms money, material and energy) and output (number of new products and services developed). So we had to rely on primary data on the supply side (BDOs and CIs) and secondary data on the demand side (SMEs) to be able to access potential strengths and weaknesses in the support functions. This led to the identification of improvement options and good practices; the focus in step 5.

4 Results

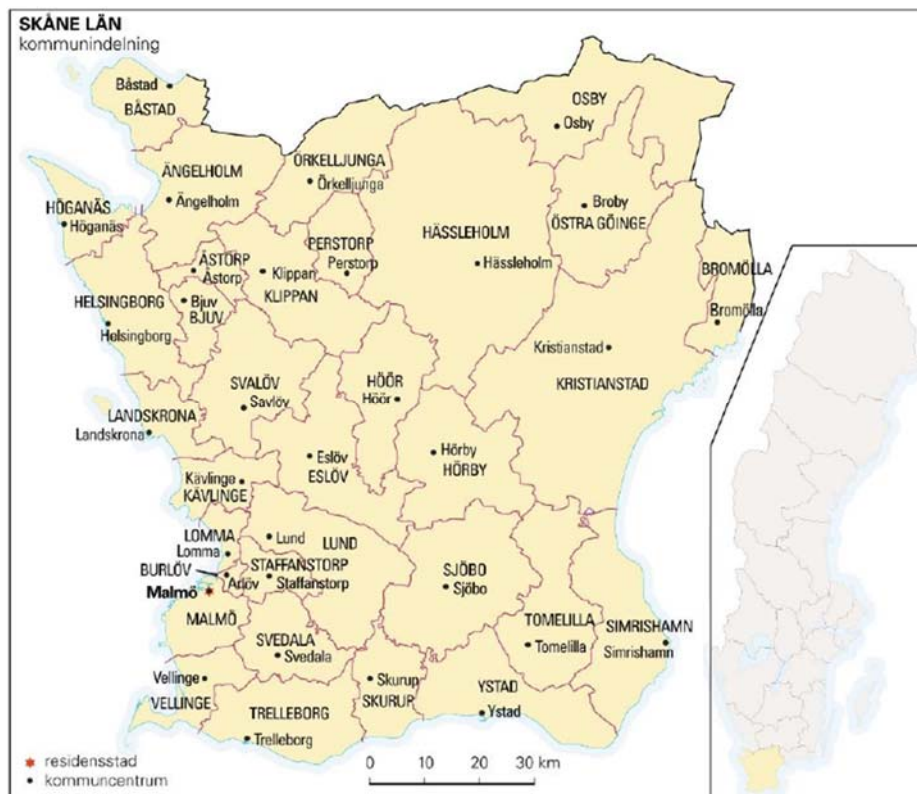
This section of the work package report focuses on presenting the empirical results. The empirical results relate to two regional studies performed in Sweden and Germany. We consider the region as the administrative unit of analysis within which we identify key business development organizations including cluster initiatives. The structure of the results follows the region as the unit of analysis and then details of the key business development organizations including cluster initiatives. The results on the Business development organizations follow a short insight into the organization, followed by the clients and eco-innovations they support, the process of the support and finally the outcome of the support activities and how is it followed up.

4.1 Regional support system in Skåne-Sweden

Skåne is Sweden's, most southerly region (see Figure 2 below). The region has a population of about 1 274 069 people (SCB, 2013)². The regions employment opportunities, population and services are concentrated in the southern and western part of Skåne within the municipalities of Malmö, Helsingborg and Lund with a population of about 312 994, 132 989 and 114 291 respectively. The region of Skåne is controlled by the regional council whose representatives are voted directly by the population of Skåne. These elected representatives decide on the regions budget, aims, approaches and administration. Like in many regions in Sweden, the regional council of SKåne has as one of its responsibilities regional development which covers strategic plans to increase growth, employment and sustainability within the region. This responsibility also includes the development of local businesses which is largely the focus of this work package.

² http://www.scb.se/en_/Finding-statistics/Statistics-by-subject-area/Population/Population-composition/Population-statistics/Aktuell-Pong/25795/Yearly-statistics--Municipalities-Counties-and-the-whole-country/159277/

Figure 2: Map of Skåne



Source: Nationalencyklopedia, 2014

The region of Skåne has a number of public organizations that support companies and entrepreneurs throughout the (eco)-innovation process. We have identified key business development organizations in line with the aim and research questions guiding this study (see Table 2 below). The identification was by reading through regional development documents, and also asking experts and public support organizations in the region about key organization regarding our questions of interest.

Table 2: Key Business development organizations including cluster initiatives in Skåne

Organization	Interviewee	Reference in text	Comments
Sustainable Business Hub	Per Flink – Project leader Research and Development and innovation	1.	Cleantech cluster initiative 6 employees, 130 member companies http://www.sbhub.se/
	Bengt Malmgren – Business developer	2.	Sector specific
Malmö Cleantech City	Jakob Economou – Project manager	3.	Support for cleantech companies 2 full-time employees, non-membership http://www.malmocleantechcity.se/ Sector specific
Region Skåne	Jonas Bergholm – Development manager	4.	Regional financier of some BDOs and CIs http://www.skane.se/

			General support
	Gudmundur Kristjansson – Business Manager	5.	
ALMI SKåne	Johan Bloem – Innovation advisor	6.	Support for all kinds of companies http://www.almi.se/Skane/ General support

4.1.1 Region Skåne

The Skåne regional council is an important administrative actor in the region of Skåne when it comes to the overall structure of the public support available for entrepreneurs and companies. The regional council however is not directly involved in offering support to companies but finances the activities of some of the public support organizations such as the Sustainable Business Hub, a cluster initiative for cleantech companies which was established on the accord of the regional council. Other clusters financially supported by the regional council include logistics, transportation, food, and IT. The regional council is also on the board of these cluster initiatives and thus influential in their strategic decisions regarding support activities. In this role, the regional council has a broader focus on regional development than in the day-to-day support activities of the business development organizations including cluster initiatives. The task to support entrepreneurs and companies is from time to time reported to the regional council through independent evaluations and discussion meetings to justify the continued financial support and operations of these cluster initiatives and other public support actors in the region. The BDOs including cluster initiatives are discussed next.

4.1.2 Sustainable Business Hub

Organization and clients

The Sustainable Business Hub (henceforth referred to as SBH) was formed in 2002 with Region Skåne, the city of Malmö, along with private companies (e.g Trivector AB and Malmbergruppen) as key initiators. The initial objective was to foster regional development by supporting companies in the cleantech sector in Skåne. When environmental issues and climate change became central agendas for many regions in Sweden by 2006, SBH was commissioned to manage the growth and development of existing environmental technology companies in the Skåne region. SBH has six employees in total (as of 2014), working with different but interrelated activities of business development. The three core areas of support activity include: (i) export development, (ii) developing world class domestic markets, and (iii) supporting research & development and innovation. The Sustainable Business Hub can be referred to as a cluster initiative in southern Sweden with about 130 member companies in the environmental technology sector (SBH presentation, 2013). The member companies are in the categories of energy, biogas, water/sewage, waste, buildings and architects. The membership is open for Swedish companies only and thus does not even include foreign companies with sales offices in the region. SBH also supports non-cleantech companies to improve their green profile and sustainability thinking e.g. sustainable buildings, architects and consultants. SBH does no active selection or rejection of potential members since there is a membership fee and thus companies willing to join the organization should themselves see the value of doing so. The financing for the organization comes from the European Regional Development Fund, Region Skåne

and also the member companies, with region Skåne being the largest funder. The organization's board consists of seven members with four of them appointed by the member companies while three are appointed by Region Skåne (interviews, Sustainable Business Hub).

The long term vision of the organization is to develop Region Skåne into a leading region in the cleantech field in northern Europe by 2020. To achieve this long term vision, the organization collaborates with national authorities, universities, local authorities, embassies and the trade council to strengthen cleantech companies in the region in terms of development, diffusion and use of environmental technology. In line with its long term vision, SBH has as its long-term goals to:

- (1) Help establish more companies in the environmental field
- (2) Help more companies to understand the potential of the environmental market
- (3) Increase the competitiveness of existing environmental companies
- (4) Increase environmental companies' growth on the Swedish market
- (5) Increase the environmental companies' exports

Support activities and functions

When the organization started supporting companies in 2003, the support activities focused generally on environment and corporate social responsibility. In 2007, the focus of the support activities was specified towards assisting environmental technology companies in export. This support includes taking part in trade delegations abroad, arranging meetings to meet potential customers and partners, and education and training about marketing and exporting activities. In recent years, the support activities have evolved to include developing a strong domestic market and also a recent incorporation (2014) of support for innovation and research & development with connections to universities and other research institutions. This progression in support activities has been motivated by the needs of the environmental technology sector and also the experiences SBH has gathered from working with supporting export from the sector. Currently SBH's support activities include support for companies interested in export, support for developing a strong domestic market and support for innovation and R&D. SBH does not have an overall support process or model that is engaged in their support activities but rather support activities are often project based and each project has a clearly defined content and working procedure e.g. creating a sub cluster, undertaking business trips and match making have several clearly defined processes in such projects.

The recent support for innovation and R&D is very much connected with research institutions and universities. These collaborative partners are not only in southern Sweden but also in neighboring regions in Denmark e.g. Danish Technical University, Copenhagen business school, Malmö high school, Lund technical university. This collaboration is a two way support because universities sometimes need help in commercializing their knowledge and sometimes companies need very specific competence to further develop their innovations. SBH in this case serves as a link between the companies and connect them to research and academic institutions for support. The main role of SBH in this support activity is to develop contacts with universities in the region with different competences and then link these competences to companies through meetings and seminars around narrow themes e.g. heat exchangers, biogas etc. The starting point is universities and companies but

expansions to cover private consultants and other expertise would be interesting developments in the near future.

SBH also provides other kinds of support such as helping member companies to find sources of financing, providing business coaching for developing business models and also identifying business partners and potential customers. The medium for giving these support to companies include lectures with invited speakers and companies around very specific themes e.g. heat exchangers and then creating a platform for people to meet and share ideas. SBH strives for very specific themed meetings for selected companies and not general meetings across the entire sector. The challenging aspect of this approach is invest time in selecting and inviting the relevant companies and speakers. This working approach has also been informed by previous activities in supporting export which pointed out that companies appreciated more focused meetings than meeting and interactions of a very general content.

SBH also provides support for member companies for demonstrating and testing their new products and services using municipalities which are often advanced in technology use and play an active role in providing platforms for demonstration and testing purposes. SBH can be a connection between companies looking for test bed and municipalities willing to show new and state of the art solutions. SBH provide a meeting platform for municipalities to present their visions including challenges and companies develop new solutions to meet these demands. This test bed and demonstration activities are sometimes coupled with innovation contests, where companies compete with their solutions for a small price and publicity. SBH motivates member companies to take part in such competitions and also linking potential competitors to municipalities an activity which can be difficult for the municipalities or companies to do by themselves. Working with the environmental technology sector, SBH recognizes some particularities of the sector which influences their support activities. The sector is relatively new and thus has many innovative companies with new products and services in new markets. The sector is also dependent of regulations and subsidies to remain relevant and vibrant. This influences profitability and long term thinking and planning. In this case stable regulations are quite important for cleantech companies to be able to make long term investments.

The support activities of SBH are not devoid of challenges. Their working approach which involves organising meetings and seminars is dependent on getting the relevant people interested to attend by having very focused themed meetings. Even so, there are discussions on-going about categorising membership into different groups and providing different support activities to each group e.g. in addition to basic business development support available for all members, SBH could further support with writing funding applications and finding collaboration partners abroad. During the interviews, developing more tailored support activities and also a better measurement of the effects of the support activities were mentioned as key areas in need of improvement for SBH (reference 1, and 2).

Outcome of support activities

The support activities offered by SBH are evaluated by independent parties from time to time using surveys with member companies and also by the cluster organization itself. From the interviews, SBH indicated that they as a cluster organization check traceable indicators such as the number of new employees for member companies in a year, how many qualified business meetings they organized in a year, and how many cooperation projects they initiative between suppliers and customers. They

find it particularly difficult to follow up later whether the meetings they organize lead to concrete projects or business deals, or new innovations developed. “We cannot follow up our members and their new product and service development as this can be numerous and we don’t have that many resources to do so” (reference 1).

In 2011, a study was conducted by a private consultancy, Oxford Research AB³ as part of Skåne’s Cluster strategy follow-up. The study was to analyze the satisfaction of member companies with the support activities from cluster initiatives and also to identify areas for improvement in such cluster initiatives in the region of Skåne. The evaluation covered a number of cluster initiatives and their activities in the region of Skåne including Sustainable Business Hub responsible for the cleantech cluster. The questions focused on analyzing how the support activities of the cluster initiatives could assist member companies in valuable contributions to the competitiveness and growth of the region through the development, diffusion and use of innovations. A survey was sent to 116 companies with a response from 45 of them representing 39%. Relevant findings from this survey for this work package are highlighted below.

Out of the responding companies, 64% of them indicated a certain importance for their business development to participation in support activities of SBH with just over 20% of the companies indicating great or very great importance to Sustainable Business Hub for their business development. The opportunity that SBH offers to network with other players within the sector together with the knowledge and experience SBH has about business opportunities in foreign countries were highlighted as particularly positive by the responding companies. Almost 7 out of 10 respondents indicated they were largely satisfied with the support activities of SBH. More concrete effects of membership in SBH are summarized according to the report below:

- 40% have gained increased knowledge of the industry to a high or very high degree and just 15% state that they have not
- 50% think that membership of SBH has contributed to new networks to a high or very high degree. Just 10% think that membership of SBH has not led to any new networks at all
- 60% have experienced increased cooperation with other companies to a certain, high or very high degree as a result of membership of SBH
- 30% have to a certain or high degree increased their cooperation with R&D players and 10% have experienced increased investment in R&D as a result of membership of SBH
- 30% state that to a certain or very high degree they have developed new products and services
- 20% have experienced increased sales to a certain or high degree as a result of membership of SBH

Though in general the evaluation showed the contribution of SBH towards networking and collaboration between member companies and other public support organizations in the region of Skåne a number of responding companies indicated a need for the improvement of support activities

3

https://www.skane.se/Public/Naringsliv/Dokument/Rapporter/Popularversion_klusterutvarderingsmodell_Eng_OxfordResearch.pdf

which could stimulate more cooperation for example through the participation of member companies on non-profit projects.

4.1.3 Malmö Cleantech City

Organization and clients

Malmö Cleantech City (henceforth referred to as MCC) started as a project in 2010 with the goal of developing the city of Malmö through linkages between cleantech companies, the municipality of Malmö, and universities and research institutions. The concrete objectives are to create jobs and employment for people in the cleantech sector. The organization has no membership base but offers support to cleantech companies in the city of Malmö through social meetings; educational and business meetings; and test beds for new products and services. The formation of the organization was based on a market analysis in 2009 which identified cleantech as an important sector for urban renewal and development in the city. Malmö Cleantech city is 100% financed by Malmö city through tax payer's money. There are currently 2 employees working fulltime at MCC (interview 2014).

In their support activities, MCC collaborates sometimes with other actors public support organizations such as Energikontoret⁴ (regional energy actor working with energy efficiency and renewable energy), Cleantech Inn⁵ (facilitator for early stage cleantech companies), IUC Skåne⁶ (focused on business development and expansion), Sustainable Business Hub and Cleantech Scandinavia. However, the city of Malmö together with cleantech companies in the city represents two key stakeholders. MCC employs a broad understanding to the term cleantech in line with the EU definition as "all technologies that are less harmful to the environment than their existing alternatives" and this definition has guided their support activities which is directed to both companies with core business as cleantech and also companies trying to introduce this kind of thinking into their core profile. MCC either contacts companies which they think are doing interesting things after a market scan or companies which have new products or services can contact them if they think they have something interesting for the cleantech market.

Support activities and functions

Malmö Cleantech City supports companies with cleantech as their core business and also companies incorporating sustainability thinking into their core business. The support provided to these categories of companies includes information services, education and training and test beds for demonstration and piloting. But most of the clients of MCC have cleantech as their core business e.g. waste management, waste water treatment, energy efficiency etc. The support activities of MCC are organized under the following four categories:

- (a) Social meetings - These are weekly breakfast meetings every Wednesday morning. People meet at the premises of MCC and discuss cleantech issues and what's going on and to

⁴ <http://www.energikontoretskane.se/omoss.4.3f8418f6135cb065b3569a.html>

⁵ <http://cleantechinn.com/#>

⁶ <http://www.iuc-skane.se/>

possibly find other companies with similar interests. These weekly social meetings are often free to attend and MCC uses this opportunity to invite and welcome new members.

- (b) Competence development/educational meetings – these meetings are about developing the competence of the cleantech companies in several business related issues. And often MCC charges a fee for companies attending these competence/educational meetings. Issues of typical focus in this educational/competence development meetings are for example how to do a good pitch, how to sell, how to use networks and finding financing.
- (c) Matchmaking – In matchmaking meetings, MCC puts together different stakeholder companies both suppliers and demand and facilitates discussions and potential connections between them. For example, providing a meeting point between construction companies and building owners, municipalities and companies etc.
- (d) Test bed area is more of a concrete support activity provided by MCC for companies in an early innovative product development phase. It follows two paths either a company with an innovative product contacts MCC to help with pilot tests in the city or sometimes the municipality defines their urban sustainability challenge and MCC can scan the market and bring the companies to solve the challenge. The technical departments within the municipality assist such companies to test and do measurements and continue to develop their products. E.g. a water saving shower has been tested. This is small scale activities to test the technologies and the results are open to the general public both as a review of the technology and for some publicity as well.

Companies participating in these kinds of support activities are either invited by MCC or apply to attend themselves if they see a good fit. When it comes to test bed, there is a technical group in the municipality which is involved in testing and evaluating the technology. Selecting for the test bed group can be tricky. In this process MCC focuses on the urban sustainability development goals and selects from a rather general level technologies that are interesting for this goals from those that are not interesting. For example “we say no to companies when we already have the technology in place especially when they apply for a test bed position”.

MCC has identified some aspects of their current support activities in need of improvement. This includes more involvement in EU projects, a stronger connection to the city of Malmö and other support actors such as MINC-Malmö Incubator. MCC strives to keep up interest in their activities by combining both broad focused meetings for all kinds of companies and also narrow themed meetings for targeted groups of companies. They also acknowledge that the large number of different support organizations can be confusing for companies seeking support and it is the responsibility of public support organizations to collaborate with each other and point out to companies where they can find different kinds of support.

Outcome of support activities

Malmö Cleantech City uses a combination of various approaches to evaluate their support activities. The first relates to Malmö Cleantech City’s own evaluation, and also an evaluation by an independent agency often contracted by the political owners – city of Malmö. When evaluating their own support

activities, MCC checks general indicators such as number of people attending their meetings, the number of people subscribed to their newsletters and number of social and education meetings held in a year. MCC also does an evaluation of the test bed activities. General evaluation questions include “What we did wrong, what we can do better, what happened in the company after testing, what’s going on in the company? What the company feels we could do better in the innovation process.” There are also rigorous and detailed measurements on the technology itself by the technical departments within the municipality. Measurements cover potential energy, material and financial savings from the use of the technology. MCC has as priority to work with the city regarding urban sustainability and also according to the needs of the cleantech companies in the city and thus most of their agendas and programs for the year are influenced by the needs and desires of these two stakeholders.

MCC is also evaluated by their political owners. “Regarding our political owners, we have meetings with them quite often and we present what we are doing and we are open with what we are doing all the time.” For example, the support activities of Malmö Cleantech City were evaluated in 2013, by a private consultancy company on behalf of the political owners. The aim of the evaluation was to assess what Malmö Cleantech City meant for cleantech entrepreneurship in the city, whether they achieved their goals and how work-activities should be developed. To do this, a survey questionnaire was sent out to companies on Malmö Cleantech City’s mailing list and interviews were conducted with selected companies and representatives of the City of Malmö. As at the time of the survey, 2012, Malmö Cleantech City’s mailing list had about 700 addresses registered. The survey had responses from 45 people representing 26 different companies. Some highlights from this evaluation relevant for this work package are presented below:

Of the newsletters sent out, an average of 32% subscribers read through while 11% go on to click through on the links in the newsletters. Meanwhile, it is also clear that many of the activities have been visited by a small group of companies that recurs frequently in many of the activities.

The companies stated in interviews that they are satisfied with Malmö Cleantech City as a meeting place and 37% percent of companies say they got new contacts through Malmö Cleantech City. Slightly fewer, 25%, said they had some extra business through Malmö Cleantech City. None of the respondents answered unequivocally yes to the question since as expected it is difficult to establish causality between support activities and realized business. In interviews and open-ended questions, the companies difficult to estimate the direct growth effects of Malmö Cleantech City. These two numbers on getting new contacts (37% responded Yes) and on getting new business (25% responded Yes) is still likely to be relatively good news looking at the resources such as the number of personnel the organization has. Given that the organization runs as a project and has survived over the past 4 or 5 years with companies willing to continue participating in their activities also suggest that they see a value in the business.

It was also evident from the interviews that especially small size companies regard Malmö Cleantech City as a platform through which to reach bigger companies. They also get to meet companies from outside the city and region through Malmö Cleantech City. Many also express a greater legitimacy when they present themselves as associated with Malmö Cleantech City. This is influence by Malmö’s brand and reputation in sustainable urban development and the environment.

Summing up the general results from the study:

- Companies are satisfied with Malmö Cleantech City forum
- Companies have difficult to see direct growth effects
- The companies see Malmö Cleantech City as a positive part of a larger context
- The municipality sees it as inspirational and beneficial for cooperation with companies

4.1.4 ALMI Skåne

Organization and clients

On the national level, ALMI is owned by the Swedish government with the purpose to create growth and renewal within Swedish businesses and industries. At its inception in 1994, there were 24 regional branches of ALMI. Subsequently, several regional branches were merged with the aim to create a more efficient administration and more customer time. On the regional level, the subsidiaries of ALMI are owned 51 percent by the parent company and 49 percent of regional owners such as county or regional councils. The overall objective of the business support activities by ALMI is to promote the development of competitive small and medium-sized enterprises and stimulate new enterprise for creating growth and innovation in Swedish business.

Support activities and functions

ALMI Skåne is part of the subsidiaries of the national ALMI and they act within four areas of business support: advising, financial support, venture capital and incubation.

The support activity of ALMI Skåne that is biggest in volume is financial support for preliminary studies. This support can be granted to individuals or companies with up to 250 employees from all industries. The purpose of the grant is to lower the risk of a project or to verify the risk. Thus the grant can be used for seeking support in order to build a prototype, file a patent application, external verification or participation at a fair. This money is largely in the form of a grant and ALMI Skåne together with the recipient dialogues out the best way to use the money. For private persons the money can be up to 25000 SEK including VAT and for companies it can be 50000SEK excluding VAT.

Another form of financial support from ALMI Skåne to companies is an innovation loan which is meant for innovative projects. A lot of the companies' receiving innovation loans from ALMI often have received the grants for preliminary studies which means that the companies have identified or reduced their risks to a reasonable level at which ALMI is willing to lend to. The loans have favorable terms and ALMI requests no security for the innovation loans but the project in itself serves as collateral. If something unexpected should happen or an incorrect assumption is made and the entrepreneurs have done everything in their capacity to make the project profitable, there is a possibility to close the project through a formal application process. If there is some value left in the project, that value is transferred to ALMI and used to amortize the loan. ALMI also has a financial support scheme focused more on product development than innovation where ALMI can recommend an entrepreneur or company to the Swedish growth Agency for a grant up to 50% in contribution up to 500,000SEK for the cost of external product development.

ALMI also offers counseling free of charge under secrecy. There is no actual time limit on how much counselling an entrepreneur or company can access but ALMI works with a segmentation model and try to spend more time on those they believe have great potential than those who have little potential. Sometimes counseling involves getting people to realize that they are not the right person to run the project, but instead they are more suited to do something else.

The interviewee, Johan Bloem reports that, those working at ALMI are not often experts at something in particular but more so have an understanding of the innovation and entrepreneurship process and also the experience they have from the many cases they have dealt with. For example, employees at ALMI encounter about 200 to 400 cases per year where they give support and advice from comprehensive business plans to advice on ideas. With diverse educational backgrounds, the employees also have enough knowledge and experience to ask questions and discover important aspects of a project in its early phase.

When it comes to sustainable entrepreneurship and eco-innovations, they are not considered as another special type of entrepreneurship or innovation. A basic pre-requisite for the support ALMI gives is rather focused on the commercial potential of the innovation, which means that there should be a customer willing to pay for the innovation once it is introduced to the market. And preliminary studies are used to answer these kinds of questions about potential customers. But if particular kinds of support is needed which is not available in-house, ALMI can have contact with other support actors to deliver such functions for example from regional networks and business development organizations including cluster initiatives with more specific industry focus.

Outcome of support activities

ALMI uses different indicators in the follow up and measurement of their support activities to companies. These include the number of successfully commercialized ideas, the number of started viable companies, their customers' development in turnover and number of employees in relation to a relevant reference group of companies.

4.2 Regional support system in North Rhine Westphalia-Germany

The results presented here will follow the region as the unit of analysis and then details of the key business development organizations including cluster initiatives operating in the region. For the business development organizations including cluster initiatives we will provide a short insight into the organization, followed by the companies and eco-innovations they support, the process of the support and finally some outcome of the support activities.

North Rhine Westphalia is the most populous state of Germany as well as the fourth largest by land area. North Rhine Westphalia has a population of approximately 17.5 million inhabitants and has some of the largest cities in Germany with the capital city of the state being Dusseldorf.

Figure 3: Map of North Rhine Westphalia



Source: Wikimedia commons

The region of North Rhine Westphalia has a number of public organizations that support companies and entrepreneurs throughout the (eco)-innovation process. Since the focus of this work package is on business development organizations, we have chosen to focus on the key actors depicted in the Table 3 below.

Table 3: Key Business development organizations including cluster initiatives in NRW

Organization	Interviewee	Reference in text	Comments
The greentech Cluster	Ralph Buchele – Principal	7	Cluster initiative focused on the environmental technology sector Non-membership organization 2 to 3 full-time employees Sector specific focus http://www.umweltcluster-nrw.de/
	Dr. Dr. Christian Sartorius – responsible for Innovation radar	8	

The Efficiency Agency	Andreas Kunsleben, Head of consulting	9	Agency focused on material and energy efficiency 30 employees in six locations including Duisburg. General focus http://www.ressourceneffizienz.de
The energy Agency	Gerd Marx, Manager of the Department for Information and Advice	10	Agency focused on energy efficiency 120 employees located in Düsseldorf, Gelsenkirchen and Wuppertal. http://www.energieagentur.nrw.de General focus
The local BDO in Duisburg	Renate Orywa –Project manager	11	Business development support for all kinds of companies 20 employees General focus http://www.gfw-duisburg.de/
	Angel Alava-Pons , Project manager	12	
The local BDO in Essen	Dr. Erich Bauch, Wirtschaftsförderung Essen, Energy – Water – Environment	13	Business development support for all kinds of companies 30 employees General focus http://www.ewg.de

4.2.1 The Greentech Cluster

Organization and clients

The Greentech cluster was set up in 2009 by the Ministry of Environment in North Rhine Westphalia. The Ministry of Environment identified 6 thematic areas to focus on for the regional development and the environmental technology sector was one of the focus areas. The main driver behind the formation of the organization was to form a cluster initiative for future technologies and as an approach for future development for the region. The basic task is trying to help companies working with environmental technologies in NRW; to promote their work, their research and their coming to the markets. The main aspect of the support activity is trying to connect companies e.g. companies with a challenge can be connected with research institutes or financial institutions to solve the challenge. The organization initially focused on fostering international business and export of environmental technologies but this focus has now been shifted to fostering innovation through projects. The cluster initiative has no membership. The organization receives 50% of its funding from the Ministry of Environment and the other 50% comes from sources such as the European Union and other funds available for regional development. The workforce which is 5 to 6 people accounts to about 2 to 3 people working full-time.

The clients of the Greentech Cluster cut across several sectors since the environmental technology sector also crosses several sectors. The organization is non membership based but maintains a relation with about 3.000 to 5.000 companies through a newsletter. A closer relation is established

with companies which engage in projects with the cluster. The idea of the Ministry of Environment is to support an entire industry sector and not particular companies which also reflects in the number of personnel and resources that are available for the cluster organization. This sector focus and resources available subsequently limits how company specific support can be. The companies or entrepreneurs who receive support depend on the innovations under discussion. For example workshops around organic electronics attract a lot of young companies while a topic on sustainable waste management is attractive for established companies. Other kinds of projects such as plastic recycling attract both young and established and even international companies. Support actors such as universities and research institutions are important for the Greentech Cluster especially in finding project partners. More so the public-sector is also an important collaborative partner when it comes to green procurement and the implementation of environmental technologies.

Support activities and functions

The Greentech Cluster works with a proactive approach which includes generating interesting eco-innovations and then bringing together companies around such innovations to develop it further. The goal of this support activity is to develop a number of new projects every year in which environmental technologies can be developed and introduced to the market. The support activity follows the capacity of the Greentech Cluster which is the ability to identify interesting technologies and innovations in the first place and then bring companies and entrepreneurs around the innovation and technology through seminars and workshops to stimulate them to initiate projects which these clients run independently. The main strength of the cluster organization is to be able to bring together the right mix and set-up of companies, universities, researchers in meetings, seminars and workshops and also to achieve a project set-up which is new along the value chain. The companies invited to the workshop are actively selected based on how fitting their profile is to the innovation under discussion. "...the projects are done within the companies on their own. We are only initiating and generating new ideas and innovations and gather interested people around it." There is a special activity for identifying interesting environmental technologies and innovations for every coming year-Innovation radar.

The innovation radar is a working approach used by the greentech cluster to fulfil their overall goal of supporting environmental technology companies in NRW in developing and implementing leading environmental technologies. The overall idea of the innovation radar is to scan, identify and introduce interesting environmental innovations (in terms of market potential and relevance for the region) to companies. The innovation radar starts with collection of about 100 ideas each year from which a selection of about 10 (based on an evaluation) are taken to an annual conference organised by the greentech cluster. These ideas are collected from newsletters, press releases, scientific conferences and some scientific and engineering journals. Up to 5 of these ideas develop further into projects with companies, research institutions and funders around it. The entire process is renewed on a yearly basis. The ideas that make it to the project level do not always come from the conference or the greentech cluster organization; some come from the companies themselves since it is more important to generate ideas which companies are willing to work further on with. The setting of these conferences also is meant to enhance open discussions and potential for collaborations. The greentech cluster organization introduces a number of innovations and technologies and about 10 people sit together regarding a special theme to further the discussion which is often more concrete than discussions in a bigger group around general topics.

Working with the evaluation of the eco-innovations to introduce to companies is a challenging and guess work process. The greentech cluster has two dimensions in their evaluations **a)** the relevance of the innovation for NRW-location of companies and research institutes, political framework conditions and technology competence in NRW (e.g. patents in NRW compared to other states in Germany in the direction of the innovation, publications etc.) and **b)** market potential which can cover both NRW, Germany and international markets. In the end, the outcomes of the innovation radar are not necessarily the topmost innovations but rather a starting point for further innovations and working projects. The greentech cluster gets input from other agencies regarding the economic relevance of the innovation, regarding market potential in NRW on a broad level, thinking in Likert scale terms e.g. the market potential is very small, small, large, etc. and what is the stage of the innovation- more scientific research or closer to the market.

Working with the innovation radar has its own challenges. It's a lot of unavailable information particularly during the evaluation and selection phase. The challenge to the entire cluster is that environmental technology cuts across several sectors and sometimes that is challenging to work with. E.g an idea about bio-plastics could be relevant for a cluster focused on plastics as their core issue and the greentech cluster has to collaborate with them in such instances. The cluster checks for already on-going projects in other clusters so as not to have duplications of efforts.

The long term existence and continued operation of the Greentech Cluster is a challenge because the organization exists as a project on a 3 year renewable contract basis. Another challenge also relates to the understanding that support for diffusion of environmental technologies and innovations is also as important as support for their development e.g. marketing, sales, market analysis, application management but the human and financial resource limitations of the cluster organization means that this cannot be done by the cluster organization.

Outcome of support activities

The Cluster has no detailed evaluation process on their support activities but the idea of bringing people together around a very specific topic to learn something new and potentially collaborate on new projects is popular and appreciated by companies since it is not always available. At the end of each year the cluster organization checks if there are starting points for projects and if a number of ideas are out of the innovation radar into projects then that can be satisfying. Some general level indicators of a functioning cluster initiative could as well be related to the large number of firms they are in contact with between 3000 and 5000, the number of companies attending their yearly conferences between 200 and 250 and also about 6 to 8 projects established yearly as a result of inputs from both the innovation radar and the annual meetings.

4.2.2 The Efficiency Agency

Organization and clients

The efficiency Agency was founded in 1998 with 7 employees by the Environment Ministry of NRW with the main objective to support SMEs in the manufacturing sector regarding cleaner production technologies. Companies which don't have products of their own and companies with relatively low resource consumption like hair dressing salon are not supported. This objective also includes the need to raise awareness on the economic benefits of cleaner production activities. Since the start,

the agency has expanded both in structure and also the support activities and functions. In 2004, four regional branches of the agency were opened to be closer to customers and other business partners like chambers of commerce and financial institutions but also in reward to a well-functioning organization. One idea behind the regional approach is to foster collaboration between various partners such as chambers of trade and commerce, chambers of the craftsmen as well as manufacturers and technical experts and to be close to entrepreneurs and companies. Currently, the agency has about 30 employees in six locations including Duisburg. Most of employees have an education in Engineering with previous working experiences in different commercial sectors. Other employees have finance and banking backgrounds as well together with geographers and one is agricultural engineer.

Regarding support activities and functions, financing consulting projects have changed; first the efficiency agency made direct contracts with companies and also third parties and paid 50% directly from their own budget. In 2003 an employee was dedicated only to organizing financing schemes for resource efficiency projects and now the agencies tries to translate resource efficiency project into a banking feasible project. The support has also widened in focus from production efficiency to the development of new products. The general client base can be regarded as product innovation less than 20%, energy efficiency about 40%, and material efficiency about 40%.

Support activities and functions

The goals behind the support activities relate to resources savings in terms of energy, material and finance and the specific targets are formulated by the Efficiency Agency in dialogue with their funders (The Environment Ministry in NRW). The agency also has goals relating to number of consultancy projects, helping to find financing and also events and training at the start of every year.

The experts from the Energy Agency visit companies and discuss different approaches to cleaner production including advice on how to find finance for cleaner production activities. Their support activities revolve around three pillars:

- (1) Consulting projects
- (2) Helping to find financing
- (3) Events and training activities including communicating the ideas

The general approach to support is to stress on the experience regarding resource efficiency and cleaner production in companies including practical examples from previous participants rather than on the tools and methods available. "We do not stress on the kind of tools we have but rather on our experience and know how regarding resource efficiency and cleaner production activities." However the support process itself follows an initial consulting, follow-up coaching (potentially by external consultants), review and follow up of basic results in reference with the initial objectives, helping to find financing and then implementation. Implementation of the results could be through technology change, organizational change, and education and training of the employees.

Initial consulting which is often free of charge, focuses on problem identification/definition and also setting objectives. After initial consulting, companies can be denied support; can receive direct advice or solution for the next step e.g. a technical consulting project. Companies are denied support in different situations for example when they already have state-of- the art technologies and

improvements in resource efficiency and the Efficiency Agency does not have a clear idea for improvements. In other instances, companies seem to be not willing to change or improve their working practices and this can hinder energy efficiency measures and also the effective use of financial resources available for the Efficiency Agency. In short, there is not much economic benefit from any immediate improvement suggestions for the agency and thus long term thinking and feasibility are quite prevalent.

Consulting projects gives directions to companies regarding relevant projects concerning resource efficiency. The agency offers support to companies regarding resource efficiency challenges using 6 core activities E.g.:

- JUMP projects: product development and also a focus on the allocation of cost
- PIUS check: analysis of firms production processes efficiency (material, energy)
- PIUS financial check: help to finance improvements
- Resource cost accounting: allocation of cost in the accounting structures
- Maintenance Tool: doing maintenance in a resource efficient way

General challenges in the support activities of the Efficiency Agency can be related to the influence of the political funders. The political owners (Ministry of Environment in NRW) influence the kind of subsidies available to companies and these subsidies can change on a short time notice. These owners also provide financing and can influence the support activities of the agency.” It would be easier if frameworks such as subsidies were more on a longer term basis available for companies since it takes some time to get us and the companies used to certain schemes.”

Outcome of support activities

The agency evaluates on a regular basis client satisfaction with their support activities, the satisfaction of participating consultants and also the implementation of the recommended measures in companies. Detailed evaluation points focus on the amounts of resource savings realized at the end of the year in terms of energy (kWh), material (kg or tons) and finance (Euros). These savings in energy and material are also converted to savings in CO₂. Other general objectives are also evaluated. For example the number of companies involved in consulting projects, the number of financing projects, the number of events and training activities, including a detailed annual report to the Ministry of Environment in NRW. The agency often gives companies some time before follow-up since the implementation of the solutions can take time. The results of the evaluation as claimed by the interviewee were often of a high level of satisfaction and also high level of implementation of the measure and also similarly high level of satisfaction of the technical consultants involved. In specifics, about 85% of firms actually implement improvement projects in energy and material efficiency. In addition, a majority of customers mention they will recommend the efficiency agency to other companies.

4.2.3 The Energy Agency

Organization and clients

The Energy Agency was founded in 1990 with about 8 personnel focused on information and initial consulting about energy efficiency in companies. A key initiating actor was the Ministry for Economy in North Rhine Westphalia which identified energy efficiency as an important aspect of cost-efficiency in companies and also providing support on such issues will drive forward the ambitions of local government. Since starting the organization has expanded in terms of personnel and also the scope of activities to include education and training by 1995 and by 2007 the cluster and networking activities were integrated in the set of activities of the Energy Agency. The organization's activities are funded by the state of North Rhine Westphalia under different ministries depending on the government in power. Some funds are drawn from the European Regional Development Fund (ERDF) and the Government has decided to fund the Agency from this fund also for the new period from 2014 to 2020. Currently, (around interviewing dates, 16/10/2014) the agency operates with around 120 employees from its locations in Düsseldorf, Gelsenkirchen and Wuppertal. Many employees are engineers but there are also geographers, lawyers and sociologists.

The client base of the Energy Agency is a mix of small, medium and big sized companies from different sectors. Acting as a knowledge resource, the agency also supports sometimes energy consultants. Excluding private households who can get advice via telephone, all companies and public institutions in North Rhine Westphalia are in principle within the scope of action for the Energy Agency. The cluster initiative focusses on companies and research institutions active in biomass, fuel cells and hydrogen, energy-efficient and solar construction, geothermics, fuels and drives of the future, power plant technology, photovoltaics and wind energy.

Support activities and functions

The support offered by the Energy Agency covers at least information provision, education and training and also coordinating among different actors as elaborated below. Information provision, initial consulting and training deal generally with efficiency in production processes. The cluster initiative and research cooperation's are often focused on research and development of new products.

Support activities include information provision on energy weak spots in companies. This covers technical systems in buildings to production processes and includes heating systems, heat recovery, insulation and energy planning. The engineers from the Energy Efficiency also give advice on how to find funding for implementing the energy efficiency measures in companies.

There are also continuous training seminars for companies. There is also action weeks offered to the company workforce on energy efficiency solutions. With its Energy Knowledge Portal the EnergyAgency.NRW also provides an on-line platform on the Internet for initial vocational and continuous training.

In collaboration with other agencies in North Rhine Westphalia such as the Energy Region in NRW, the Energy Agency is responsible for climate protection activities within networks for biomass, fuel cells and hydrogen, energy-efficient and solar construction, geothermics, fuels and drives of the future, power plant technology, photovoltaics and wind energy. The support focus in this case is to

initiate innovative projects and products, speed up their market readiness and exploit its economic potentials including foreign trade (especially in recent years).

The Energy Agency as home for the cluster EnergyResearch.NRW also serves as a contact organization regarding energy research in North Rhine Westphalia and also works to advance collaboration between research and industry.

Other support actors with which the Energy Agency collaborates include local business development organizations regarding energy efficiency projects, chambers of trade and commerce and chambers of crafts also represent important local partners for organizing local events and facilitating contact to their member companies. Also good contacts to research institutions are important.

Outcome of support activities

The Energy Agency has no defined targets or measurable objectives. Generally, the Agency has to deliver its support activities and functions as discussed above. However, each year there are discussions with the financing ministry, the Ministry for Climate Protection, Environment, Agriculture, Nature Conservation and Consumer Protection regarding work plan and ideas for future action.

4.2.4 Local Business Development Organizations

Agency for Business Promotions Duisburg

Organization and clients

The local business development organization in Duisburg was formed in 1988. Currently the shareholders are the city of Duisburg 50% and also private companies 50%. The organization has 20 employees with backgrounds in geography, social sciences, economics, together with one engineer, one lawyer, and a town planner. The driving force was to revive industrial activities in the city of Duisburg. The traditional focus of the organization was to sell public land and real estate but currently the focus also includes supporting new entrepreneurs and companies, and creating jobs in collaboration with the University of Duisburg and other public agencies. The organizations activities revolve around some sectors such as logistics, new material, environmental technology, city development, and the creative sector-musicians, actors. The most important focus sector is logistics because Duisburg is associated with logistics. On a general level, the goals of the organization are to create new jobs, attract new companies and to secure the existing jobs and companies in Duisburg.

Support activities and functions

The organization has different support activities some of which are targeted at fostering eco-innovation. Most of the eco-innovation related support activities offered by BDO cover environmental improvement in processes.

The main eco-innovation support activity is Ecoprofit®. The organization started working with Ecoprofit in 2010. Ecoprofit is a registered trademark about environmental improvements in a company. The core idea of Ecoprofit which originated in Austria is to facilitate eco-efficiency innovation using education, as well as customized problem solving to improve eco-efficiency of processes, products, practices, and services in organizations (Klewitz et al., 2012). The BDO first has

to find at least 10 companies which are willing to take part in the Ecoprofit activities. The BDO together with the city of Duisburg pays for the consultants who have to help the companies to save resource (energy, materials). There are 8 workshops where all companies take part and then there are individual activities on the site of the companies. For the first year, there were 40 participant companies and for the second year there were 10 companies. The organizations approach to communicate and recruit companies to participate in energy and material saving programs has been to highlight their opportunity to save money.

The business development organization also acts as a meeting point between the companies and other public support organizations because of the good contact they have with both actors. For example, when there are new regulations regarding energy and material resources issues the organization invites the Energy Agency and the Efficiency Agency and put them together with the companies particularly those who will be interested in the issue. E.g. an activity with the energy agency was together with the public authority focused on energy efficiency in buildings and also real estate companies and architects were participants. Other important collaboration partners are the University of Duisburg and private consultants.

In addition, when companies want to move to the city the BDO can help them with the environmental implications of their activities. The organization relies on technical expertise from the Efficiency Agency and Energy Agency.

Challenges in the support activities and functions of the organizations relate to how to support companies in need of certain specific assistance and also how to convince companies of the importance of the BDO's support activities. In addition, the organization is dependent on political owners for funding which means that new ideas and the direction of support activities can change with changes in the political powers.

Outcome of support activities

The organization is non-profit and thus the most important thing is how content shareholders are with their work. Detailed evaluation of the goals of the organization is difficult to do because there are several other organizations working with similar goals and with activities, which can influence the outcome of those goals in North Rhine Westphalia. Thus, discussions with the key stakeholders about their satisfaction with the BDO activities are fairly satisfactory.

Essen Economic Development Agency

Organization and clients

A private public partnership in 1991 established the local BDO in Essen. The initial focus was on real estate and the allocation of land. Since 2002, the city of Essen started to participate in Ecoprofit and the local BDO has been involved in its related support activities. The city of Essen owns (50%) of the organization while the other half (50%) is owned by an association of businesses like utilities, savings bank, real estate companies etc. In practice the organization is about 95% financed by the city of Essen. The organization has 30 employees mostly town planners and geographers and also a lawyer and some economists. The goals of the organization are

- Enforcing economic power of businesses in Essen

- Create and secure employment
- Improve the framework conditions for business development
- Make the town of Essen positively known in the regional, national and international competition for investors and companies seeking new locations

Most of the companies supported by the business development organization are SMEs which lack time or knowledge regarding certain eco-innovation activities. Otherwise, some big companies also receive help but not as often. Strictly speaking the organization has no members but there are target groups in some of the support projects that the organization offers to firms.

Support activities and functions

The local business development organization has both general business support activities as well as support activities geared towards eco-innovation. When support is demanded for eco-innovation, expertise or partner agencies might be contacted to take over the support activity.

The main areas of support activity are:

- General service for business, especially when expanding or restructuring activities or preparing high investments,
- Acquisition of firms new in Essen,
- StartUp-Support,
- Marketing of the business location Essen,
- Improvement of general framework conditions in Essen for business, especially in town planning for business,

The organization uses networks with other public support agencies to deliver specific eco-innovation support to companies in Essen. For example when firms need improvement in energy or material efficiency they are connected to the energy or efficiency agency for support. Other collaborative partners in support activities include other banks, consultants, and cities. For example environmental technology firms in the sub-branch of biomass and environmental remediation of polluted sites are supported together with neighbouring cities of Mülheim and Oberhausen in a network.

The support is also delivered through other means such as events and seminars, bringing delegations to and from Essen around the environmental technology field. For example there have been congresses on the use of IT in the energy industry (billing systems) in 2006 and another one on energy efficiency in 2009. At the regular E-World-Energy fair the BDO organizes a "diplomat's day" and invites employees of foreign embassies to build international contacts for local firms. In one case, a visit of interested foreign firms to Essen could be arranged in the field of environmental remediation.

The existence and support activity of the Business Development Organization faces some challenges. Prominent among them is the availability of financial resources from the city of Essen. This also affects the number of personnel available to offer support to companies. The city faces financial problems and supports the BDO mainly because of a free contract to do so. The running contract of the BDO ends in 2016 and what happens afterward with the organization is still an open question.

Outcome of support activities

The support activities of the business development organization are evaluated using an agreed upon set of indicators together with the funders/owners. The assessment points include:

- Number of newly settled companies in Essen
- Number of start-ups
- Created employment
- Secured employment (only measured if a really convincing reason exists, that the BDO did really prevent employment from vanishing)
- Acquired funding to industry from other sources
- an indicator concerning key-account contacts
- and a high number of indicators concerning investment, sites, offices which are of lower interest to our study

Actually, there were no eco-indicators in the list. The success of the eco-innovation activity seems to be focused on:

- the participants of the eco-profit project,
- the firms profiting from the environmental technology cluster run with Mühlheim and Oberhausen.

4.3 Review of impact of and companies' satisfaction with Eco-Innovation support in NRW

The support of business cannot be evaluated without a thorough view on the outcome and the point of view of the companies receiving the support. But it is not easy to get this kind of information. In a preliminary study carried out in southeast Sweden, the researchers tried to send out a questionnaire to 84 companies by e-mail (Brambila Macías and Palmén, 2014). Of these 9 failed to be delivered and just 9 completed questionnaires were received. The effort to get a commentary on consulting activities performed by a third party seems to be nearly wasted.

In the ongoing project, a different path has been followed. Feedback from the customer side can be obtained by two separate ways:

- (1) The organisations interviewed could send out a questionnaire to a group of their customers and ask for feedback on their work. The research team would evaluate the answers and report to the organisation in question as well as for the ongoing project.
- (2) Existing and published surveys on similar consulting and support activities could be found and analysed for the benefit of the ongoing project.

As a matter of fact, the organisations interviewed split up in two groups: two organisations already performed a customer survey. Some results of one survey have been given to us by the organisation (Umweltcluster.NRW), but the other organisation (Effizienzagentur NRW) did not decide to give the results of the survey to us. They could anyway be convinced that the results of their survey were

generally quite positive for the organisation and could probably be published in the form of a press information for the benefit of the organisation.

Three other organisations did say that they did not perform a customer survey to date.

Since the outcome of motivating the organisations to perform a customer survey were rather limited, the second method of obtaining survey results has been followed additionally. Up to date, the following surveys could be obtained.

Table 4: Surveys obtained from BDOs and CIs

Organisation	Activity performed	Survey conducted	Number of replies received
Federal Ministry for Economic Affairs and Energy	Energy Consulting for SMEs	Role of regional partners of the activity	52 (of 141, 37%)
		Point of view of energy consultants involved in the program	321 (of 1.647, 20%)
		Point of view of companies receiving the service	542 (of 4.434, 12%)
Klimaschutzagentur Region Hannover	Initial Energy Consulting for SMEs	Point of view of companies receiving the service	53 (of 250, 21%)
Umweltcluster.NRW	Cluster Management	Involvement of cluster companies in cluster activities	230
German Environmental Ministry	Support for EMAS	Activity and benefits of EMAS participants	573 (Of 1.007, 57%)

4.3.1 The Energy Consulting Survey of the Federal Ministry of Economic Affairs and Energy

The program analysed was targeted at energy efficiency in small and medium sized companies with up to 250 employees. The evaluation was carried out in Fall 2010 (Frahm, Gruber, Fleitner, & Schломann, 2010). The following description of the results is completely based on this report.

The program contained in phase one an initial consulting with a duration of one or two days for which a grant of 80% of the consulting cost was paid. The maximum consulting fee had to be below 800 € per day. In the optional phase two a detailed analysis is performed. The grant for this is 60% of a maximum of 10 consulting days, all over 4.800 € per company. The two phases can be applied for integrated or separately. From January 2008 to May 2010 an impressive 10.407 companies applied for this support. To disseminate the funding, 141 regional partners throughout Germany were involved who spread the program to regional companies. Companies from many sectors applied: hotels and restaurants (16%), "other" services (14%), "office-like" companies (13%), metal production and food industry (each 11%), food retail and "other" production (each 10%), "other" retail (9%) and car repair workshops (7%).

Of the participating companies, 35% had up to 10 employees, 41% had between 11 and 50 employees and 24 % had 51 to 250 employees.

The task to evaluate the program was performed by three separate surveys. Those were sent to the 141 regional partners, to 1.647 energy consultants and to 4.434 companies which did apply for the program.

The programme was distributed by regional partners. Most important were Chambers of Industry and Commerce and Chambers of Crafts. Other regional partners were the Energy Agency NRW, the Energy Agency Berlin and other Energy Agencies as well as some Business Development Organisations. Of the **regional partners**, 52 sent back a complete questionnaire. The activity of the regional partners varied widely. Some just delivered one company, others 250. While they said, that the main obstacles to disseminate the program were lack of interest in companies and not enough PR for the program, some of them obviously succeeded in dissemination. It obviously also belongs to the regional partners to get active. In the view of the regional partners the program was best known in the group of the consultants, who in many cases convinced companies to participate.

A majority of the regional partners (74%) think that the program strongly increased the demand for energy consulting. Only a minority saw a bandwagon-effect (20%). Most (88%) were of the opinion that new ideas got into companies by the program. But other companies made use of the program to follow innovative ideas which they longer had in mind, but now had the chance to get support by a consultant (45%). In many cases, the consultants were employed, when major restructuring or major investments were due (60%).

The availability of competent consultants was assessed to be good in the realm of building efficiency (85%). Moving to process technics (22%) or green IT (14%) competent consultants seem to be scarce.

The role of the regional partners is manifold. They support in the application process (96%), in case of problems (90%), by advice to investment credits (77%), in accounting questions (73%) and when looking for a fitting consultant (71%) and making a contract with him (33%).

In the view of the regional partners, the most important obstacles which hinder the companies to put possible measures in to practice are high investment cost (79%), lack of (management) time (37%), changed priorities of the company (35%), unclear recommendations of the consultant (25%) or the fact, that the proposed measure was at the end of the day comparatively marginal (25%).

Overall, 1.647 **consultants** were active in the program, of which 321 sent back a completed questionnaire. 95% of them performed at least one initial consulting (phase one), 66% performed at least one detailed consulting (phase two). The technical focus of the consultants was buildings (23%), renewables and heat recovery (22%), lighting (18%) and ventilation and air-conditioning (18%). Production process technics is the focus of only 11% of the consultants. As could be expected, advice on cross cutting technologies is much better provided than advice on complicated process technologies. The study of Hitchens et al. (2003, p. 161) found, that in the case of efficiency of process technology, the suppliers of machinery are the most important source of advice. Since firms in one sector often possess similar production technology and processes, it might also be hypothesized, that clusters might be a valuable environment to exchange experiences about the efficiency of production processes. It might also be a valuable strategy that a cluster or a sector

“invests” in a group of consultants who specialize in the sectors technologies and such become better sources of advice. Suppliers of technology might as well be important partners for such a process.

It is not surprising, that in the view of the consultants 94% strongly agree and agree, that new ideas were introduced to the SMEs. In the view of the consultants, the demand for energy consulting was significantly increased by the program (61% strongly agree and agree). But nevertheless, companies still shy at taking external consultants into confidence (78% strongly agree and agree). Furthermore, the detailed consulting (phase two) is for many companies too expensive (59% strongly agree and agree). Just 12% of the consultants saw bandwagon-effects (strongly agree and agree). The consultants strongly (10%) and generally (50% agree, that they are consulted most often, when major restructuring or major investments were due.

Out of the group of 10.407 **companies**, which applied for funding, 4.434 were known by the central administration and could be supplied with a questionnaire. 521 companies replied. Most of them (40%) had heard about the program from consultants, 22% were informed by industry associations or chambers of commerce, others by partners and friends, newspapers or the internet. In most cases (29%) the consultant employed was recommended by a regional partner of the program. In another 20% of the cases, the consultant made himself known. 19% relied on a recommendation from business partners. 16% made use of an internet database of consultants. Only 5% considered it complicated to find a consultant.

The most important reasons to make use of the program are high energy cost (94% very important or important), due restructuring or modernisation (77% very important or important), the funding program (74% very important or important) and lack of internal know how (67% very important or important). In general, a combination of convincing reasons seems to back the decision to make use of the program.

The energy cost share in the companies is under 1% in 12% of the firms, over 1% and under 2% in 23% of the firms, over 2% and under 5% in 34% of the firms, over 5% and under 10% in 19% of the firms and over 10% in 12% of the firms. For 91% of the companies this had been the very first energy consulting process. Only 8% had previously performed major measures for energy efficiency. The measures performed most often before the participation in the program were lighting, heating, behaviour, building, heat recovery and compressed air.

Consultants were generally acting in a way, which made clients content. Only 4% were not content with neutrality of the consultants, only 9% with his competence and 11% (each) with his explanations, his report or the time investment of the firm's employees. 17% considered the cost-benefit ration of the consulting process to be unconvincing. 75% would recommend other companies to take part in energy consulting.

Due to the frequency of cases and due to the knowledge base of the consultants, measures were most often proposed and realized in the following fields:

Table 5: Proposed and realized measures

Measure	Proposed (percentage of cases)	Realized (percentage of cases)
Heating	73	60
Lighting	66	49
Building	53	28
Heat recovery	49	22
Air-conditioning, ventilation	46	19
Behaviour	44	38
Energy management	41	19
Compressed air	37	18
Cold supply	36	12
Process heat	36	11
Motors	31	7
Green IT	29	12
Process technics	26	8

Source: Frahm et al. (2010, p. 50)

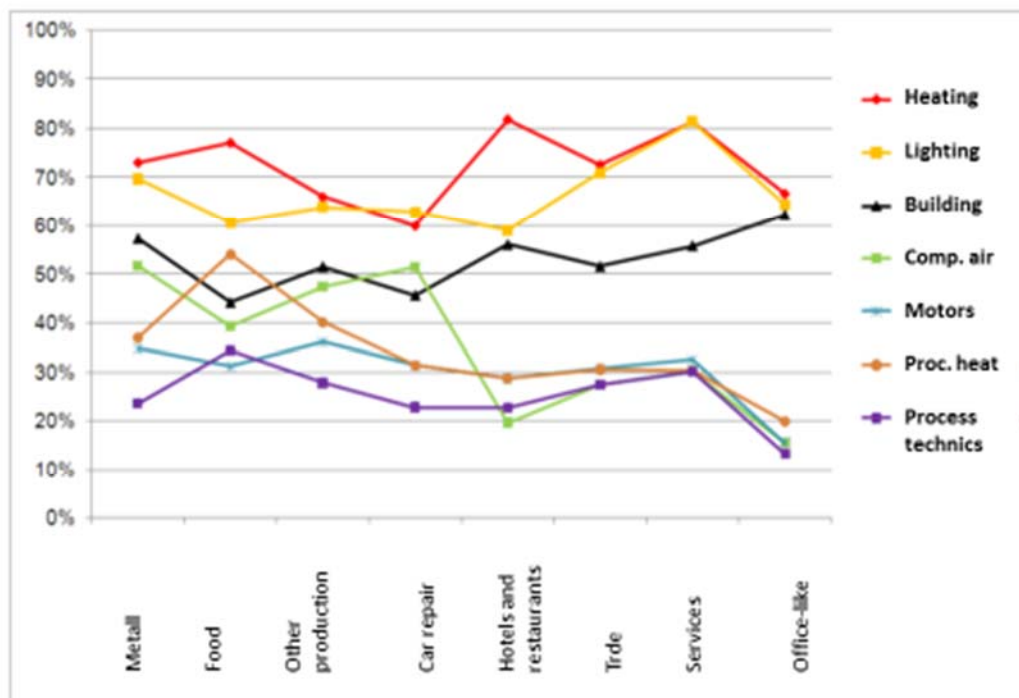
All over, 672 measures have been analysed. 152 of these measures had already been concretely planned in advance of the consulting process. On average, investments of 147.000 € have been associated with this group of measures. The high investment is – probably - the reason, why the consultant was very welcome to comment on the plan and optimize it.

A second group of 272 measures was already in mind of the companies, but no concrete plans had been made. Average investments of 34.000 € were made. In the third group, 248 completely new ideas were realized with an average investment of 11.000 €.

The measures were not equally distributed over the sectors. But even if the sector is taken into consideration, measures in process technics remain comparatively few.

Surprising is the fact, that motors are only seldom the target of efficiency measures. In Europe, the sales share of high-efficiency motors increased in ten years from two percent to only nine percent - despite their high efficiency (Umweltbundesamt, 2009). This fact underlines the suspicion, that consultants really have something to learn around process technics.

Figure 4: Proposed measures in different sectors



Source: Frahm et al. (2010, p. 50)

It is clearly visible in the table above, that low investment measures stand a bigger chance of realisation than high investment measures. In the mean, 5,4 measures were proposed and 2,8 measures were realized in each company. Obstacles seem to show, that liquidity is overall more important for realising a measure than profitability.

Table 6: Importance of obstacles hindering the realisation of measures

Obstacle	very important	important	less important	not important
too high investment cost	65	18	12	5
other investments have higher priority	49	30	6	15
measures not profitable	39	29	20	12
changes in operations	19	17	21	43
technically not feasible	16	18	21	45
external capital too expensive	16	18	17	49
unrealistic measure proposed	12	19	27	42
too much	12	21	25	42

management time necessary				
measure unclear	11	17	30	42
unclear development of energy prices	10	29	30	31

Source: Frahm et al. (2010, p. 50)

In 64% of the company, the consultant asked, upon the measures were realized. 52% said that the consultant did support them in the realisation process. Of the remaining 48%, 40% would have liked it to receive this kind of support.

Table 7: Average saving of energy and number of cases

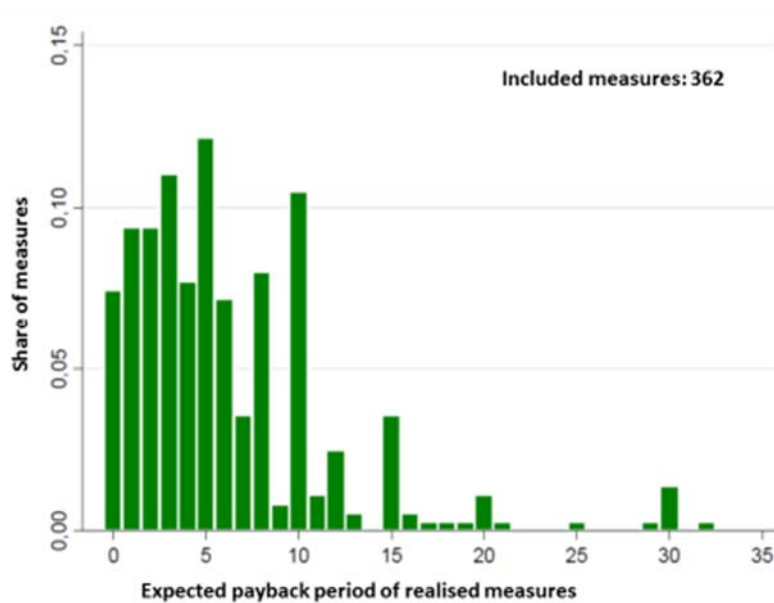
Measure	average saving of energy in relation to company energy use in %	number of cases
Heating	7,8	81
Building	10,1	67
Lighting	3,5	57
Heat recovery	7,1	47
Cold supply	4,9	29
Process technics	3,8	24
Compressed air	0,9	20
Air-conditioning, ventilation	4,9	15
Green IT	3,4	9
Motors	1,2	8
Behaviour	2,8	5

Source: Company survey and Consulting Reports (Frahm et al., 2010, p. 70)

The average saving is in most of the cases based on ex-ante assessments. Only 13% of the companies performed measurements to prove the savings. Furthermore, the time between the realisation and the survey was short, resulting in a lack of experience with the impact of the measure.

The payback periods of the different measures differed widely. While fast payback was often the case when optimizing compressed air systems (2 years), lighting (4 years), modes of behaviour (2 years) and high-efficiency motors (4 years), other measures had longer payback periods. Those were typically building related measures (e.g. insulation 11 years), heating systems (6 years) as well as air-conditioning and ventilation (8 years). Process technic paid back on average in 7 years.

Figure 5: Expected payback periods



Source: Frahm et al. (2010, S. 75)

The whole program was able to account for a reduction of 624.000 tons of CO₂-emissions, which have been calculated on bases of the realised measures. An overall investment of 666 mil. € resulted in a reduction of energy cost of 155 mil. € per annum, as calculated by the firms. To achieve this, consulting to the value of 32.5 mil. € has been paid for by public funding (17.7 mil. €) and the companies (14.7 mil. €).

4.3.2 The Energy Consulting Survey of the Klimaschutzagentur Hannover

The climate protection agency of the region of Hanover originally was focussed on energy efficiency advice for private households. Since a good local network exists, which includes the local business development agency, the chamber of industry and commerce as well as the chamber of skilled crafts, an idea to give advice to small companies was developed. The additional and regional service was interlinked to the national program of the Ministry of Economics described above and preceded this program. A very short energy check of 2 hours consulting was offered to local companies for free. An energy consultant makes a two hour appointment and quite roughly gathers information and data. He will point out first areas of action and will write a short report on first measures to save energy. He will also point out further possibilities of funding, e.g. the initial and detailed consulting funded by the Ministry of Economics. Between 2012 and the beginning of 2014 about 250 local companies took part in the “eco-bizz” efficiency check.

The energy check relies on a decision support system. The companies individual energy relevant data is filtered and sorted, allowing for comparison with benchmarks or average numbers. The flexible manner in which the check is carried out, allows for an examination of the individual state of the art in each company. The consultant points out to individual shortcomings and gives advices what to do

in a subsequent step. He answers questions of the company and highlights the idea of energy being a managers task (Chefsache). Together with the company he interprets energy relevant data, evaluates other relevant information thus supporting the company’s decision-making process towards a higher energy efficiency level.

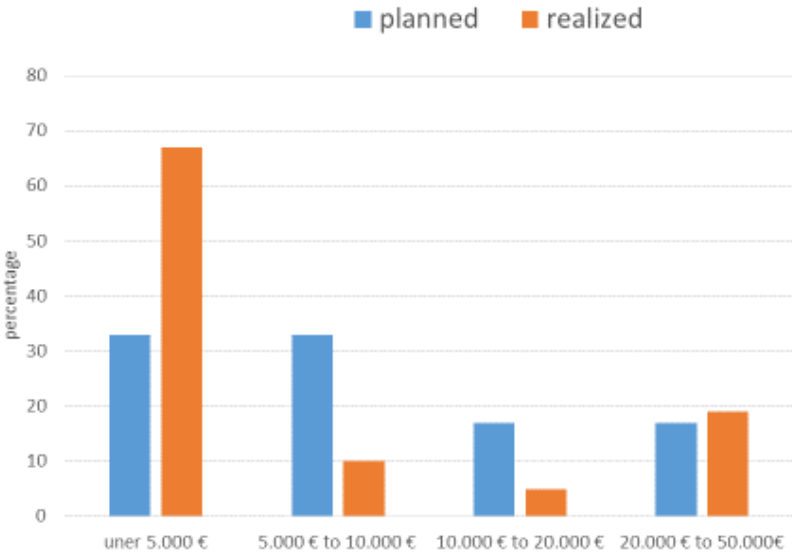
An evaluation was carried out in Spring 2014 (Bader, 2014). The following description of the results is completely based on this presentation. A questionnaire was sent out to all of the 250 participants, drawing 53 returns. The participating companies were very small: 47% have up to 10 employees, 34% between 11 and 50 employees, 13% between 51 and 100 employees and only 6% have more than 100 employees.

The objectives of the companies to participate are quite similar to the national program: 88% strive for lower energy cost, 58% want to get an overview over their status of energy efficiency and 33% want to engage in climate protection. It is a little bit puzzling, that only 23% mentioned that they wanted a table of possible measures to improve energy efficiency.

The participants were very content with the consultants. 39% evaluated the work of the consultants with very good (+++), 43% with good (++) and 12% with rather good (+). Only 2 percent (each) were critical (-, -- or ---).

A surprising 62% of the companies put concrete measures in practice. Of these measures, 74% deal with lighting or heating. 60% decided to keep on activities striving for more energy efficiency. Based on the small effort for consulting it is impressive, that 19% of the participants invested 20.000 € to 50.000€ in energy efficiency measures.

Figure 6: Planned and realized investments due to the “eco-bizz” efficiency check



Source: Bader (2014)

Over all, the participants were quite content with the energy efficiency check of “e.ecoBizz”. 29% evaluated the check to be very good (+++), 39% with good (++) and 28% with rather good (+). Only 4 percent were critical (- or - - -).

4.3.3 The survey of the Greentech Cluster NRW

With the intention to learn more about the demands of their clients when moving into innovation and future markets, the Greentech Cluster NRW performed a survey between 20th November 2012 until 14th January 2013. The survey draw 230 replies.

The questions built on the structure of six future markets, which are targeted by the cluster.

- Use and processing of biomass
- Resource efficiency in Industry
- Energy efficiency of buildings
- Use of biotec-plastics
- Recycling technology
- Water and waste water

Starting from this field, questions focussed on points of reference in the work of the companies, their interest in co-operation and the competences, which could be contributed to possible projects.

About 23% of the respondents showed interest in active participation in projects, another 22% are interested in more passive co-operation like participation in working groups or meetings.

Table 8: Interest of companies in participation in cluster activities

Future markets	Active co-operation interest	Passive co-operation interest	No co-operation interest	No points of reference
Use and processing of biomass	25	22	18	35
Resource efficiency in Industry	27	22	11	40
Energy efficiency of buildings	30	23	20	27
Use of biotec-plastics	7	18	18	57
Recycling technology	30	25	9	35
Water and waste water	17	21	19	43

Source: Umwelttechnologien NRW (2013, p. 6)

More than half of companies (58%) are explicit concerning specific interests of co-operation. Of these, 29% are looking for partners for the market introduction of new products or for innovations in development, 13% are looking for new customers for newly developed products, 12% are in search of R&D partners and 14% are looking for contacts in foreign countries. 33% have different interests.

Many of the companies which are interested in co-operation are engineering bureaus and want to contribute their services. 184 companies can contribute technical planning and consulting, 80 companies are specialized on market analysis, 67 on project planning, 59 on marketing and PR and 14 on financing.

Another big group is interested in technical contributions. 139 companies could help in technical realisation and detailed construction of parts (of machinery), 102 offer the production of parts and components.

Since most requests for co-operation are focussed on market access, it might be of special relevance that 86 companies offer services in distribution and sales and another 84 see a possibility to access their clients base to build up contacts to possible customers of new products.

Another question asked companies about their experience in co-operation with universities. 47% of the companies already co-operated with universities in NRW. An additional 15% already co-operated with universities outside of NRW and 27% did until not co-operate with universities, but have general interest to do so. For 11% this is not relevant.

The highest percentage of co-operation experience with universities is shown by companies from environmental friendly energy (82%) and the water sector (79%). The lowest share show companies from the recycling sector (46%).

Obstacles to university co-operation are the simple fact, that no contact person is known (33%), that the right university is unclear (18%), that the time investment in such projects is considered to be too high (18%), the financial burden is expected to be too high (13%), contract details are unclear (8%), that there is a lack of trust in the professionalism of the universities teams (7%) or the quality of their services (3). Additionally, 59% of the companies mention that they do not know programs of innovation funding for projects between firms and universities. Only two programs are really known by a significant share of the firms: innovation vouchers which are usually easy to be accessed, but very limited in volume (32%) and the Federal Innovation Program for medium sized firms (16%). All other EU, federal and regional programs are mentioned by less than 5% of the respondents.

4.3.4 Surveys on Eco-profit and Eco-Management

No really broad surveys of Ecoprofit (Ökoprofit) activities have been found. On behalf of the town of München, BAUM Consult aggregated the results of 126 Ökoprofit-projects in 82 different towns (Landeshauptstadt München, 2008). They show that considerable savings have been achieved not only in the realm of electricity, heat, fuel and CO₂-emissions, but also in the fields of raw material, waste and water.

More systematic was an evaluation of EMAS participants (European Environmental Management and Audit Scheme) by the German Federal Environmental Ministry in 2012 (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2013). Although participating in EMAS is much more work for the companies than taking part in an eco-profit project, it might be instructive to have a look on the results. Although the best results were achieved in the field of energy, relevant parts of participants have achieved broader improvements also concerning resource efficiency.

Figure 7: Savings through implementing the EMAS system

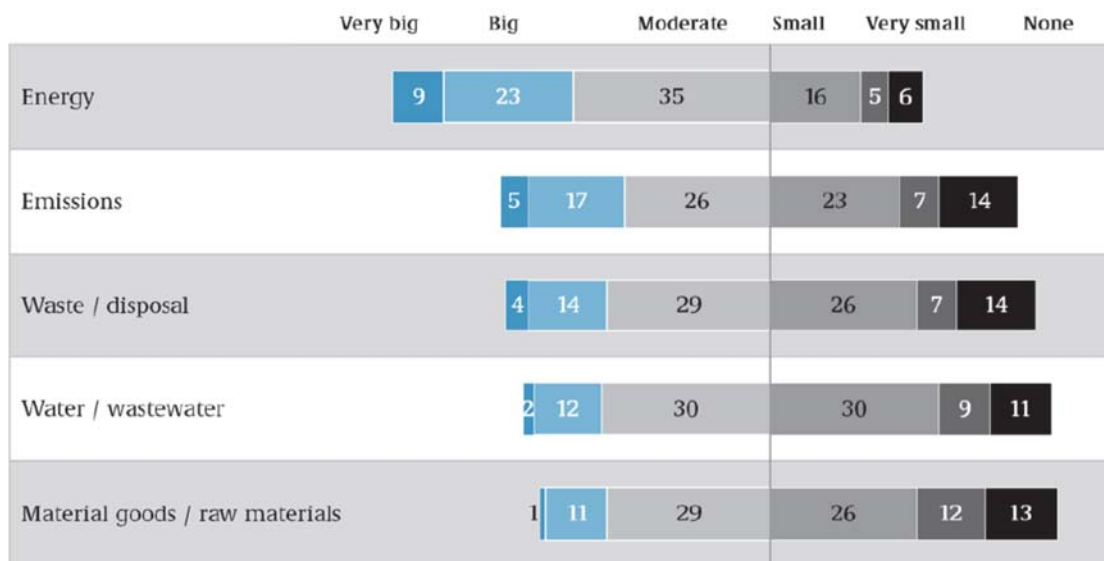


Fig. 16: Answers to the question "How high were the cost savings in the following areas?"⁴⁴

Source: (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2013, p. 24)

In the field of resource efficiency, companies implemented a spectrum of measures. Most often, they named production related optimization (29%), followed by water savings (19%), waste reduction and treatment (10%), recycling (9%), collecting consumption data (7%), avoiding hazardous substances (5) and employee training (5%). In response to the question of how EMAS could be established in practice as an instrument for sustainable resource management, the following suggestions were made (summary of the most frequent entries) (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2013, p. 34):

- (Industry) benchmarks and key data for assessing resource management,
- Training auditors, auditing resource management,
- Integration in environmental programme and environmental targets,
- Developing qualitative and quantitative minimum standards, boundary values and (legal) guidelines,
- Visual representation of consumption data, input-output analysis, implementing a material flow management system, CO2 balancing, analysis of actual and target status, checklist with "to do's", providing helpful tools,
- Consciousness raising for employees.

It might also be of interest, that an impact of EMAS on product design has not been asked for in the evaluation at all. This strikes even more, since in the EMAS regulation (European Parliament and Council, 2009) explicitly states, that important environmental aspects include:

- product life cycle related issues (design, development, packaging, transportation, use and waste recovery/disposal) and

- new markets.

This has obviously been forgotten by the German Government.

Looking back on the eco-design criteria and its importance for eco-innovation we must conclude, that incremental process innovation is much more in the focus of business development than product innovation. Support in eco-design we found only in less than 20% of the support activities of the Efficiency Agency NRW, who are obviously paving a new path for more thorough rethinking of business activities.

5 Concluding discussions

In this concluding discussions section, we will discuss the previously presented findings from North Rhine Westphalia (NRW), Germany and Region Skåne, Sweden in four steps in light of relevant theory and previous literature. First, we synthesize from the findings, the functions of the BDOs and CIs in supporting eco-innovation. Second, we present some identified challenges with the current support activities of studied BDOs and CIs in supporting eco-innovation. Third, we discuss potential best practices in the support activities from these two regions and in the fourth and final step we propose practical implications for policy makers, and BDOs including CIs based on identified weaknesses and good practices.

5.1 Functions of BDOs and CIs in eco-innovation

Since, the analytical approach guiding this study departs from the technological innovation systems literature, which stresses on the importance of innovation system functions as a basis for understanding the dynamics of the system in supporting the development, diffusion and use of innovations, it will be prudent to synthesize first the support functions from the empirical data collected. From the empirical studies we identify at least the following functions of BDOs and CIs for eco-innovation and sustainable entrepreneurship. To relate to the existing literature on innovation intermediaries and innovation system functions, we have labelled the support activities of the studied BDOs and CIs with existing functions in the literature (cf Bergek et al., 2008; Howells, 2006; Lopez-Vega and Vanhaverbeke, 2009). This list of support functions is by no means exhaustive and we intend to further develop them into more detail or abstraction and also timeline along the eco-innovation chain in our scientific publications and synthesis from the work package. It should also be observed that, the support functions often interact with each other and sometimes even conflict and counteract each other.

Table 9: Support functions of BDOs and CIs for eco-innovation

Support Function	Activity	Example BDO and CI providing function
1. Forecasting and road mapping	Generating a list of potential eco-innovations to develop. Stimulating eco-innovation projects.	Greentech Cluster, NRW Malmö Cleantech City, Skåne
2. Resource mobilization	Provision of financial assistance, linkages to financiers, assistance with financing implementation projects.	ALMI SKåne, Local BDOs in Essen and Duisburg; Efficiency Agency
3. Networking and partnerships	Breakfast meetings, social gatherings around a specific theme. Conferences, seminars, collaboration projects between companies and other actors.	Sustainable Business Hub; Malmö Cleantech City; ALMI SKåne; Greentech Cluster, NRW; Energy efficiency agency; Efficiency Agency; Local BDOs in Essen and Duisburg
4. Commercialization	Assistance with sales and	Sustainable Business Hub; Malmö

	marketing; export promotion activities .	Cleantech City; ALMI Skåne; Local BDOs in Essen and Duisburg
5. Technical consulting	Energy and material efficiency consulting and project implementation	Energy and Efficiency Agency, NRW
6. Knowledge/Information gathering, processing, generating and spreading	Seminars, workshops, meetings around specific topics, newsletters	Sustainable Business Hub; Malmö Cleantech City; ALMI Skåne; Greentech Cluster, NRW; Energy efficiency agency; Efficiency Agency; Local BDOs in Essen and Duisburg
7. Sector branding and legitimization	Seminars, workshops, meetings around specific topics, newsletters	Sustainable Business Hub; Malmö Cleantech City; Greentech Cluster, NRW;
8. Prototyping and piloting	Field testing and measurement	Malmö Cleantech City; ALMI Skåne; Greentech Cluster, NRW

To make this support functions more concrete, we briefly outline the various levels of intermediation as presented in the table above using examples from the relevant BDOs and CIs.

i) Forecasting and road mapping

With this support, intermediaries provide foresight and roadmaps to firms on relevant eco-innovations to develop based on relevant criteria and intelligent information. For example, The Greentech Cluster in NRW works with a proactive approach – innovation radar which includes generating a list of eco-innovations for each year and then bringing together companies to develop it further. The goal of this support activity is to develop a number of new projects every year in which environmental technologies can be developed and introduced to the market (interview, Greentech Cluster, NRW). The support activity follows the capacity of the Greentech Cluster which is the ability to identify interesting technologies and then bring interested companies and entrepreneurs around the eco-innovation through seminars and workshops to stimulate them to initiate projects which these clients run independently. The main strength of the cluster organization is to be able to bring together the right mix and set-up of companies, universities, researchers in meetings, seminars and workshops and also to achieve a project set-up which is new along the value chain. The companies invited to the workshop are actively selected based on how fitting their profile is to the innovation under discussion. “...the projects are done within the companies on their own. We are only initiating and generating new ideas and innovations and gather interested people around it” (interview, Greentech cluster, NRW).

ii) Resource mobilization

This support function deals with how the intermediaries assist firms with mobilizing different resources needs for eco-innovation. Such resources include technical competence/human capital, financial capital. This function can be provided by the intermediary itself or by linking firms to other organizations specialized in providing the particular resource. For example, ALMI SKåne provides financing to support different stages of the innovation and entrepreneurship process. The support activity of ALMI Skåne that is biggest in volume is financial support for preliminary studies. This

support can be granted to individuals or companies with up to 250 employees from all industries. The purpose of the grant is to lower the risk of a project or to verify the risk. Thus the grant can be used for seeking support in order to build a prototype, file a patent application, external verification or participation at a fair. Since 2003, an employee of The Efficiency Agency in NRW was dedicated only to organizing financing schemes for resource efficiency projects and now the agencies tries to translate resource efficiency project into a banking feasible project. The support has also widened in focus from production efficiency to the development of new products (interviews, The Efficiency Agency, NRW). The local business development organizations and sustainable business hub do not provide such financial resources to firms by themselves but they do serve as a hub through which firms can access relevant information on such resources and also link to relevant actors which are able to provide such resources (interview, Sustainable Business Hub).

iii) Networking and partnerships

Innovation intermediaries acknowledge that innovation diffuses through knowledge networks and knowledge creation is a sophisticated, dynamic process and many innovations come from interactions with user groups, consumer channels and supplier groups outside the firm. For example, Sustainable Business Hub (SBH), Malmö Cleantech City(MCC), Greentech Cluster provide meeting arenas and projects for collaboration and interaction purposes between various innovation stakeholders such as supplier and potential customers, researchers and financiers. The main role of SBH in this support activity is to develop contacts with universities in the region with different competences and then link these competences to companies through meetings and seminars around narrow themes e.g. heat exchangers, biogas etc. The starting point is universities and companies but expansions to cover private consultants and other expertise would be interesting developments in the near future. For Malmö Cleantech City such interactions and networking activities are organised through weekly breakfast meetings and matchmaking meetings with specially invited attendants (interviews Malmö Cleantech City).

iv) Commercialization

This intermediation activity has to do with activities geared towards exploiting an innovation by identifying potential markets and consequent strategies for assisting firms to serve those markets both home and abroad. For example Sustainable Business Hub provides export promotion activities (e.g. business delegations, matchmaking services) for its members. Sustainable Business Hub has since 2007 focused on the support activities was specified towards assisting environmental technology companies in export. This support includes taking part in trade delegations abroad, arranging meetings to meet potential customers and partners, and education and training about marketing and exporting activities. In collaboration with other agencies in North Rhine Westphalia such as the Energy Region in NRW, the Energy Agency is responsible for climate protection activities within networks for biomass, fuel cells and hydrogen, energy-efficient and solar construction, geothermics, fuels and drives of the future, power plant technology, photovoltaics and wind energy. Their support focus in this case is to initiate innovative projects and products, speed up their market readiness and exploit its economic potentials including foreign trade (interview, Energy Agency, NRW).

v) Technical consulting

This intermediation support focuses on the provision of technical knowledge or assistance needed for the identification and implementation of eco-innovations such as energy efficiency and material efficiency projects. For example the Efficiency Agency in NRW offers free consulting on problem identification/definition and also setting objectives. After initial consulting, companies can be denied support; can receive direct advice or solution for the next step e.g. a technical consulting project. Companies are denied support in different situations for example when they already have state-of-the-art technologies and improvements in resource efficiency and the Efficiency Agency does not have a clear idea for improvements. In other instances, companies seem to be not willing to change or improve their working practices and this can hinder energy efficiency measures and also the effective use of financial resources available for the Efficiency Agency.

vi) Information gathering and spreading

Information gathering and spreading on the environmental technology sector and on sustainability issues in general is one of the most common support activity offered by the studied intermediaries. The medium for giving these support to companies include lectures with invited speakers and companies around very specific themes e.g. heat exchangers and then creating a platform for people to meet and share ideas, newsletters, magazines and industry proceedings. The information content can vary from general business information such as market demand and trends and also technical information on environmental technologies. For example, the Energy Agency in NRW offers support activities including information provision on energy weak spots in companies. This covers technical systems in buildings to production processes and includes heating systems, heat recovery, insulation and energy planning. There are also continuous training seminars for companies including action weeks offered to the company workforce on energy efficiency solutions. With its Energy Knowledge Portal the Energy Agency, NRW also provides an on-line platform on the Internet for initial vocational and continuous training.

vii) Sector branding and legitimation

Legitimacy deals with social acceptance and compliance with relevant institutions. The function covers the acceptance the support actors offer to certain entrepreneurs and technology types as eco-innovations and sustainable entrepreneurship. This could be through their membership, accreditation and other means of affiliation to the support actors. Legitimacy and the branding are important for resources to be mobilized, for demand to form and actors to gain political strength. For example the membership that sustainable business hub offers to companies gives them some form of legitimacy as working with eco-innovation and sustainability related issues, in a similar fashion to Malmö Cleantech Cities and their clients. Participating in BDOs organised support programs such as Ecoprofit® and being certified can give an indication that a company is concerned and works with environmental issues. Ecoprofit® is a registered trademark about environmental improvements in companies and is popular among German speaking countries (Klewitz, 2012).

vii) Prototyping and piloting

Here intermediation activities emphasize on assessment of technologies and evaluating particularly their environmental performance for example in terms of energy, material and financial savings often on test beds and under laboratory conditions. For example, SBH provides support for member companies for demonstrating and testing their new products and services using municipalities which

are often advanced in technology use and play an active role in providing platforms for prototyping and testing purposes. SBH can be a connection between companies looking for test bed and municipalities willing to show new and state of the art solutions. SBH provide a meeting platform for municipalities to present their visions including challenges and companies develop new solutions to meet these demands. This test bed and demonstration activities are sometimes coupled with innovation contests, where companies compete with their solutions for a small price and publicity (interview, sustainable business hub). In the case of Malmö Cleantech City, the test bed area is more of a concrete support activity provided by MCC for companies in an early innovative product development phase. It follows two paths either a company with an innovative product contacts MCC to help with pilot tests in the city or sometimes the municipality defines their urban sustainability challenge and MCC can scan the market and bring the companies to solve the challenge. The technical departments within the municipality assist such companies to test and do measurements and continue to develop their products. E.g. a water saving shower has been tested. This is small scale activities to test the technologies and the results are open to the general public both as a review of the technology and for some publicity as well.

5.2 Challenges with current support activities

To identify challenges with the current support activities of BDOs including CIs, an analysis of both the supply and demand sides of the support system would be appropriate. In this work package, we had to rely on secondary data to access the demand side and thus our discussions on current challenges could relate to the supply side only and /or the supply and demand in light of relevant scientific literature. Furthermore, a discussion about challenges with the current intermediation support activities should be approached carefully since public support for eco-innovation and sustainable entrepreneurship is supposed to complement market initiatives and thus should not be expected to fulfil every function. Overall such challenges and system weaknesses should not be treated as particularly catastrophic since the formative phase of an innovation system is particularly characterized by high uncertainty in terms of technologies and markets together with experimentation and variety creation (Bergek et al., 2008).

On the demand side, some literatures indicate SMEs are faced with challenges such as resource constraints in terms of time, knowledge, finances, and human capital (Klewitz et al., 2012), in addition to particular challenge of translating sustainability goals into customer value (Keskin et al., 2013), often few personnel dedicated to sustainability management or an ad hoc informal management of sustainability related issues. Thus linkages with external actors are needed to access and utilize critical resources to tackle such challenges. It is not obvious to establish if the functions provided by the BDOs assists SMEs to tackle these challenges. However some challenges can be identified with the support functions and activities of studied BDOs and CIs:

1. Functional ambiguity

Though, most SMEs appreciate the support they receive from BDOs and CIs, it is often difficult to establish a concrete relation between the support they receive and eco-innovation outcomes and/or business development. This challenge is particularly pronounced for general focused actors such as local BDOs in Essen and Duisburg, and ALMI (regional BDO in Region Skåne), since their support is largely general business development which are particularly prone to the challenge of establishing a

cause and effect between support activities and eco-innovation outcomes. This means that though, such intermediaries want to tackle various market and system failures in the innovation system, the organizations themselves suffer from failures and challenges within the system. Assessing the impact of their activities is difficult given their sometimes indirect impact on the businesses value chain and this challenge goes a long way to affect their access to financial resources, the long term existence of their support activities as their clients and/or financiers find it difficult to grasp the nature and value of their support activities. However, when support activities involve consulting support for energy and material efficiency, the outcomes can be easily followed up in terms of financial, energy and material savings in the firm as a result of the technical support from the BDO.

For example, it seems to be of importance, that while regional partners and consultants are absolutely convinced, that the programs bring a multitude of new ideas into the firms, the firms themselves simply think, this is not true. From the view of the firms consulted, the consultant supports them in the field of projects, which they already had in mind but until the consultant came, saw no opportunity to follow. Like a participant of the program put it recently (Schüren, 2014), an owner of a small company - many times acting as the single manager - has simply not the time to follow up on major efficiency ideas. The “good vibrations” between him and the consultant started a process, which in consequence resulted in a CO₂-reduction of around 90% in his firm. This aspect might be of importance for the marketing of this kind of projects. The message “bring in new ideas” might be not as good as the message “activate the good ideas, you have in mind”.

2. Resource constraints

Another challenge with the current support activities of the studied BDOs and CIs relates to their resource constraints in term of e.g. personnel, financing, time, and knowledge. This challenge is of course influenced by the input provided to the organization by relevant stakeholders and more importantly this resource limitation also influences the quality of their support activities. For example the mandate given most of the studied BDOs and CIs and also the financial resources and knowledge competence available at their disposal influences how general or specific their support functions could be. For example, the activities of cluster initiatives are often mandated towards an entire cluster and not for individual companies’ needs or characteristics partly because of resource limitations as indicated by Sustainable Business Hub, Greentech Cluster, Malmö Cleantech.

Furthermore many consultants lack experience when it comes to production processes. A study of Hitchens et al. (2003, p. 161) found, that in the case of efficiency of process technology, the suppliers of machinery are the most important source of advice. Since firms in one sector often possess similar production technology and processes, it can also be hypothesized, that clusters or sectors might be a valuable environment to exchange experiences about the efficiency of production processes.

3. One-size fits all approach

Many local BDOs (e.g. ALMI Skåne, Essen, Duisburg) do not consider eco-innovation and sustainable entrepreneurship as different from “ordinary” innovation and entrepreneurship. And cluster initiatives (Sustainable Business Hub, Malmö Cleantech City, Greentech Cluster) which focus on the environmental technology sector use similar support activities as local BDOs – cf: intermediaries in “ordinary” innovation (cf Howells, 2006). Even though this generalization approach to support activities can be linked to the resource constraints (e.g. finance, knowledge, personnel) on the side of

BDOs and CIs, it has potential implications on the support outcomes. For example (Klewitz and Hansen, 2013), in their study of eco-innovation intermediation activities for SMEs in the manufacturing sector established the need for some differentiation in the support provided. This varied along the lines that, some SMEs require continuous handholding during their pursuit of sustainability while others deal with this types of issues once they receive initial help and therefore strongly recommend, different levels of support from intermediaries from customized and individual support to more loosely held support such as networks. Understanding from the studied intermediaries however indicates a largely general sector focus approach to support and also loosely held activities such as networks and social meetings which can also be as a result of their resource constraints and mandate to complement the market.

4. Reactive support

The current support approach offered by many of the BDOs (ALMI, local BDOs in Essen and Duisburg, Sustainable Business Hub) is very reactive to the needs of companies. And from experience, company needs often fall within the current economic and institutional settings. For example when electricity and material costs get high, companies contact the energy and material agency for support. With, this reactive approach, radical innovations which go beyond current economic and institutional boundaries might be difficult to generate. A proactive approach is recognized as an essential push factor to trigger eco-innovations with low absorptive capacity (Klewitz and Hansen, 2013).

5. Demand side challenges

Other challenges hinted on the demand side cover the receptivity of the target SMEs to receive support and also the coverage of the support activities to a large number of SMEs. In specific, some companies are not willing to receive support or seem contra innovative (resistant to change). Those support processes are terminated, since the support provided would probably be in vain. Regarding the coverage of the support activities, there are about 300.000 small producing companies (10 to 50 employees) in Germany, about 63.000 medium sized one (up to 250 employees) and 13.000 big ones (more than 250 employees) (Söllner, 2009). The statistics makes it probable, that not more than 30 to 40.000 companies up to now received energy efficiency consulting, leaving a gap of about 336.000 companies which did not receive this support.

5.3 Potential good practices with current support activities

Despite a number of challenges highlighted with the current support activities of BDOs and CIs, it should be mentioned that there are some potential “good” practices also with the current support activities which are important to mention both for strengthening purposes and also as potential input to learning and dissemination activities for other regions and countries based on the fact that Germany and Sweden have consistently been ranked among the top ten in eco-innovations worldwide(WWF, 2012, 2014). Potential “good” practices include:

1. A mix of general and specific functions

A mix of different types of BDOs and CIs providing different support functions to firms – those providing “hard” support (e.g. technical support on energy and material efficiency, financing) and those providing “soft” support such as networking, social meetings. The provision of different kinds

of support functions goes a long way to underline the fact that, eco-innovations face different and interrelated barriers (e.g. eco-innovations also face general business development barriers encountered by any innovation and entrepreneur) and it could thus be fruitful to combine different support approaches for firms developing and/or implementing such innovations. For example, the energy-efficiency type of support is of importance for climate protection and cost efficiency of firms, while the product-related type, is relevant for market success and competitiveness of firms as well as of regions.

2. Proactive support

Proactive support in scanning and foresighting relevant eco-innovations to firms is a potentially good practice when it comes to developing radical innovations. Proactive support approaches is expected to trigger eco-innovation activity particularly in firms with low absorptive capacity and also when radical innovations outside current economic and institutional settings are of interest. And such radical innovations are expected to deliver greater environmental benefits than incremental innovations but also face more systemic and difficult to tackle barriers.

3. Interdependence

Active interaction between various types of BDOs and CIs to promote learning and competence sharing is regarded as a good practise. It was often observed that local BDOs did not always have in-house competence in supporting eco-innovation activities but rather had a strong relation with a large base of firms and also focused on business development activities and active interactions with other support actors such as material and energy efficiency experts, universities have proven relevant in developing support on eco-innovation.

4. Support for different kinds of eco-innovations

Support for different kinds of eco-innovations e.g. product and process innovations. The literature has already pointed out that there is a distinction between product and process eco-innovations regarding the barriers to their development and diffusion and thus tailored intermediation activities targeted at these types of eco-innovation could be considered a “good” practise from cases in the two studied regions. For example in North Rhine Westphalia, energy and resource efficiency as well as product development are object of BDOs activities and hundreds of firms are part of consulting and co-operation processes. Clients strongly pointed out, that the support should not end with the report. Energy consultants, who get involved in securing funds, writing tenders, evaluating bids, commenting on prices and offers and finally accompanying realization are of extreme value for companies. The single manager might get a partner for discussion and decision in the process.

5.4 Practical recommendations

The discussions offered so far has some implications both for policy makers and also for the intermediaries in their support activities. These recommendations are backed-up with good practise examples were available.

For Policy makers:

- (1) The functions of the support system could be of primary interest for policy makers as compared to the structure. Since the functions of the support system has a direct connection to the overall goals of an innovation system which is to facilitate the development, diffusion and use of eco-innovations. The structure of the support system however could in many ways be connected to the regional characteristics such as population, industrial characteristics, and strategic focus. Thus the overall goal of policy to stimulate the development and implementation of eco-innovations could be achieved using different structures of support provided the necessary support functions are being provided to firms (see e.g. Bergek et al., 2008).
- (2) There are several actors which act to support eco-innovation and entrepreneurs in different ways and this could lead to a proliferation of support actors and their activities, often confusing to target firms. However, this diversity should be acknowledged and learning between e.g. cluster activities which are relatively new phenomena and the activities of more established business development organization could go a long way to develop and maintain support functions for eco-innovation.

For Business development organizations including cluster initiatives

- (1) Collaboration and interdependence while acknowledging differing, competing and complimentary roles and responsibilities between different types of intermediaries both public and private will strengthen the support for eco-entrepreneurs.

Good practice example: The two studied regions, Skåne in Sweden and North Rhine Westphalia in Germany had a mix of intermediaries proving general framework support such as financial and knowledge resource mobilization; networking and partnerships; information gathering and spreading as well as intermediaries proving eco-innovation specific support such as technical consulting on material and energy efficiency. The dynamic tailoring relies on the fine interplay and reliance between these two types of general and specific focused intermediaries in providing support for eco-innovators.

- (1) A proactive approach to support is necessary to trigger radical eco-innovations.

Good practice example: The innovation radar program by the Green Technology Cluster, North Rhine Westphalia (<http://www.umweltcluster-nrw.de/>) is a cost effective approach to scanning, forecasting and road mapping relevant eco-innovations and providing a platform for relevant actors to develop it further. Proactive support is needed to trigger radical innovations beyond current economic and institutional settings together with experimentation and variety creation with support to avoid stagnation and lock-in with eco-innovations.

- (1) Broadening the support base to avoid supporting only the usual suspects.
- (2) Differentiating support based on relevant differences between firms, entrepreneurs and eco-innovation types.

Good practice example: The Greentech Cluster, North Rhine Westphalia uses a proactive approach called the innovation radar to support mainly product eco-innovations. The innovation radar program is a cost effective approach to scanning, forecasting, road mapping relevant eco-innovations and providing a platform for relevant actors to develop it further. The Energy Agency and Efficiency Agency uses technical consulting to identify and propose eco-innovation improvements in industrial processes.

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7 Appendix

7.1 Interview guide

Organisation
1. Can you please give a description of how your organization was formed? What was the main idea, driving force and key actors?
2. Can you describe the business development support activities of your organization?
3. Which of your activities are fostering eco-innovation?
4. Do you have other activities and how do they interact with business support for eco-innovation?
5. Can you kindly describe how your organization has changed over time?
6. How do you finance your business support activities?
7. Can you describe your organization in terms of number of employees, their skills, location etc?
8. What are the goals for your business support activities? And how are these goals formulated?
9. Which other public/private actors do you collaborate with to deliver support for eco-innovation?
10. Which private/public actors compete with your organization's activities?
11. How do you ensure the long term existence of your organization and its activities?
12. In your opinion, what is (should be) the role of public support in (eco)-innovation?
Clients
13. Which kind of companies do you support? Do you have any categorization (E.g., by: size, sector, ownership, maturity etc.)?
14. Why do the companies approach your organisation? What is their driving intention?
15. Which percentage of your clients strives for process / efficiency innovation and which for product innovation?
16. Can you describe your criteria for selecting (or not-selecting) a company for business support?
17. What are the focus areas of your member companies (if applicable)?
Process of advice
18. How do you approach new clients?
19. How do you offer business development support to companies?
20. What do you regard as companies most significant need in eco-innovation?
21. What are the steps in your support process?
22. Do you have any particular approach to support eco-innovation compared to "normal" innovations?
23. What are the strengths of your support process?
24. What are typical problems in the support process?
25. How do you improve the process due to the problems?
26. How do you respond to changing market trends, pressure from stakeholders/ funders in your support?

Achievements
27. Are your clients content with your service?
28. What are the criteria of your clients when evaluating your service?
29. What are your own criteria for success?
30. Do you fulfil your own criteria for success?
31. Finally: Can you describe how your owners (funders) evaluate you?
Closing remarks
32. Any further comments/documents/questions?
33. Can you recommend another person to talk to (in your organization)?
34. Are you available for feedback on the interview transcript/further discussions?

7.2 Work package publications

- (1) Kanda, W., Hjelm, O., & Bienkowska, D. (2014). Boosting eco-innovation: The role of public support organizations. In XXV ISPIM Conference on Innovation for sustainable Economy and Society, Dublin, June 8-11, 2014. Available online at <http://www.diva-portal.org/smash/get/diva2:725365/FULLTEXT01.pdf> [Last accessed 2015-03-17]
- (2) Kanda, W., Hjelm, O. (2014). An approach for analyzing public support systems for eco-innovations: Lessons from two German and Swedish regions. In 18th Annual Interdisciplinary Entrepreneurship Conference, November 13-14th, 2014, Oldenburg, Germany. Available online at <http://www.diva-portal.org/smash/get/diva2:765719/FULLTEXT01.pdf> [last accessed 2015-03-17]
- (3) Wisdom Kanda, Pablo del Río González, Olof Hjelm, Dzamila Bienkowska. Analysing the roles of intermediaries in eco-innovation: a functions of innovation systems approach. In Global Cleaner Production and Sustainable Consumption Conference, November 1-4th, 2015, Sites,Barcelona,Spain. Available online at https://www.researchgate.net/publication/283352482_A_function_of_innovation_systems_a_pproach_for_analysing_the_roles_of_intermediaries_in_eco-innovation [Last accessed 2016-03-30]
- (4) Wisdom Kanda, Jens Clausen, Olof Hjelm, Dzamila Bienkowska. The roles of intermediaries in eco-innovation: a study of business development organizations and cluster initiatives in a Swedish and German region. In Global Cleaner Production and Sustainable Consumption Conference, November 1-4th, 2015, Sites,Barcelona,Spain. Available online at https://www.researchgate.net/publication/283352482_A_function_of_innovation_systems_a_pproach_for_analysing_the_roles_of_intermediaries_in_eco-innovation [Last accessed 2016-03-30]

7.3 Student projects

- (1) Brambila Macías, S.A., Palmén, C. (2014). Support of Business Development Organizations for Eco-innovations in Small and Medium Sized Enterprises. Master Thesis. Linköping University.
- (2) Palmén,C., Åslund, P. (2013).Boosting Eco-innovation: The role of business development organizations in supporting clean technologies. Student project. Linköping University.

- (3) Arvidsson, J., Högström, C. (2013). Boosting Eco-innovation: The role of public business development organizations. Student project. Linköping University.
- (4) Ekberg, K., Sterne, A. (2014). Support for innovation-A case study on public business development organizations in Skåne. Student project. Linköping University.