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**The Challenges in Marketing for Clean Tech SMEs in Finland**

Thesis

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<p>Environmental sustainability and clean technology are among the hottest topics nowadays. Advances in clean technology are happening right now and the business sector is moving fast. Finland has started to recognize the importance of the clean technologies and it is aiming to become one of the leading clean technology countries in the world.</p> <p>The aim of this thesis is to find out the challenges the clean technology small and medium sized companies face in their business to business marketing. The topic of clean technology is a widely searched subject but only a little research has been done about the business to business marketing in the clean technology sectors.</p> <p>The theoretical part of the thesis focuses on the clean technology markets at the global and Finnish level. China and the United States were used as a comparison to Finnish clean technology market. The theoretical framework also includes theory about the business to business marketing for small and medium sized enterprises.</p> <p>The research for the thesis was done using the qualitative and secondary research methods. The results of the research point out that the biggest challenges in business to business marketing for the clean technology companies are funding and allocation of the existing funds. The challenges also include issues such as entering a number of markets at once, the technical focus on research and development, and the importance of market references.</p>	
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<p>Ympäristön kestävä kehitys ja “clean tech” eli puhtaat teknologiat ovat tämän päivän kuumimpia puheenaiheita. Edistysaskeleet clean techissä tapahtuvat nyt ja yrityssektori kehitty nopeasti. Suomessa on alettu ymmärtämään puhtaiden teknologioiden tärkeys. Suomen tavoitteena on olla yksi maailman johtavista maista puhtaissa teknologioissa.</p> <p>Tämän lopputyön tavoitteena on selvittää pienten ja keskisuurten yritysten clean tech -haasteet yritysten välisessä markkinoinnissa. Puhtaita prosesseja on tutkittu paljon, mutta clean tech -yritysten välistä markkinointia ei ole vielä tutkittu yhtä kattavasti.</p> <p>Lopputyön teoriaosuus keskittyy clean techin Suomen ja kansainvälisiin markkinoihin. Suomen clean tech -markkinoita verrataan Kiinan ja Yhdysvaltojen markkinoihin. Teoriaviitekehukseen kuuluu myös teoriaa pienten ja keskisuurten yritysten välisestä markkinoinnista.</p> <p>Lopputyön tutkimus toteutettiin laadullisena tutkimuksena, jota tukee aiheesta tehty kirjallisuuskatsaus. Tutkimuksen tulokset osoittavat, että clean tech -yritysten välisen markkinoinnin suurin haaste on rahoitus ja jo olemassa olevien varojen kohdentaminen. Haasteisiin kuuluu myös samanaikainen laajeneminen useille markkinoille, tutkimuksen ja kehityksen tekninen näkökulma sekä pilottihankkeiden tärkeys.</p>	
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## CONTENTS

1 INTRODUCTION	1
2 CLEAN TECHNOLOGY	3
2.1 The definition of clean tech	3
2.2 The global clean tech	6
2.3 Finnish clean tech market	9
2.4 Clean tech SME B2B marketing	14
3 CHINA AND USA CLEAN TECHNOLOGY	16
3.1 China	16
3.2 USA	20
4 THE RESEARCH	23
4.1 Research method	23
4.2 Research question	26
5 RESEARCH FINDINGS	27
6 DISCUSSION	32
7 CONCLUSIONS	37
SOURCES	38
APPENDICES	

## 1 INTRODUCTION

The main subject of this thesis is the challenges of the clean technology small and medium sized companies' marketing. The business around the clean technology is growing fast and it will continue to grow even more in the future because we need more environmentally friendly solutions. It has quickly become one of the biggest industries in the world. The clean technology has also become an important interest for many of the governments all over the world. (Peattie 1995, 6.)

The topic of clean technology was chosen because the clean tech is such an important topic for the future. The clean tech solutions help to improve the environment, and for a true change to happen that is essential. (Peattie 1995, 6.) One area that the thesis aims to discover is the importance of the home market references for the companies and how it easy it is to get them. With the thesis the author wants to find out the need and value of the market references for clean tech small and medium sized companies.

The topic of challenges in the marketing was chosen also based on author's interest in marketing. That combined with the need of the commissioner Centre for Measurement and Information Systems (CEMIS) to find more about the clean technology markets made the topic suitable for both the commissioner and the author. CEMIS is a joint organization between different parties, such as Kajaani University of Applied Sciences, Universities of Oulu and Jyväskylä and the Centre for Metrology and Accreditation. CEMIS focuses on developing measurement and information system expertise for various fields and industries. (The Centre for Measurement and Information Systems n.d.)

The thesis aims to find out what are the challenges in the marketing for the Finnish clean tech small and medium enterprises. The secondary research question is to find out why these challenges exist for the companies. Finland has a strong reputation as successful country with innovative, environmental solutions but it has been lacking the real commercial success, especially in export. The small and medium sized enterprises point of view was chosen because the most of the Finnish clean technology companies are small or medium sized.

The thesis is divided into theory, research and conclusion parts. The literature part of the thesis consists of introduction to global and Finnish clean technology industry and a closer look to United States' and Chinese industry. USA and China are the two leading countries in

the clean technology at the moment, and this thesis aims to find out what obstacles the Finnish companies need to overcome in their marketing to achieve the same level of success. The theoretical framework focuses on business to business marketing from small and medium sized business' perspective.

The research part of the thesis focuses on what are the challenges in marketing for the clean tech SME's and why they are obstacles for marketing. The last part of the thesis is conclusion, in which the thesis process is evaluated from the author's point of view, the thesis is critically examined and the future areas of research are pointed out.

The research method used in the thesis is qualitative research supported by secondary data research. The qualitative research offers insights into the challenges in the marketing from the Finnish clean technology professionals. The secondary data gathered is used to support the qualitative research and to further develop and verify the research findings.

## 2 CLEAN TECHNOLOGY

The consumption in the world has been expanding rapidly since the 1950s and the growth of the population has been huge. There are more people in the world today than there has ever been. The need for sustainable and environmental thinking has been recognized in the last three decades as the societies have started to become more concerned with the state of the environment in the world. (Peattie 1995, 4-5; Choudhary and Gokarn, 2013, 27.)

The concern for environment started for real in the 1980s when the environmental issues surfaced and people started to realise its real meaning and impacts. It was understood that the state of the environment will only continue to worsen in the future years if nothing was done. The companies and people started to comprehend that there was a real need for protecting the world and its natural resources. (Peattie 1995, 6.) This has driven the businesses to find alternative ways to answer the new needs of the customers and the other stakeholders (Choudhary and Gokarn, 2013, 28.)

The change in the environmental conditions and the global warming are one of the most important issues today. The awareness of the changing climate and the other ecological issues has been increasing fast in the last decades. Finding the new innovations related to sustainable and environmentally safe processes has become one of the main objectives all around the world. The growing awareness of the environmental trend and the tightening legislation has compelled the companies to become more environmental. The legislation is changing all over the globe increasingly towards protecting the environment. (Palmberg & Nikulainen 2010, 1.)

### 2.1 The definition of clean tech

The term clean technology (clean tech) can be applied to most of the industrial sectors. The term is applicable to almost all the sectors if the process or a product fulfils the clean technology requirement. This can make it hard to classify which technologies can be seen as clean tech. (Sitra 2007, 10.)

Almost everything from energy and materials to transportation and water technologies can be seen to be as a part of clean technology industry. The technologies such as wind power, solar power and energy efficient energy solutions can be seen as one the biggest sectors of clean technology. (Ernst & Young 2012, 13.)

The main objective of clean tech is to use natural resources more effectively and lessen the environmental impact that comes from the manufacturing or the traditional processes. A clean tech product aims to offer improved quality compared to the conventional product while being less harmful to the environment. The environmental products have been seen as more expensive but clean tech is striving to offer the products and solutions with lower cost to all the stakeholders. (Cleantech Group 2012; Statistics Finland n.d.)

Nowadays as the opinions of the public are becoming greener and more conscious about the environmental issues it is possible that the companies can have a negative impact on their reputation if they do not follow the latest environmental regulations. The companies may face challenges in communicating their green and clean tech initiatives to their customers and their competitors. (CMS Cameron McKenna 2009, 39.)

The clean tech markets are not only niche markets anymore. As the clean tech markets are divided in sub categories the sub categories can be seen as niche markets. Clean tech cannot be defined as one single market. The products and processes are a mix of different business sectors. The term clean tech covers a broad range of different technologies and business sectors. As per clean tech definition it is possible to tie it to multiple areas. For example, clean tech solutions can be used in construction sector as well as in developing efficient energy processes. (Wildner *et al.* 2011, 2.)

Much of the clean tech business today is done in business to business sector. As the technologies and processes in manufacturing are moving towards the new age of green technologies the companies need to have these new technologies in their disposal. This is why the clean tech commerce is largely business to business sector because the companies need to have the technology to be able to start using clean solutions and processes. The clean tech companies develop the solutions for the other companies for them to be able to move towards more clean and efficient way of doing business. (Lane 2013, 302.)



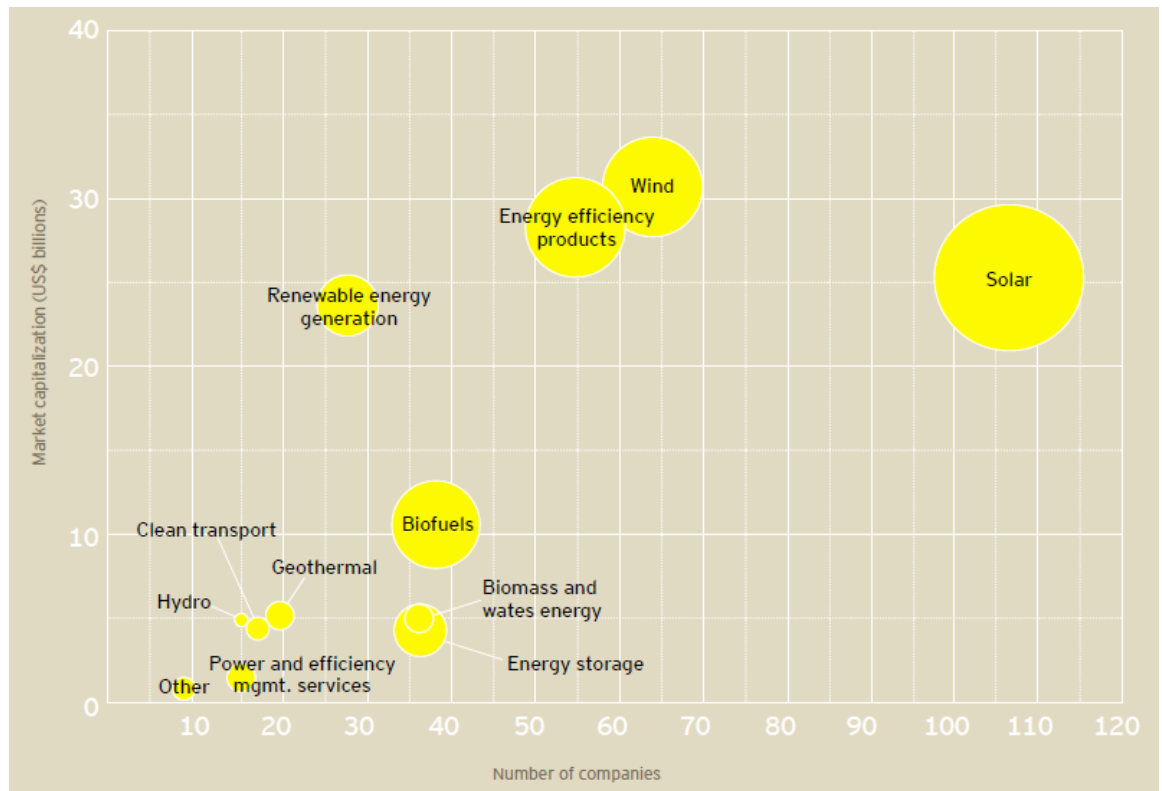


Figure 1. Cleantech segment landscape (Ernst & Young 2012, 13)

The clean energy and the alternative energy production include an energy production in areas such as bio fuels, wind and solar energy, and other low emission technologies (Sitra 2007, 40). The investments in solar energy are receiving the most financing compared to the other clean technology segments (The Pew Charitable Trusts 2013, 5). For example, the price of a photovoltaic system module has declined 75% since 2008. When combined with wind energy the solar energy makes up to 50% clean energy sales. (Ernst & Young 2012, 26; Van der Slot & Van den Berg 2013, 17.)

Figure 1 clearly shows that the solar energy is the single biggest segment in the clean tech industry. The wind segment followed the solar in 2011 as the second biggest segment. One of the segments that had growth in their revue and net income during that year was biomass/waste-to-energy segment. (Ernst & Young 2012, 11.)

As mentioned above the clean technology solutions are not only about the clean energy sources. In addition to the energy efficiency processes the clean technology industry includes for example the clean transportation. The logistics side of clean tech consists of controls and limits on emissions, hybrid cars and fuel efficiency. (CMS Cameron McKenna 2009, 5,7.)

Construction can also be seen as part of the clean technology industry. The aim in the clean tech construction is the efficient use of the resources. The clean technology in construction includes for example the use of ecological resources, lighting and water solutions and the efficient heating of the building. (CMS Cameron McKenna 2009, 5, 7.)

## 2.2 The global clean tech

According to CMS Cameron McKenna's report "The Impact on Key Sectors in Europe" (2009, 4) the following years will bring a major change in the environmental legislation and policies. In time this will compel the companies to change their technologies towards the cleaner alternatives.

The drivers behind the growth of the global clean tech are simple. The need for preservation of the environment as it is, globalization and urbanization are important factors to it. It is also a fact that non-renewable natural resources will not last forever, and that is why there is a need for new efficient energy sources. Another important driver is the need for securing the goods and products as the population has grown so much and it is estimated that the people will have a longer lifespan. (CMS Cameron McKenna 2009, 3.)

The driver behind the change towards more cleaner and greener processes for the companies is often legislation. It is important for companies to foresee the changes in legislation to be able to make the informed and best possible decisions. That way the company can have a competitive advantage as it has prepared strategically for the changes and has ready ways to comply with them. However, some of the companies see this as a hardship and are not prepared to think far ahead. (Aaltonen 2011, 6.)

The European Union (EU) has set climate and energy targets for its member countries in 2007. The objectives to reach by 2020 are the following: the greenhouse gas emission should be reduced 20% of their 1990 level, the 20% of all EU energy consumption should come from renewable energy resources and the energy efficiency should be increased 20% in the whole EU area. (EU 2014a.)

EU has also set a policy framework for 2030 after having made progress to meet its 2020 energy objectives. A 40% reduction of the domestic greenhouse gas emissions in 1990 is ex-

pected by 2030. This continuation to the previous energy targets was made to guarantee that European Union continues to move towards more competitive and secure energy systems. The 2050 objective is to cut at least 80% of the greenhouse gas emissions by that time. (EU 2014b.)

Clean technologies are at the heart of the international environmental management standard ISO 14000. The standard is not a product certification but it is focused on the activities in the production. The standard gives specific demands for “planning environmental objectives and targets, implementing programmes to meet these objectives and targets, checking and corrective action”. The main point of the standard is the management from environmental perspective. The companies can be certified with this standard. (Belz & Peattie 2012, 177.)

The global competitiveness has been growing as the clean tech field develops. The economic recession has had a strong effect in the competition in the clean tech industry. The already well-developed wind and solar markets have been facing intense competition. This has caused a reduction in the pricing and it is helping the change towards more efficient energy sources. (Ernst & Young 2012, 3.)

From mid-2000s the investments in clean energy grew at a fast pace until 2011. The Asia-Pacific area has been showing a small growth in their investments while the investments in other areas have been declining during the economical crisis. The last few years the global investments have been reduced around 10% in 2012 and 2013. (Bloomberg New Energy Finance 2014 a, 5.) Even though the economical crisis can slow down the pace of the investments in clean tech, investments to this sector should be viewed as long-term investments. The clean tech innovations can have the potential to answer to the problems of the economy crisis. (CMS Cameron McKenna 2009, 4.)

The cost of clean energy is going down world-wide. The conventional energy sources are seen as less attractive alternatives because they can be unstable in their pricing in addition to their impact on environment. (The Pew Charitable Trusts 2013, 5.) The Ernst & Young’s report “Global cleantech insights and trends” report (2012, 8) states that in their survey the main energy strategy objective for the companies was to reduce the cost of the energy by more efficient use and sources. The reliability of the energy supply was also mentioned to be an important objective for the clean technology companies.

It is vital for the success of the company that the company has planned ahead and can identify the future changes. The companies need to take notice of the constantly changing directives in environmental legislation to develop their product in the best possible way. (Aaltonen 2011, 10.)

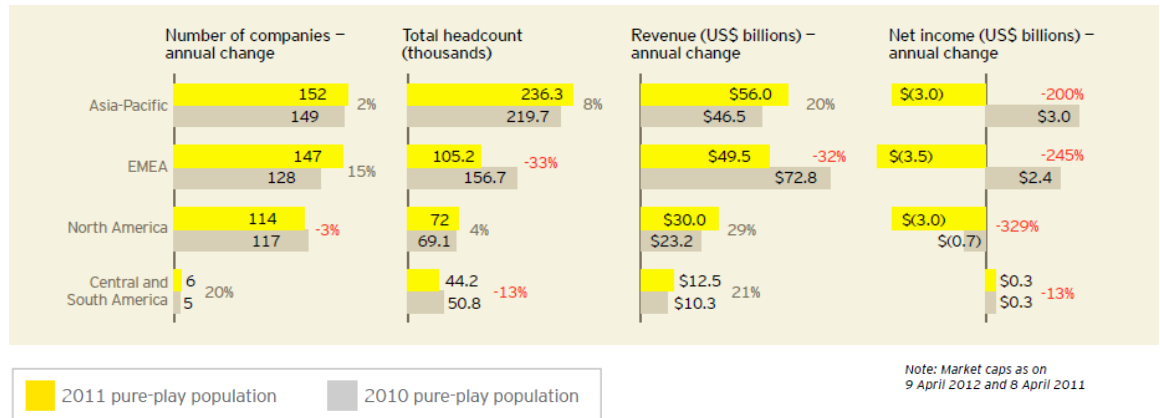


Figure 2. Global public pure-play company landscape by region (Ernst & Young 2012, 10)

The net income of the global clean tech industry has taken a dive during 2012 even though the revenues stayed almost the same with only 3% reduction. From the figure 2 one can see that the Asia-Pacific region has the highest clean tech company population amount compared to the other global regions. North America has more diverse representation of the companies. In the global view China and the United States are the biggest individual players in company population amount and market value at the moment. In the company population they are followed by Germany and Canada. The third tier in company population is composed of Australia, the United Kingdom, France and India. However, the emerging markets in the Middle East and Southeast Asia are developing fast and they benefit a lot from the competition which is cheapening the prices of the clean technology solutions. They can be seen to be the leaders of the future in clean tech growth. (Ernst & Young 2012, 8-11, 19-28.) Japan has also started to grow fast, and during 2013 its investments grew the fastest in the world.. (The Pew Charitable Trusts 2014, 15.)

Ernst & Young's report (2012, 10) shows the average amount of personnel for the companies in different regions in 2011 and 2012. In the Europe, Middle-East and Africa region the median of personnel in a company decreased from 140 in 2011 to 113.5 in 2012. The average headcount for a company in Asia-Pacific was 457 in 2012. The median for the region

has grown with 57 persons between 2011 and 2012. In North America the median head count increased from 130 in 2011 to 150 in 2012.

The Global Cleantech 100 is an yearly listing providing an overview of the most interesting and innovative clean technology companies. The companies are nominated to the list and a panel of experts then chooses the 100 most promising. In 2013 the most of the companies that were listed dealt with energy efficiency, energy storage and energy generation. A Finnish MetGen made it to the list. The company produces and develops multicopper oxidases enzymes for a number of industries. (Paddison 2013; The Guardian n.d.)

### 2.3 Finnish clean tech market

In the last decade Finland has been active in developing its clean tech industry. It has aimed to become one of the most innovative countries in the world in the clean technology sector. As a country Finland has a positive image with the environmental issues. However, Finland has not succeeded growing its environmental sector as it has hoped in the past. (Sitra 2007, 5.)

The government of Finland has started to give support for clean tech research and development. The Finnish global image is environmental friendly. The goal is to get Finland to become one of the leading countries in clean tech sector. As Finland has started to invest more in the clean tech have there has been more start-up companies in the clean tech sector. The public investments are important for Finnish start-ups and it is a way of the government to support clean tech. (Nordic Cleantech Open n.d., 4-5.)

According to the Sitra's report "Cleantech Finland - improving the environment through business" (2007, 22-25) the main clean tech sectors in Finland are renewable energy, recycling of materials, resource saving processes, energy saving technologies and water treatments. Finland has had success in these areas and has already prospered in these fields. The Environmental Programme had set a goal to make the clean tech business sector a growth area and internationalization driver for Finland. The Environmental Programme started in 2006 and ended in 2012.

The clean tech industry in Finland will need to export their products and processes to be able to grow and develop. For the most of the clean tech companies a half of their revenues have come from the exports. (Ministry of Employment and the Economy 2013.) The key markets were Sweden, Germany, Russia, UK and China in 2013. The Finnish clean tech companies estimated that China would grow to be the most interesting market in 2020, followed by Russia. (Cleantech Finland 2014, 5,10-11.)

There are over 2000 companies active in different clean tech sectors in Finland. The Finnish strengths in clean technology are the already extensive expertise in heat and electricity production. Finland has already clean tech products and technologies that can be turned in large projects. There is also a long tradition of close cooperation with Finnish universities and research institutes. (Invest in Finland n.d.)

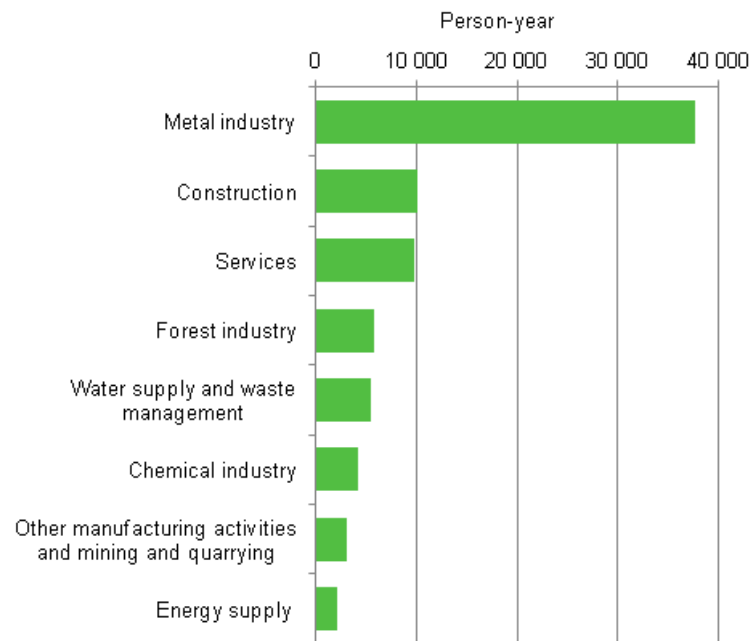


Figure 3. Employment in the environmental goods and services sector by industry 2012 (Statistics Finland 2013)

The most of the Finnish clean tech companies, around 90%, are micro companies with less than 10 employees. The small and medium-sized enterprises had employed over 50% of the employees in the clean tech industry in 2011. (Lith 2012, 4.) However, the 10 biggest companies generate 80% of the revenues in clean tech sector (Lähtenmäki 2014, 38).

The business in the environmental goods and services sector is defined as business that aims to efficiently use natural resources and prevent pollution. The manufacturing industries were the biggest employer in the environmental goods and clean tech industry in 2012 in Finland, which is shown in figure 3. The industry includes services and products such as the use of recycled materials in manufacturing and also the production of renewable energy products. The environmental service industries include areas such as research, planning and consulting in environmental context. (Statistics Finland 2013.)

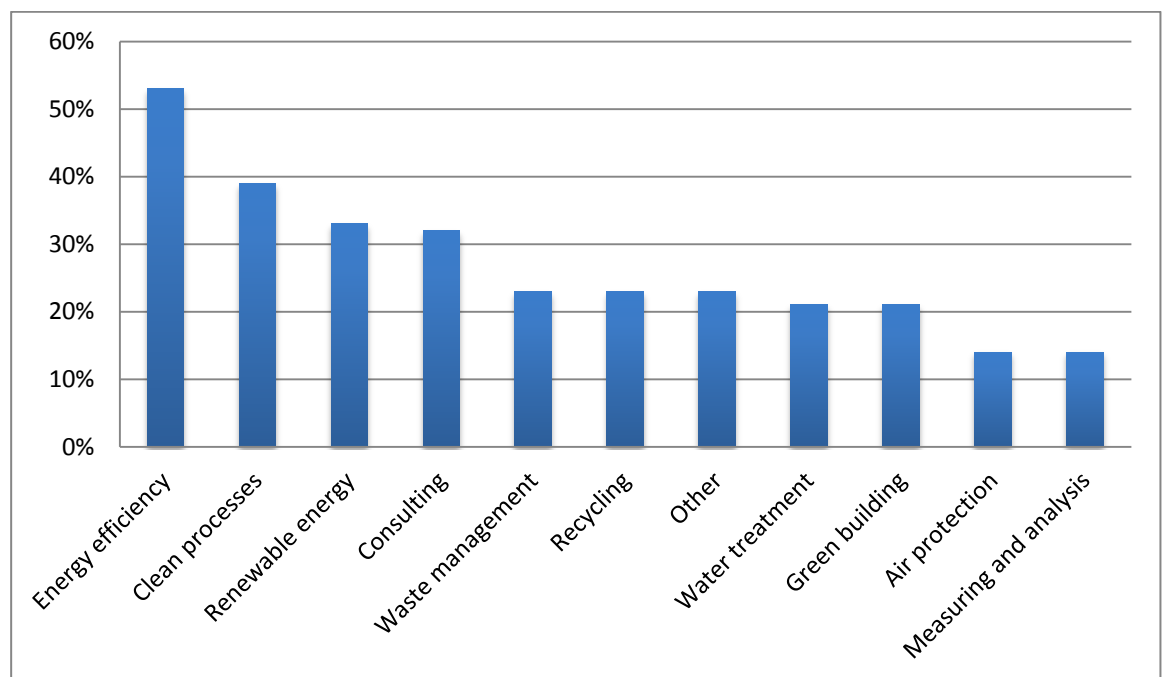


Figure 4. The business sectors of Finnish clean tech companies in 2013 (Cleantech Finland 2014, 12.)

As shown in the figure 4 the main strength areas of Finnish clean technology industry are efficient use of energy in manufacturing, clean energy, efficient industrial processes, waste management, and recycling. (Ministry of Employment and the Economy 2014). The energy efficiency has traditionally been one of the main clean tech sectors in Finland, and over 50% of the clean tech companies are involved in energy efficiency solutions and processes. The revenue in this sector is over a third of the whole clean tech industry's revenue. (Ministry of Employment and the Economy 2013.)

The biggest Finnish clean technology companies are focused on biofuels and mining industry. One of the biggest companies, Wärtsilä, uses biofuels in its manufacturing and power plants. In oil, paper and gas manufacturing and in mining another big company, Metso, has developed technologies and processes that save natural resources. For example, its crushers save energy up to 40% compared to its competitors. (Lähtenmäki 2014, 41.)

Neste Oil has gotten 2,5 billion revenues with its renewable fuels. Neste Oil is one of the biggest companies in Finland and also an important international player for biomass. The company has developed a biodiesel of which's materials over half is comes from waste. It is estimated that around 90% of Outotec's mining equipment and mining technology are clean technology solutions. 4,6 million tons of carbon dioxide emissions were saved by its clean technologies in 2012. (Lähtenmäki 2014, 41; Sitra 2007, 17.)

The clean tech in industry in Finland has grown 15% in 2012. The total turnover of the industry was 24,6 billion euros in that year. For 2013 the clean tech industry was predicted to grow even 29%, and especially the small enterprises are expected to grow fast. (Ministry of Employment and the Economy 2013.) The Finnish Ministry of Employment and the Economy (2014) has set a goal to grow the revenue of the clean tech industry to 40 billion euros by 2018 and create 40 000 new jobs by 2020.

The "Cleantech industry in Finland 2014" research by Cleantech Finland (2014, 8, 14) reports that the Finnish clean technology companies are feeling positive about the future. They are planning to invest in clean tech, creating new jobs and entering to new markets. One fourth of the companies have commented that their clean tech business grows more rapidly than their other business sectors in Finland, and 30% of the companies comment the same for their international business.

For Finland to achieve more success it needs to be able to globalize its products and processes. The success of SMEs depends on a supportive environment, networks and presence in the right international markets. It is especially important to enter to new markets with potential products and technologies. (Sitra 2007, 20.)

The Finnish Strategic Programme for the Cleantech Business (EU 2013) aims to internationalize the markets of the Finnish clean tech companies. The government will encourage especially the small enterprises to grow and will also support their expansion to foreign countries.



The organization Cleantech Finland helps its member countries in their marketing activities. This is especially the case in the marketing to abroad. The Cleantech Finland supports the individual brands of the companies and strengthens the image of the clean tech in the companies' marketing. The Cleantech Finland offers several different kinds of marketing services for its member companies. Some of the marketing services are included in the membership. However, the organization also offers additional services such as extra support for marketing targeted to foreign countries. (Cleantech Finland n.d.)

Finland is developing the home markets for the clean tech to further grow the amount of the exports. The home markets are important in testing the products and processes, and they also give references to the international clients. The new rule on public procurement adopted in 2013 states that in all governmental purchases it should be considered if a clean tech solution is suitable. (EU 2013.) The Finnish Strategic Programme for Cleantech has set a goal to use at least 1% of public procurement to support the clean technology sector. This is done to improve the home markets for the companies who are going abroad. (Ministry of Employment and the Economy n.d.)

The challenges in the marketing to abroad and the challenges in export go hand in hand. In global scale even the big Finnish companies are small. For this reason the Cleantech Finland has helped the clean tech companies to present themselves with the support of the organization, as a united front. (Cleantech Finland n.d.)

One of the challenges in the SME's marketing in Finland is also the funding. It is easy to gain funding for the research and development but for the market entry and marketing it is harder. (Laatikainen 2013, 4.) As the Finnish companies are quite small in international standards it can cause that the Finnish companies are not always able to offer whole clean tech entities but only a part of the solution. This can be unattractive to the foreign clients because they would prefer to buy the whole solution in one place. (Raunio 2013, 4.) The research done by Cleantech Finland also shows that the companies feel the public sector does not support the commercialization of clean technology solution. (Cleantech Finland 2014, 15.)

## 2.4 Clean tech SME B2B marketing

The term business to business (B2B) marketing refers to the marketing of the companies which sell or have any kind of a transaction relationship with another organization. The products or services purchased in B2B exchange are used by the buying company in their own production or processes. In the monetary value the business to business market is considerably bigger than the consumer market. One customer can have a huge financial value. (Hutt & Speh 2010, 4)

At the heart of successful B2B marketing is a cross-functional relationship. The close cooperation between the different business areas such as research and development and customer service is important to improve and better understand the business to business marketing. (Hutt & Speh 2010, 11.)

In the business to business context marketing needs to be market and customer orientated. The market-orientated companies are able to operate superiorly based on the information about the customers and the competitors. They take in the account the market orientation in all of their operations and sense the changes in the markets. They are also able to use resources such as manufacturing and research and development together in a precise manner to produce the best possible product. (Hutt & Speh 2010, 8.)

The capabilities are more relevant to the performance of the small and medium enterprises than just resources. The utilization of the resources is more important than simply having them. The marketing capabilities are important in comprehending the company performance. The marketing capabilities that affect the performance of a SME are a widely researched subject. It is established that one of the main higher-level capabilities that has an effect on the marketing performance of the company is innovation. (Merrilees *et al.* 2011, 368-369.) Innovation is nowadays heavily linked to the sustainability and environmental change (Nidumolu *et al.* 2009, 4).

Innovation capabilities are seen as a major influence on the marketing performance and on the performance of the company. Innovation is seen to have a good effect on the performance especially in the small and medium enterprises especially in the business to business environment. (Merrilees *et al.* 2011, 369.)

The innovation capability in marketing is linked to the market orientation. The market orientated culture of the company needs to be used with the capabilities for it to have an effect to the performance. Studies demonstrate that the market research increases the innovation capability of the company. (Merrilees *et al.* 2011, 370.)

### 3 CHINA AND USA CLEAN TECHNOLOGY

China and the United States are the two leading individual countries in clean technology nowadays. With the European Union they form the three main regions of the clean technology development at the moment. (Van der Slot, A. & Van den Berg 2012, 3-4.) The Chinese clean tech market was estimated to be over 60 billion US dollars in 2013. In comparison the clean technology market in United States was estimated to be less than 50 billion US dollar. (The Economist 2014a)

#### 3.1 China

The success of China in the clean technology field has already been proven. The clean tech solutions it has developed have also helped to improve the environmental situation in the other countries. To truly achieve the global sustainable development and a real effect the different countries will need to work together and share their innovations. The politics between the economies will play a major role in this, and it all depends on how they behave towards each other. For example, the relationship between USA and China is one that can either expedite or hinder the global commercialization of the clean technologies. (The Climate Group 2009, 10.)

The development of the renewable energy technologies is important for China to secure the sufficiency of energy and to reduce the amount of the carbon in use. It is also important so that the China can meet its energy objectives. The technological and policy barriers have the possibility to hinder the development of the Chinese cleantech market. The cleantech market in China has some obstacles that the country needs to surpass before the renewable energy market can truly become successful. (Caprotti 2009, 6.)

The Chinese government is supporting the transformation towards the energy saving solutions with the fiscal incentives and the credit support. For example, the Chinese government offered subsidies for the buildings in which the photovoltaic systems were installed in 2009. This has sped up the process of the penetration of new technological innovations throughout China. (The Climate Group 2009, 7.)

The clean tech market in China is relatively new; they are fluctuating and immature. This presents a challenge to the companies which are willing to penetrate the entrance barrier. The know-how of the people is growing. As the conditions in higher education get better the intellectual capital is growing. The amount of the engineers in China is getting higher. China needs to do the transition from being only an importer of the clean tech solutions to being an importer and an exporter. (The Climate Group 2009, 10.)

The Chinese 12<sup>th</sup> five year plan has taken in the account the sustainability and the environmentalism goals. The objectives for the decreases in pollution are set to reflect the need for more sustainable processes and the Chinese government is supporting these actions. For example, the goal of the plan is to increase the use of the non-fossil fuels by 11.4% and reduce CO<sub>2</sub> emissions per unit of GDP by 17%. (KPMG 2011a.)

China has made a public announcement to be committed to the emission reduction targets. The Chinese companies are faced with pressure from the regulations and the other stakeholders to become more sustainable in their activities, and the industry leaders are already realising the meaning of this. More and more of the businesses are already developing the sustainable strategies that are in an agreement with their business strategy. (KPMG 2011b.)

The new five year plan of China has acknowledged the importance of succeeding with the new energy sources and the in biotechnology fields. The Chinese government will be supporting the national and global leaders in advancing with the new technologies and also in their commercialization. The five year plan is also focused on supporting the mature manufacturers who are committed to the energy efficiency and the environmental protection. The plan offers the taxation and fiscal benefits to the companies who are willing to take in to account the green development. However, for the mature industries this will add up in the costs to reach the energy efficiency and carbon dioxide–emission targets. At the same time it allows the companies to reinforce their leadership positions. The plan also gives the foreign companies the chance to become more competitive in Chinese market by mergers and acquisitions. (Woetzel 2011.)

The global economical climate along with the policy, fiscal and technological challenges are the main issues that are preventing the faster growth of the clean tech market in China (China's Cleantech landscape 2009, 2). The growth in the private investments would enable

the development of renewable energy technology and solutions. The increase in the investments would help with the advancement of the sector. (Caprotti 2009, 7-8.)

The most of the large Chinese companies have usually been state-owned enterprises, and now these companies are entering to the clean tech sector. The companies have almost an unlimited amount of funding, and the companies have the possibility to easily dominate the sector. The amount of the resources allocated to clean technologies is a good thing but the big players might end up shutting down the smaller, possible more innovative enterprises. (Levi *et al.* 2010, 15.)

The state-owned companies are entering to the all clean energy sectors in China. A large state-owned construction business Gezhouba is one of the leading companies in waterpower and China Guangdong Nuclear Power Corporation is expanding to the solar power. China Ordnance Equipment Industry Group Co. has also started its change towards the clean technology with a number of different business sectors such as wind and thin-solar R&D and manufacturing and transmission technologies. (Levi *et al.* 2010, 52.)

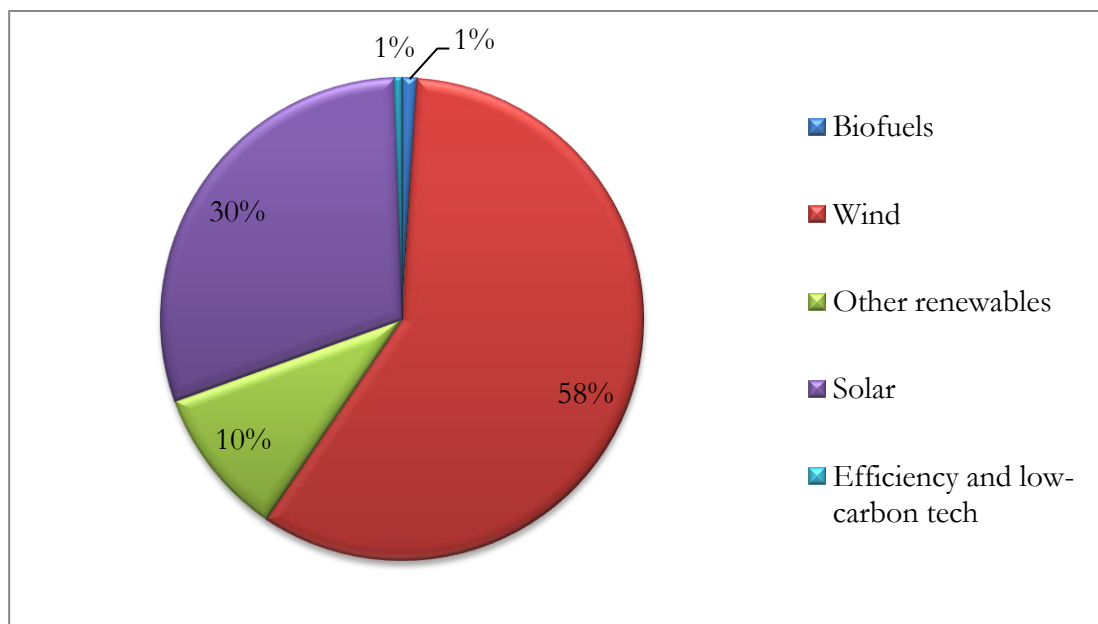


Figure 5. The investments in clean energy sectors by sector 2008-2013 in China (The Pew Charitable Trusts 2014, 50.)

The research by Kachan & Co. (2012, 8) shows that the biggest sectors that have “significant homegrown Chinese technology innovation” are renewable energy and energy efficiency. Clean transportation, waste treatment and natural resource efficiency were also mentioned as

the important sectors. However, in the technological innovations China is looking for from western countries the energy efficiency was the biggest and closely followed by the waste treatment and the renewable energy.

The figure 5 clearly shows that China has a strong wind energy market. The country had invested the most in the wind energy in the world in 2013. During that year China increased its solar generating capacity by 12.1 GW which is the biggest amount that has been installed in one year in all over the world. During 2014 China is expected to pass 200GW of the installed clean energy capacity. The clean energy goal of China is that the clean energy resources would account for 11.5% of the energy use by 2015. (The Pew Charitable Trusts 2014, 37.)

The transportation will play a major role in the greenhouse gas emissions in China in the future. China should allocate its resources in the adaption of the electronic vehicles to lessen the dependency on the imported oil and to reduce the greenhouse gas emissions. The increase in the use of the electric vehicles would also reduce the amount of the vehicle exhaust which is a huge problem in China. (Joerss, Woetzel & Zhang 2009.)

The construction is an important sector for Chinese clean technology because the fast urbanization will continue and people will need more buildings for living, work and entertainment. The per capita floor space is forecasted to double from 2005 amount by 2030. The clean building will allow people to enjoy bigger living space and use the same amount of energy per square meter as they do today. (Joerss, Woetzel & Zhang 2009.)

The dividedness of the Chinese economy is one of the reasons for the challenges such as the quality control and overcapacity in the clean tech sector. The problems with duplication and obtaining the early-stage financing have been common challenges in the innovation technology development. (Levi *et al.* 2010, 15.)

Chinese government has been aggressively advertising its clean technology sector and exports. (Levi *et al.* 2010, 15.) The success behind the Chinese clean tech industry is coming from points such as its environmental government policies, low cost labour, big home market for testing the processes and a good supply chain. (Van der Slot & Van den Berg 2012, 4.)

### 3.2 USA

The United States of America is offering tax incentives for the clean tech companies to encourage the companies to focus on sustainable technologies. The energy and sustainable policies have varied from the state to state, and that has caused the variations in the implementation of the legislation related to clean tech. (Kazarian 2009, 48.)

In the United States the trading of the emissions has not reached the popularity yet. The government has recognized the need for the commercialization of the clean tech solutions and is supporting the clean technology industry. It has agreed to lower the carbon emissions to 85% of 2005 levels by 2050. (Hargadon & Kenney 2011, 3.)

The national and governmental policy on the energy efficiency and renewable energy has a clear impact on the clean tech investments in the country. For example, in the USA there is no coherent state renewable energy policy, and the changing legislation and tax incentives have caused uncertainty in the sector. (The Pew Charitable Trusts 2013, 19.)

The strength of United States is innovation, and many of the best clean tech solutions come from there. It is a leader in bio fuel, energy efficiency and low-carbon solutions related investing. In US the investments for the research and development are the highest. United States also was the second biggest country for the wind technology investments and the third for the solar investments in 2013. However, the US has the challenges in the manufacturing and the utilization. (The Pew Charitable Trusts 2013, 7; The Pew Charitable Trusts 2014, 15.)

Many of the renewable energy solutions and the technologies need support to become competitive with the traditional technologies. More of the sustainable energy solutions are “economically viable” especially when the incentives are taken in the account. (Bloomberg New Energy Finance 2014 b, 16.)

From 2009 to 2012 the US government supported readily the clean energy and technologies with 66 billion US dollars in various ways. The support from the government helped the success of the clean technology products and processes even during the economical depression. The Obama administration has taken actions to reach the long term reductions. (Bloomberg New Energy Finance 2014 b, 12.)



The Climate Action plan was introduced in 2013 by the Obama administration. The plan included incentives for actions such as increased energy efficiency, declined emissions and use of natural gas. It also included a directive for US Environmental Protection Agency to suggest a greenhouse gas limits on the power plants that are already on use by mid-2014. In addition, the US Department of Energy has granted loans with the lower interest rates to the supporters of “clean energy projects”. The US has no nationwide targets for sustainable generation capacity but states have implemented their own policies support sustainable energy. (Bloomberg New Energy Finance 2014 b, 12-13.)

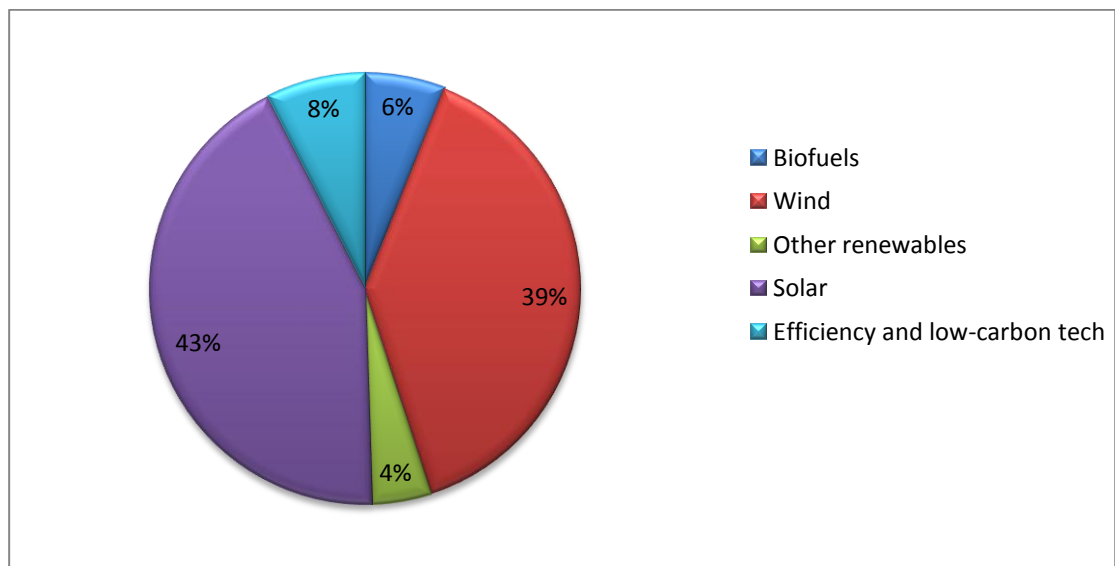


Figure 6. The investments in clean energy sectors by sector 2008-2013 in USA (The Pew Charitable Trusts 2014, 50.)

United States has traditionally had a strong focus on bio fuels and it still remains as an important clean tech sector for US. The US renewable fuel standard states that 36 billion gallons of bio fuel should be used yearly by year 2022. (Van der Slot & Van den Berg 2012, 38.) United States is the biggest investor for the bio fuels. However, the investments in solar energy and wind energy technology are bypassing the investments made in bio fuels, which is shown in figure 6. (The Pew Charitable Trusts 2013, 49.) The solar and wind investments are now over 80% of all clean energy investments. (The Pew Charitable Trusts 2014, 50.)

The Wall Street Journal lists yearly the best venture-backed clean technology companies in United States. In 2012 the top 10 included companies such as Recycle Rewards which provides recycling services, and the company employs 150 employees. Boston Power Inc. with its 161 employees manufactures lithium-ion batteries to be used in electronic cars and other

applications. Tigo Energy Inc. provides electronics that improve power output for solar installations. Sundrop Fuels Inc employs 40 employees and it produces renewable gasoline from wood waste. The product of Hara Software Inc. is energy management software. (The Wall Street Journal n.d.)

## 4 THE RESEARCH

The research in this thesis about the marketing challenges of clean technology small and medium sized companies was conducted as a qualitative research. The secondary data of the industry and the global clean technology landscape is used to support the qualitative research. It is also used to examine the results in the bigger picture and how the Finnish companies handle their marketing compared to the other countries.

### 4.1 Research method

The aim of qualitative research is to find the answer to the question how and why. In the qualitative research the data is not numerical and the answers cannot be transferred to numerical values. In the qualitative research the data is for example text. As the used data in the qualitative researched can have different forms there are also many different analysis techniques. (Guest *et al.* 2013, 1-2.)

The objective of the qualitative research is to identify the challenges in marketing in clean technology companies and explore the reasons for these challenges. The qualitative method gives the possibility to determine the reasons behind the obstacles. With open ended questions in the qualitative method the researcher can also get results that they have not anticipated, and the perception of the researcher does not limit the answers to the questions. (Guest *et al.* 2013, 19-21.)

The secondary research method was used to find the necessary background information about the topic. The secondary sources have given the information about the Finnish and global clean technology markets and market structure, and they have deepened the knowledge of the author about the topic.

The qualitative research method was chosen for the research because it will give descriptive answer to the research question: What are the challenges in B2B marketing for small and medium sized clean technology companies in Finland? As there is not a lot of research done yet about the marketing of clean technology companies in Finland, the numerical values

would not have been sufficient information. With the qualitative research method the reasons behind the marketing challenges can also be identified and explored.

The qualitative research for the thesis was conducted by interviews. The persons who were interviewed were chosen from small or medium sized Finnish clean technology companies. The persons who answered were either marketing managers of the companies or someone who is deeply familiar with the marketing activities of the company.

The qualitative research focused on the following areas:

- B2B marketing channels
- B2B marketing limitations
- the challenges in marketing in Finland and abroad
- home market references
- market orientation and innovation
- the role of Finnish government regarding the clean technology
- the role of network and clusters and,
- the missing expertise and personnel areas in the clean technology companies.

Three companies from different areas of clean technology participated in the research to guarantee a valid result and representation of different aspects of clean tech business. Nocart operates in renewable energy electricity generation, and its Power Generation Unit offers multiple solutions for small power plants. Their Power Generation Unit generates quality electricity from almost any kind of power sources such as water or solar panels. The company employs 4 permanent workers and 2-5 people who work in subcontracting. The company is in the growing phase at the moment. (Nocart n.d.; Korhonen 2013.)

EHP-Tekniikka specializes in environmental safety with environmental and process monitoring solutions and services. It also includes safety alarm systems that warn if, for example, the measurements exceed the agreed amounts. The company and its subsidiaries employ altogether 22 employees. (EHP-Tekniikka n.d.; Hiljanen 2013.)

Elozo Oy operates in cleaning of garments and other items without chemicals or water, and the process generates almost no emissions. The Elozo Ozone Cleaning System uses ozone gas for cleaning and removing the bacteria from the garments. Elozo Oy employs 5 people. (Elozo n.d.; Valkama 2013.)

United States and China are the most successful individual countries in clean technology at the moment. Their success in the clean technology field has come from the different aspects that were highlighted in the theoretical part. These two countries were chosen so it would be possible to compare their markets and reasons for the success of the countries with the obstacles of Finnish clean technology marketing. This comparison should point out what the Finnish companies are missing in their B2B marketing activities. The factor of governmental support is also taken into account.

#### Data and reliability

The topic of clean technology is a current topic and its research has started mainly from the beginning of the 2000s. The clean tech sector also moves very quickly and there are a lot of changes happening. To eliminate the errors in the literature the author used mainly new sources. The most of the sources were electronic. The reliability of sources was taken into account, and only reliable researches, articles, websites and publications were used.

The qualitative data was gathered from the three companies who participated in the research. All the companies were small companies with less than 20 employees from different areas of the clean technology sector. Further research is needed to generalize the results for the big companies.

#### The research limitations

The research was decided to be limited to small and medium sized companies. The most of the clean technology companies in Finland are small or medium sized enterprises, and that made it a logical choice for the focus of the research. Marketing activities can differ in small and big companies and that was the second reason why the research is limited to small and medium sized companies.

Another limitation to the study is that it was decided to include only the business to business companies. The most of the clean technology companies in Finland are business to business companies, and for that reason the business to consumer companies have been excluded.

from the research. However, because of this limitation the same challenges in marketing cannot be applied to business to consumer clean technology companies.

## 4.2 Research question

The main research question in this thesis is:

What are the challenges in business to business marketing for small and medium sized clean technology companies in Finland?

Finland has a long history with environmental expertise. However, the commercialization and marketing of the products has not gone as well as the companies and the Finnish government have hoped. The clean technology industry is a widely researched subject but the subject of clean technology companies' marketing is still quite untouched subject.

The research question aims to find out the reasons behind the marketing obstacles for the small and medium sized clean tech companies in Finland. Why the companies feel that the marketing aspect of their business is hard, and why do they struggle with the growth? The research question also aims to understand what challenges in marketing are preventing the international growth for the SMEs.

In addition to the main research question the research also aims to find out why these specific challenges exist. The research wants to discover what capabilities and/or resources the Finnish small and medium sized companies are missing to improve their business to business marketing performance. The link between innovation capabilities and market orientation to marketing performance is also included in the research.

## 5 RESEARCH FINDINGS

In this part the results and the findings of the research are analyzed. The findings from the research were varied as the companies were in different stages and dealt in different clean technology areas. However, the common challenges in B2B marketing for the clean technology sector could be found. The questions that were asked from the companies are presented in Appendix 1.

### **The B2B marketing channels**

The most effective business to business marketing channel is seen to be the personal contact. According to the research it is especially important B2B marketing channel for the companies in the beginning stage or for the companies which are entering to a new market. This approach allows the companies to gather references and demonstrate that their clean tech process works. As the solutions provided are usually very specific to the customers, the personal contact as a way of marketing the products is seen to be essential. The personal contact also allows the clean tech companies to educate their customers about the environmental problems they may have, and raise the awareness of the clean technologies.

The results show that the internet is a valuable tool in the business to business marketing. The customers search information about the companies from the websites, and contact the clean tech companies based on the information found on internet. Google is also seen to increase the “visibility on the Internet”, at least for some of the companies. The positive influence of the trade fairs for the B2B marketing and awareness was also mentioned by one of the answerers.

The customers want to have information about the companies before they contact them. For this reason the mass marketing is not effective anymore. The printed media in the business to business sector is also considered to be ineffective. The press releases and the printed advertisements do not reach the business to business audience as well as the other mediums such as internet.

### **The limitations and challenges in B2B marketing**

The main research question was to find out the challenges the small and medium sized clean technology business to business enterprises face in their marketing in Finland.

The biggest and the most important limitation for the companies is the lack of funding. This is a problem for the companies at all stages, from start-ups to those who have been in the business for longer. All the companies that took a part in the research pointed out that the funding is the main challenge for their business to business marketing. As the resources are limited, the resources must often be allocated to the other matters than marketing.

Another limitation regarding the funding that came up during the research is “being a pioneer with new technology” in niche markets. This requires the company to operate in multiple countries almost straight from the beginning. It forces the companies to use even more capital to be able to market themselves in all the countries it operates at the same time. In marketing abroad a challenge in the business to business marketing is also finding the right partners. One of the companies also finds that Finland by itself is “far too small as market”.

The resource that would be needed to overcome the lack of funding is capital financing. An increase in financial recourses would also be needed for the companies which have outsourced their B2B marketing activities to further develop their marketing activities.

The international marketing and sales suffer from the same challenges as the national marketing and sales. Even with an experienced export partner for marketing the lack of funding for marketing activities is an obstacle. The small companies lack the awareness in the eyes of the customers compared to the big companies, and one company can easily blend in with the rest of the companies. Some of the interviewed companies pointed out that the experienced sales and marketing personnel would be very beneficial for marketing in both Finland and abroad.

To summarize the result for this research question, the biggest limitation in B2B marketing for clean technology companies is the funding. The small and medium sized companies feel that there is not enough money and/or funding instruments in Finland to support their marketing activities.



### **The financing of the clean tech B2B marketing**

The previous paragraph explained that according to the research the biggest challenge in B2B marketing for the clean technology companies is the funding. All the respondents reported that they had invested heavily in the marketing but they felt that it has not been sufficient. The research and development and intellectual property require large amount of capital. One of the respondents commented: “We have invested in marketing very much compared to revenue but even that has not been enough yet.” Another respondent said that they would invest more in the international marketing if the Finnish market did not already take the most of the funding reserved for the marketing. The third company has a positive attitude towards future, and commented that they should be able to start investing more in the sales and marketing soon.

### **The market references**

According to the companies that participated in the research the challenge in obtaining the market references and pilot projects is twofold. Finding the market references and the willing participants is not difficult but finding the funding is more challenging. In addition, one of the companies pointed out that for the “easier and simpler” projects it is easier to find the market references than for those projects which require more work.

The companies obtain the market references in various ways. For example, one way is to offer the product for testing for a limited time. This technique can be useful in the early stage to gather the market references.

The market references are essential for the clean technology small and medium sized enterprises. It is the same in international markets and in Finland. One of the respondents described: “For new solutions [home market references] are significant.” This shows that the importance of the references rises even more when the product or the solution is completely new technology. The customers need the references to be able to make the buying decision.

### **The focus of R&D**

The research and development (R&D) is an important part of producing the product. The research pointed out that traditionally in the technical field the R&D is driven by technical innovations. One of the respondents noted that the markets show how the product should

develop to meet the needs of the customer. The technology sets the limits on what one can do with research and development.

Another respondent commented that traditionally the technical innovation has been focus in Finland, and that Finnish companies are successful in technical field. However, the commercialisation is more challenging for the companies. The respondent was not able to speculate the reasons behind the commercialisation difficulties.

### **Innovation and market orientation**

All the companies who participated in the research agreed that market orientation is crucial in marketing the clean technology product. One of the respondents said: “You can’t be innovative without first understanding what is needed in the market and where the world is evolving in terms of legislations, needs and awareness that set the opportunities you are aiming at with Cleantech products.”. When the company is aware of the needs of the market they can offer the products and the solutions that the customer wants.

The market orientation should be taken in to account already at the begging stage of the enterprise. The marketing for the product or the solution should start as early as possible. A well built brand that is already clear from the beginning stage can be a differentiating factor for the company. The challenge in this is that usually the companies are more focused on developing the product in the early stage rather than concerned with the commercialization.

### **The support of the government for clean technology companies**

The question about the governmental support was included in the research to find out how the companies felt about it. When asked if the government supports the clean technology companies enough one company responded with “Yes to the certain extent.” The research showed that in practise the government does not support enough small and medium sized enterprises that are willing to grow and want to participate in the international markets. It was mentioned that government supports some clean technology organizations such as CleanTech Finland, and that for example the Finnish Funding Agency for Innovation (Tekes) is seen “to be interested in new products within clean tech”. These were seen as a positive signs about the improvement of the governmental support.

**The clusters and networks**

Only one of the respondents was a part of a clean technology cluster or a network. For them the main benefit from the network is the raised awareness. The network they are a part of has events for its member companies. For example the network organizes seminars and networking events. These events are mainly located in the capital area but the company is located hundreds of kilometres away from the capital. The company does not get the most out of their membership as they cannot attend to all of the events.

**The expertise of the personnel**

The main expertise for the personnel that the companies are missing is financial management. This shows that the small and medium sized companies are struggling with the know-how with finance. One of the companies also mentioned that they would need more expertise in quality management for their company.

Only one of the companies answered that they need more training for their human resources. The need for the training in this sector was also mainly for financial expertise but not for accounting.

## 6 DISCUSSION

The study confirmed what was previously mentioned in the theoretical part about the marketing challenges for the clean tech companies in Finland. The main problem for the clean technology business to business marketing is funding. The companies are missing the financial resources to allocate evenly to the different business areas. The enterprises feel that the funding they have needs to be distributed to other aspects of business, and use what little is left for their marketing. Even though the companies realised the importance of marketing in business to business environment they do not have resources to use enough funding for all the activities. Furthermore, even when the companies invest heavily in their B2B marketing they feel that it is not enough to achieve the wanted result.

The small and medium sized companies especially feel that the governmental and the public funding do not support the marketing and the commercialization. The governmental funding is important for the Finnish companies and they struggle with getting it for their marketing. According to the results of the study the companies think that it is easier to get financing for the technical innovation and the research & development than for the marketing. This also supports the findings in the theory part.

The study also found that the small and medium sized companies feel that the government is not supporting enough the growing and internationalization of the companies. The participants were aware that the government has started a number of strategies and programs but at least some of them felt that the real support is lacking.

The lack of governmental financial support – as with the other forms of funding -- for the marketing can cause the companies to only focus on the technological aspect of the product. The market orientated point of view should be taken in the account from the beginning stage of the development to guarantee that the product will be viable and that there will be a real need for it. The market orientation and the innovation together will create a ready product which is easier to sell for the business customers.

The Finnish government has started to support the clean technology and the solutions it provides. The Finnish government started The Finnish Strategic Programme for the Clean-tech Business that aims to give support for the small and medium sized enterprises by helping them to use Finnish home market to further develop their product before exporting.

However, the companies feel the government is not enough supporting those small and medium-sized companies which would be willing to grow and go international. It might be that the growing interest from the Finnish government is relatively new and the biggest supports from its side have started to happen only in the last few years or are coming in the few following years.

The author was surprised by the fact that only one of the companies that participated in the research was a part of a cluster or a network. There are a number of clusters and networks in Finland, and one of the most well-known is the Cleantech Finland. The amount of support gathered for B2B marketing from the clusters and networks could be useful for the most of the small and medium sized companies. However, it was pointed out in the answers that the most of the events organized by these clusters and networks are located in capital area which is inconvenient for the companies operating in rest of Finland.

The research answers clearly point out that the personal selling is still the most effective way in the business to business marketing. The respondents mentioned that it was especially true for the companies whose products are innovative and new. The clean technology processes and technologies fit well within that definition. The companies also feel that the customers need to be educated about the environmental aspects of the traditional products and the benefits of the clean tech products. Internet was the second biggest channel for business to business marketing, and it is essential for the companies to have websites. The B2B customers search about the products of the companies by themselves even before they contact the company, and the website is an easy tool for that.

A challenge in international business to business marketing is that it is hard for a small company to stand out compared to the big companies. The B2B marketing abroad has mostly the same problems as the national marketing. Funding is the biggest challenge but also the finding and choosing the right export partner can be problematic. The partner helps to soothe the entering and the familiarizing the new market. However, the funding is again an obstacle even with a partner if there is no money to allocate for the marketing activities.

The small and medium sized companies have only a little workforce compared big corporations. They do not have the same amount of people to allocate to marketing and sales as the bigger enterprises. It can easily happen that the people are lost in the day-to-day tasks and they may not have time to focus on marketing the product, at least in the long run. The re-

search findings pointed out that the companies have the most need for further expertise in financial matters in addition to more sales and marketing personnel.

The study showed that obtaining the home market references was not too difficult for the clean tech companies. This came to as a surprise to the author as it was already clear before the research was conducted how important the home market references are for success of the company. However, the reasons for it can be the law about the public procurement and the overall change towards more sustainable alternatives in business. It is beneficial for the companies to gather these references to become successful, nationally and internationally. The customers are inclined to buy the products and technologies that are tested to work well.

The smallness of Finland was also established in the research findings, especially regarding to the smallness of the markets in here. As a small country Finland has only a limited amount of possibilities for the clean technology companies and if the company wants to grow beyond the Finnish market they are forced to expand to abroad. An innovative and pioneering product that is targeted to a niche market forces company to immediately start the export to be able to sell their product.

The challenge of operating in multiple markets at once is tied to the challenges of funding and personnel. When expanding abroad the marketing activities need to be offered to all of the countries the company operates. This requires personnel which has knowledge of the markets of the company operates and the personnel also would need to speak the language of the market. The challenge of funding for marketing also arises to export as well. The company should be able to allocate the limited budget they have for marketing to both home market and international markets.

The theoretical part established that the successful business to business marketing requires a good relationship with different sectors of the company. The research conducted for the thesis supports this as all the companies agreed that the different sectors should work and grow together towards a common goal. The research and development should take in the account the commercialization and usability to achieve the best possible product.

The results of this study are very clear that the market orientation is beneficial for the companies. A clean technology company should look at the market orientated point of view al-

ready at the first stages of the firm. A strong company with a vision and a clear brand can communicate the value to the customer easier.

The study confirmed that the innovation capabilities of the companies are enhanced by market orientation. The technical innovations are usually the products or solutions the clean tech companies offer. The best technical innovations come from understanding the needs of the customers and the development of the market. The marketing and commercialization focus from the beginning benefits the research and development as well.

The small and medium sized companies which participated in the research understood the importance of smart resource use. This is especially evident in the allocation of funding and in which sectors the companies use the funding. The companies pointed out that for marketing was usually used what funds were left after other business areas. The good personnel can wisely utilize the resources.

In US and China, both governments support the cleantech very heavily in monetary ways such as the financial incentives. For example, the sustainable business get taxation benefits and other forms of monetary support from the government. The regulations are also shaped to support the change towards sustainable alternatives. The Finnish government has started to support the clean technology sector in a number of ways but it needs to improve it even more, especially for the small and medium sized enterprises.

The Finnish home market is much smaller than compared to for example Chinese home market. Even though the Finnish companies commented that finding the market references was not too problematic they also felt that Finland itself is a small market. The Chinese clean tech companies have more opportunities to test their products and processes in the home market before starting the export. This is one of the points with what the Chinese clean technology companies have gained their success.

There are differences in the most important sectors between Finland and US and China. Finland is more focused on energy efficiency, clean processes and renewable energy. The biggest individual Finnish companies are mostly focused on biofuels and mining industry. The clean tech sector of China is the most interested in renewable energy sources such as wind and solar power at the moment. In the other hand, United States is pioneering in bio fuels with strong focus on wind and solar power technologies. The biggest difference that is

between Finland and US and China is that the two latter countries are dealing more with renewable energy sources and Finland with energy efficiency.

The median of the personnel in the companies in European and US companies was 113.5 and 150 respectively. The Asian-Pacific average is a lot bigger, 475 in 2012. (Ernst & Young 2012,10.) The most of the innovative clean technology companies in US are also small and medium sized businesses as in Finland. There are big companies in both of the countries but the most of the clean technology businesses are small and medium sized. The Chinese companies are different in their personnel structure; they have much larger amount of people working in the companies in average. The biggest Chinese clean tech companies are usually state-owned whereas the most of the Finnish and US clean tech companies are privately owned.



## 7 CONCLUSIONS

The reason for this research was to find out business to business marketing challenges for small and medium sized clean technology companies in Finland. The clean technology is a very current and widely searched topic, but the marketing perspective has not been studied a lot yet. Especially in Finland the marketing point of view has been lacking. The challenges in marketing were observed in the innovation and market orientation point of view.

The research found out that the biggest challenge in the business to business marketing for clean technology small and medium sized companies is funding. The lack of funding and the problem of allocating the resources create the most challenges for marketing of small and medium sized companies. The same challenges also apply for the internationalization and the export.

In this thesis the Finnish clean technology market was also compared to the biggest clean tech markets in the world at the moment, United States and China. It was found out that the markets in US and China are somewhat different compared to Finland even though some similarities were found. Especially the importance of the governmental support was highlighted as a success factor of those two countries.

The thesis process was eventful for the author. The topic of the clean technology was unfamiliar to her at the beginning and it required a lot of reading in the first stages to get acquainted with the topic. Even though the process turned out to be more challenging and took a lot more time than anticipated at the start, the author has found the topic to be very interesting and the whole process very rewarding at the end.

The author recommends that the future researches are to find out what could be done to overcome the challenges in business to business marketing for the clean technology companies. As the study showed the main obstacle is funding. The future researchers could explore the different funding mechanisms for the companies and how the business to business companies could improve their financial management and allocation of resources.

This research does not cover the business to business companies marketing challenges for big companies. The future research could study the marketing challenges for those companies in Finland and compare that information for small and medium sized companies.

## SOURCES

- Aaltonen, J. (2011). *Cleantech-toimialan ennakoitisehitys 2009-2010 : Loppuraportti*. Helsinki: Uudenmaan elinkeino-, liikenne- ja ympäristökeskus.
- Belz, F., & Peattie, K. (2012). *Sustainability marketing : A global perspective* (2nd ed. ed.). Chichester: John Wiley & Sons.
- Bloomberg New Energy Finance. (2014 a). *Clean Energy Investment – Q1 2014 Fact Pack*. Available at: <<http://about.bnef.com/content/uploads/sites/4/2014/04/Q1-2014-clean-energy-investment-fact-pack.pdf>> [Accessed 01.05.2014].
- Bloomberg New Energy Finance. (2014 b). *2014 Sustainable Energy in America FACTBOOK*. Available at: <<http://www.bcse.org/factbook/pdfs/2014%20Sustainable%20Energy%20in%20America%20Factbook.pdf>> [Accessed 05.05.2014].
- Caprotti, F. (2009). China's cleantech landscape: The renewable energy technology paradox. *Sustainable Development Law and Policy*, 9(3), 6-8.
- Choudhary, A. & Gokarn, S. (2013). Green marketing: A means for sustainable development. *Researchers World: Journal of Arts, Science & Commerce*, 4(3), 26-32.
- Cleantech Finland. (n.d.) *Together we achieve great things – Cleantech Finland membership gives added muscle to your international success!* Available at: <<http://www.cleantech.fi/content/together-we-achieve-great-things-%E2%80%93-cleantech-finland-membership-gives-added-muscle-your>> [Accessed 05.02.2014].
- Cleantech Finland. (2014) *Cleantech industry in finland 2014*. Available at: <<http://www.slideshare.net/cleantechfinland/cleantech-industry-in-finland-2014>> [Accessed 15.05.2014].
- Cleantech Group. (2012) *What is Cleantech?* Available at: <[www.cleantech.com/what-is-cleantech/](http://www.cleantech.com/what-is-cleantech/)> [Accessed 22.01.2014].
- CMS Cameron McKenna. (2009). *Cleantech, the Impact on Key Sectors in Europe*. Available at: <[http://www.cmslegal.com/Hubbard.FileSystem/files/Publication/c44ff06e-d3f2-475b-a5c6-0b4407f1ded4/Presentation/PublicationAttachment/eb4e7248-8ca7-4b12-986f-109db53996dd/Cleantech\\_Report\\_June2009.pdf](http://www.cmslegal.com/Hubbard.FileSystem/files/Publication/c44ff06e-d3f2-475b-a5c6-0b4407f1ded4/Presentation/PublicationAttachment/eb4e7248-8ca7-4b12-986f-109db53996dd/Cleantech_Report_June2009.pdf)> [Accessed 05.12.2013].
- Green Net Finland ry. (2011). *Innovaatioputkesta yritystoimintaa – Cleantech innovaatioiden kaupallistaminen: Loppuraportti*. Available at: <[http://www.greennetfinland.fi/fi/images/c/c7/Innovaatioputkesta\\_yritystoimintaa\\_loppuraportti.pdf](http://www.greennetfinland.fi/fi/images/c/c7/Innovaatioputkesta_yritystoimintaa_loppuraportti.pdf)> [Accessed 22.01.2014].
- Guest, G, Namey, E. E. & Mitchell, M. L.. (2013). *Collecting Qualitative Data A Field Manual for Applied Research*. California: SAGE Publications.

- Ernst & Young. (2012). *Global cleantech insights and trends report 2012*. Available at: <[http://www.ey.com/Publication/vwLUAssets/Global\\_cleantech\\_insights\\_and\\_trends\\_report\\_2012/\\$File/cleantech\\_matters.pdf](http://www.ey.com/Publication/vwLUAssets/Global_cleantech_insights_and_trends_report_2012/$File/cleantech_matters.pdf)> [Accessed 05.12.2013].
- EU. (2014a). *The 2020 climate and energy package*. Available at: <[http://ec.europa.eu/clima/policies/package/index\\_en.htm](http://ec.europa.eu/clima/policies/package/index_en.htm)> [Accessed 02.02.2014].
- EU. (2014b). *2030 framework for climate and energy policies*. Available at: <[http://ec.europa.eu/clima/policies/2030/index\\_en.htm](http://ec.europa.eu/clima/policies/2030/index_en.htm)> [Accessed 02.02.2014].
- EU. (2013). *Finland focuses on future prosperity through cleantech growth*. Available at: <[http://ec.europa.eu/environment/ecoap/about-eco-innovation/good-practices/finland/20131113-finland-focuses-on-future-prosperity-through-cleantech-growth\\_en.htm](http://ec.europa.eu/environment/ecoap/about-eco-innovation/good-practices/finland/20131113-finland-focuses-on-future-prosperity-through-cleantech-growth_en.htm)> [Accessed 16.01.2014].
- Hargadon, A. & Kenney, M.. (2011). *Venture Capital and Clean Technology: Opportunities and Difficulties*. (Working Paper No. 198). Available at: <<http://brie.berkeley.edu/publications/WP%20198.pdf>>
- Hutt, M. D. & Speh, T., W. (2010). *Business Marketing Management: B2B, 10<sup>th</sup> edition*. Mason, OH : South-Western.
- Invest in Finland. (n.d.). *Cleantech*. Available at: <<http://www.investinfinland.fi/industries/cleantech/18>> [Accessed 20.01.2014].
- Joerss, M.; Woetzel, J. & Zhang, H.. (2009). *China's green opportunity*. Available at: <[http://www.mckinsey.com/insights/sustainability/chinas\\_green\\_opportunity](http://www.mckinsey.com/insights/sustainability/chinas_green_opportunity)> [Accessed 26.05.2013].
- Kachan & Co. (2012). *Successful Cleantech Cooperation in China*. Available at: <<http://www.kachan.com/sites/default/files/Kachan%20China%20Cleantech%20Report%20030512.pdf>> [Accessed 05.05.2014].
- Kazarian, U. (2009). Evolving U.S. clean tech: Legislative trends. *Sustainable Development Law & Policy*, 9(3), 48-50.
- KPMG. (2011a). *China's 12th Five Year Plan: Overview*. Available at: <<http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Publicationseries/5-years-plan/Documents/China-12th-Five-Year-Plan-Overview-201104.pdf>> [Accessed 20.02.2014].
- KPMG. (2011b). *China's 12th Five-Year Plan: Sustainability*. Available at: <<http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/China-12th-Five-Year-Plan-Sustainability-201104-v2.pdf>> [Accessed 21.02.2014].
- Lane, E. (2013). Greenwashing 2.0. *Columbia Journal of Environmental Law*, 38(2), 279-331.
- Levi, M., A., Economy, E., C., O'Neil, S., O., & Segal, A. (2010). *Energy Innovation Driving Technology Competition and Cooperation Among the United States, China, India, and Brazil*. Council on Foreign Relations Press. Available at: <[http://i.cfr.org/content/publications/attachments/Energy\\_Innovation\\_Report.pdf](http://i.cfr.org/content/publications/attachments/Energy_Innovation_Report.pdf)> [Accessed 25.02.2014].

- Lith, P. (2012). *CleanTech-alan tarjonta ja tuotteiden julkiset hankinnat suomessa*. Available at: <[http://www.tem.fi/files/35510/Cleantech-alan\\_tarjonta\\_ja\\_tuotteiden\\_julkiset\\_hankinnat\\_Suomessa.pdf](http://www.tem.fi/files/35510/Cleantech-alan_tarjonta_ja_tuotteiden_julkiset_hankinnat_Suomessa.pdf)> [Accessed 15.12.2013].
- Laatikainen, T. (2013, February 15). Cleantech saa valtiolta satoja miljoonia. *Tekniikka&Talous*, 4.
- Lähteenmäki, P. (2014, April 11). Saasteongelma pahenee, ehtiikö Suomi markkinoille?. *Talouselämä*, 36-41.
- Nidumolu, R., Prahalad, C., K., & Rangaswami, M., R. (2009). *Why sustainability is now the key driver of innovation*. Harvard Business Review.
- Nordic Cleantech Open. (n.d.) *Finnish Cleantech Venture Report 2011*. Available at: <[http://www.nordiccleantechopen.com/x7scg483/wp-content/uploads/2010/11/Finnish\\_Cleantech\\_Venture\\_Report\\_2011-1.pdf](http://www.nordiccleantechopen.com/x7scg483/wp-content/uploads/2010/11/Finnish_Cleantech_Venture_Report_2011-1.pdf)> [Accessed 02.12.2013].
- Merrilees, B., Rundle-Thiele, S., & Lye, A. (2011). Marketing capabilities: Antecedents and implications for B2B SME performance. *Industrial Marketing Management*, 40, 368-375.
- Ministry of Employment and the Economy. (2014). *Strategic Programme for the Cleantech Business*. Available at: <[http://www.tem.fi/en/current\\_issues/pending\\_projects/strategic\\_programmes\\_and\\_flags\\_hip\\_projects/strategic\\_programme\\_for\\_the\\_cleantech\\_business](http://www.tem.fi/en/current_issues/pending_projects/strategic_programmes_and_flags_hip_projects/strategic_programme_for_the_cleantech_business)>
- Ministry of Employment and the Economy. (2013). *Suomen Cleantech-liiketoiminta kasvoi 15 % vuonna 2012*. Available at: <[https://www.tem.fi/ajankohtaista/vireilla/strategiset\\_ohjelmat\\_ja\\_karkihankkeet/cleantechin\\_strateginen\\_ohjelma/ajankohtaista\\_cleantech-ohjelmasta/suomen\\_cleantech-liiketoiminta\\_kasvoi\\_15\\_vuonna\\_2012.110362.news](https://www.tem.fi/ajankohtaista/vireilla/strategiset_ohjelmat_ja_karkihankkeet/cleantechin_strateginen_ohjelma/ajankohtaista_cleantech-ohjelmasta/suomen_cleantech-liiketoiminta_kasvoi_15_vuonna_2012.110362.news)>
- Ministry of Employment and the Economy. (n.d.). *Measures for the focus areas of the Strategic Programme for Cleantech*. Available at: <[http://www.tem.fi/files/34087/Measures\\_for\\_the\\_focus\\_areas\\_of\\_the\\_Strategic\\_Programme\\_for\\_Cleantech.pdf](http://www.tem.fi/files/34087/Measures_for_the_focus_areas_of_the_Strategic_Programme_for_Cleantech.pdf)>
- Paddison, L. (2013). *Welcome to the Global Cleantech 100*. The Guardian. Available at <<http://www.theguardian.com/sustainable-business/cleantech-global-100-list-2013>> [Accessed 15.05.2014].
- Palmberg, C. & Nikulainen, T. (2010). *Towards Green Post-Crisis Economy? – The Position of Finland in Environmental Technologies*. ETLA. Discussion Papers no.1219 Available at: <<http://www.etla.fi/wp-content/uploads/2012/09/dp1219.pdf>>
- Peattie, K. (1995). *Environmental marketing management: Meeting the green challenge*. London: Pitman. 4-6.
- Raunio, H. (2013, December 13). Niinistö käännättää kuntia vihreiksi. *Tekniikka&Talous*, 4.

Sitra. (2007). *Cleantech Finland - improving the environment through business*. Available at: <<http://www.sitra.fi/node/75374>> [Accessed 01.12.2013].

Statistics Finland. (2013) *The environmental goods and services sector employed nearly 80,000 persons in 2012*. Available at: <[http://www.stat.fi/til/ylyt/2012/ylyt\\_2012\\_2013-12-05\\_tie\\_001\\_en.html](http://www.stat.fi/til/ylyt/2012/ylyt_2012_2013-12-05_tie_001_en.html)> [Accessed 08.12.2013].

Statistics Finland. (n.d.) *Statistics: Environmental goods and services sector*. Available at: <[http://www.stat.fi/til/ylyt/kas\\_en.html](http://www.stat.fi/til/ylyt/kas_en.html)> [Accessed 13.01.2014].

The Climate Group. (2009). *China's Clean Revolution II: Opportunities for a low carbon future*. Available at: <[http://www.theclimategroup.org/\\_assets/files/Chinas-Clean-Revolution-II.pdf](http://www.theclimategroup.org/_assets/files/Chinas-Clean-Revolution-II.pdf)> [Accessed 26.02.2014].

The Guardian. (n.d.). *Global Cleantech 100 interactive map*. Available at: <<http://www.theguardian.com/globalcleantech100/interactive/world-map>> [Accessed 15.05.2014].

The Economist. (2014). *Red light, green light*. Available at: <<http://www.economist.com/news/business/21598670-chinas-anti-pollution-drive-will-make-it-good-place-clean-energy-firms-red-light-green>> [Accessed 15.04.2014].

The Centre for Measurement and Information Systems. (n.d.) The Centre for Measurement and Information Systems. Available at: <<http://www.cemis.fi/in-english/front-page>> [Accessed 22.09.2014].

The Pew Charitable Trusts. (2013). *Who's Winning the Clean Energy Race? 2012 Edition Full Report*. Available at: <<http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/-clenG20-Report-2012-Digital.pdf>> [Accessed 22.01.2014].

The Pew Charitable Trusts. (2014). *Who's Winning the Clean Energy Race? 2013*. Available at: <<http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/clen-whos-winning-the-clean-energy-race-2013.pdf>> [Accessed 20.05.2014].

The Wall Street Journal. (n.d.). *The Top 10 Venture-Backed Green Companies*. Available at: <<http://online.wsj.com/news/articles/SB10000872396390444734804578063163908128462>> [Accessed 10.05.2014].

Van der Slot, A. & Van den Berg, W. (2012). *Clean Economy, Living Planet - The Race to the Top of Global Clean Energy Technology Manufacturing*. Available at: <[http://www.rolandberger.com/media/pdf/Roland\\_Berger\\_WWF\\_Clean\\_Economy\\_20120606.pdf](http://www.rolandberger.com/media/pdf/Roland_Berger_WWF_Clean_Economy_20120606.pdf)> [Accessed 13.02.2014].

Wildner, M., Foged Sørensen, B., Koch, C., & Sørensen, M. (2011). Cleantech take off - A business perspective on climate change. *Global Conference on Global Warming 2011*, Lisbon, Portugal.

Woetzel, F. (2009). *China and the US: The potential of a clean-tech partnership*. Available at: <[http://www.mckinsey.com/insights/energy\\_resources\\_materials/china\\_and\\_the\\_us\\_the\\_potential\\_of\\_a\\_clean-tech\\_partnership](http://www.mckinsey.com/insights/energy_resources_materials/china_and_the_us_the_potential_of_a_clean-tech_partnership)> [Accessed 16.02.2014].

### Participants to the research

Hiljanen, R. (2014) Managing Director of EHP-Tekniikka.

Korhonen, V. (2014) Managing Director of Nocart.

Valkama, K. (2014) Finnish contact person of Elozo.

## Interview questions

1. In what clean technology sector are you operating?
  - a. What are your products/services?
  - b. How many employees do you have?
2. Which B2B marketing channels do you feel are the most effective and which least effective in your clean tech marketing? Why?
3. What would you feel are your biggest limitations in B2B marketing for clean tech product and why?
  - a. What kind of capabilities would you increase in marketing if possible?
4. What are the challenges in marketing your clean tech product in Finland? Why?
  - a. If you do export, then what are the biggest challenges in marketing abroad?
5. What kind of help you need to improve your marketing and sales internationally?
  - a. What are the challenges in marketing and sales internationally?
6. Do you find you have challenges in finding home market references?
  - a. What is the importance of the references in B2B marketing in Finland? And what about abroad?
7. Do you feel R&D is driven more by technical developments or commercialization point of view?
8. Do you feel that innovative and market orientated point of view help in clean tech B2B marketing?
9. Do you feel that the company is invested in marketing? Enough or too little? Do you feel that the company has invested enough for marketing compared for example to R&D?
10. Do you feel the Finnish government supports clean technology?
11. If your company is a part of clean tech cluster or network, please answer to this question. If not, feel free to ignore it.

- a. What is the role of network or cluster in marketing of clean tech product for SME in your opinion? Does the network or cluster provide support for the B2B marketing activities? If yes, how? Do you feel that it is enough?
12. What kind of expertise areas are you missing in your company?
13. Do you have a need for training for your human resources?