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Willingness to Invest in Wind Energy

- A Swedish Farmers' Perspective -

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Abstract

As wind energy companies grow beyond national borders, international development becomes essential to secure growth and prosperity. What usually gets overlooked is the potential that lies in local development, especially within smaller communities and by farmers. Large portions of territory in Sweden are owned by farmers and they are potentially representing investors or partakers in wind energy projects. Community investments and farmers invest in wind energy turbines has become a trend in Europe and is perceived as means of developing rural areas, by bringing about economical and societal benefits. This research project is focused on the investments in wind energy by farmers and communities by investigating their motivations and willingness to invest. The aim of this research is to assess the drives, obstacles and benefits to farmers who invested in wind energy in Sweden. Furthermore, it is intended to explore the impact of governmental incentives, in form of tradable green certificates (TGC), on farmer's decisions to invest in wind energy.

Interviews with Swedish farmers were assessed together within a theoretical framework consisting of the push-pull theory, sustainable business development and farm diversification concepts. The research showed that the main investment drivers can be seen in terms of economic benefits, weather and agricultural yield unpredictability, good wind conditions, energy security and over dependence on fossil fuels, and community building. Obstacles encountered by farmers were price variability, losses, time consuming legal and bureucratical procedures. Nevertheless, farmers received many benefits recognized mostly as economic benefits, diversification of farms and risks, social cohesion and community building, knowledge and contribution to a better and sustainable future. Tradable green certificates were shown to be a driving force, however, this force was more important to independent farmer's invertments than to a farmer's community investent.

Abbreviations

List of Abbreviations	
ARD	American research and Development
BAT	Best Available Technology
CSR	Corporate Social Responsibility
CO_2	Carbon Dioxide
EU	European Union
EMS	Environmental Management System
EWEA	European Wind Energy Association
FIT	Feed-in-Tariffs
GDP	Gross Domestic Product
GW	Giga Watt
GWEC	Global Wind Energy Council
LCA	Life Cycle Analysis
Mtoe	Million Tons of oil equivalent
MW	Mega Watt
MWh	Mega Watt hour
OECD	Organization for Economic Co-operation and Development
OM	Operational Management
P2	Pollution Prevention
RE	Renewable Energy
RES	Renewable Energy Source
RCT	Renewable Certificate Trading
RGC	Renewable Green Certificate
RPS	Renewable Portfolio Standard
ROI	Return on Investment
SEK	Swedish Kronor, currency
SBD	Sustainable Business Development
SD	Sustainable Development
SRI	Socially Responsible Investment
TBL	Triple Bottom Line
TPS	Technology Performance Standard
UK	United Kingdom
UN	United Nations
USA	United States of America
WBCSD	World Business Council for Sustainable Development
WCED	World Commission on Environment and Development
WNA	World Nuclear Association
WWEA	World Wind Energy Association

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1 Introduction

Recent developments in the world economy have led to a growing production of energy, increasing the overall energy production by 5.5% in 2010 compared to the levels in 2009 (www, Enerdata, 2012). The largest producers of energy remain China and India with an overall increase of 6% in 2010. From the Organization for Economic Co-operation and Development (OECD) countries, the highest increase, 6.7%, was recorded in Japan, 4% in Europe and 3.7% in the United States of America (USA) (www, WWEA, 2009, 1; www, Enerdata, 2012). In Europe overall energy production is seeing a fall from standard/commercial energy sources (Jäger-Waldu, *et al.*, 2011a). Oil production alone within the Euro zone countries has seen a dramatic fall of 42% in the period between 1999-2009 (European Commission, 2010), all other standard sources of energy production have decreased during the same period. However, the dependence of the Euro zone on those sources of energy is nevertheless stronger. The import of energy from standard sources of energy is increasing, despite decreasing local production. Energy dependency, in terms of energy imports, in countries belonging to the European Union (EU) has grown steadily during the past decade, rising from 45.1% in 1999 to 53.9% in 2009. In the case of Sweden, the dependency is much lower and steadier, being 35.0% in 1999 (European Commission, 2010), and growing only by 2.4% in the past decade (*ibid*.). The overlying reliance on imports from countries outside the EU is raising concerns about energy supply and security. Moreover, the needs of the global energy market are raising the question of natural resources availability, especially when it comes to fossil fuels (European Commission, 2010).

Many more concerns, other than energy security, have been connected to the topic of fossil fuels, such as air pollution and the high levels emissions of Green House Gasses (GHG), the environmental impacts connected to natural resources, including their extraction and transportation, relatedness to climate change and global warming, and many other issues concerning human health, livelihood and environment (Robertson, 2005; Esteban, *et al*., 2010). As stated in the Climate policy set forth by the EU in 2007, " Energy accounts for 80% of all GHG emissions in the EU; it is at the root of climate change and most air pollution" (Commission of the European Communities, 2007, p. 3). It is also emphasized that Europe needs to act together to deliver "sustainable, secure and competitive energy" (Commission of the European Communities, 2007a, p. 3). Altogether, the current state of affairs has further pushed the demand for more environmental friendly and non-degradable sources of energy (Wang, 2011; Esteban, *et al*., 2010).

Consequently, this issue of growing energy production and environmental issues has been addressed by many different non-governmental organizations, agencies, national and the international community. Growing public concern has led governments, at the EU level and individual national governmental agencies, to set policies and a solid legislative framework that would give attention to the issue. Many non-binding agreements such as the Kyoto protocol and other following relevant protocols, conferences and summits are reaching out and setting targets for GHG emissions (www, EWEA, 2011, 1). In the case of the Kyoto protocol, all 192 parties that ratified the document have agreed to the reduction of GHG emissions by 8%, compared to the levels in 1990 by the end of 2012 (European Commission, 2010). Besides the Kyoto non-binding protocol, the EU has set a program for carbon trading, "Emission trading directive", specially designed to meet targets of the climate change programme. Furthermore, the EU has set even more challenging targets, setting out to decrease GHG emissions by 20% by 2020 (Commission of the European Communities, 2007; www, EWEA, 2011, 1). EU climate policy makers are even currently deciding to increase the targets (www, EWEA, 2011, 1). Despite the failure to accomplish the target set by the Kyoto protocol, almost every country in the EU is on its way to reducing GHG emissions (European Commission, 2010¸ European Commission, 2011a). However, as part of the 2020 targets, and one of the binding elements, is the commitment to increasing the amount of renewable engery (RE) with respect to the total energy production in the EU. Similarly, to expect a 20% decrease of energy consumption, the EU commission has pledged to increase RE production to achieve a 20% share in the amount of total energy produced (European Commission, 2011b). To meet these challenging targets, the EU will need to incentivize growth which translated to increased production and new higher capacity installations. It is believed that well suited policies and stabile incentive systems can encourage investments (Burer and Wustenhagen, 2009) and stimulate competitive energy prices (Commission of the European Communities, 2007a).

In the EU, the share of renewable power installations in 2010 was 40%, which brought the total RE production capacity to 58,8GW (giga watt) (European Commission, 2010). Despite that the biggest share of nuclear energy in the EU-27’s primary energy production is 28%, followed by solid fuels, 20%, and gas 19%, fossile fuels are experiencing a decrease in production, which is giving much space to RE sources. In fact, the decade presented an increase of 60% in RE production, taking a share of 16% of total energy supply in Europe (www, Ren21, 2011, 1), while all fossil fuels had a significant fall (European Commission, 2010; Martinez, 2008).

1.1 Problem Background

Renewable sources of energy have seen variable growth during the past two decades, and even though all renewable energy sources (RES) had positive growth some were faster growing than others. For instance, solar photovoltaic electricity generation has grown more than 80 % in 2010 (European Renewable Energy Council, 2011), accounting for 23% of total RE installations, followed by wind at 16%, while biomass generation accounted only 1% of total RE installations (Jäger-Waldau, *et al.*, 2011a).

Focusing on wind energy, it has been shown to have greater efficiency and energy production rates compared to other RES, namely solar, bio fuels and wave energy, and consequently experienced steady and constant growth (Wang, 2011 and www, EWEA, 2009, 1, 2). Even though some renewable energy resources are "older" and a have longer history of practices, such as hydroelectric energy, wind energy has rapidly reached technological maturity and has seen a decrease in production costs (Weinzettel, 2008).

There are many reasons why wind energy has had such a fast and successful technological development compared to other energy sources. Depending on the position of a wind turbine, the presence of consistent high velocity wind speeds in certain areas, a permanent productive production of energy can be established (Esteban, *et al.*, 2010). As the emission of greenhouse gases causes environmental concerns, wind power can be seen as one of the friendliest energy generation resources, since wind turbines do not emit Carbon Dioxide in its energy generation (CO_2) (Martinez, 2008; www, WNA, 2012). These are the reason for the rapid increase in the share of wind energy in worlds electricity supply, which has seen growth from less than one per cent in 2008 (*ibid*.) to 2.5 % in 2010 (www, WWEA, 2010, 3). Many countries have embraced the trend by increasing installations and production capacity, showned an average increase of 28% in the past ten years (www, GWEC, 2009), and anadditional 20.8% of preexisting global capacity is forecasted to be installed by 2014 (*ibid*.).

In the case of Europe, wind energy currently provides more than 5% of Europe's Electricity (www, EWEA, 2010, 4), with a capacity of 93,957 MW at the end of 2011 (www, EWEA, 2011, 5). Setting out to reach 20% of the RE target in the EU, wind energy is forecasted to produce approximately between 15.7% and 16.5% of the overall electricity demand (www, EWEA, 2011, 3). Sweden had a share of 5% of the total EU wind electricity supply in 2010, which represents 3 TWh of electricity. In 2011, Sweden's total wind production capacity was 2907 MW.

Having in mind the wind energy figures, one can conclude that the wind energy sector has a high potential for growth. The EU-27 states point to the growing importance of this energy source development by 2020. Jager-Waldau, *et al.*, (2011b) predicts that wind energy production is going to bear 41.3% of the total renewable energy production. However, many elements are still missing (*ibid*.). The EU has highlighted in theirEnergy Policy (Commission of the European Communities, 2007), that in order to have secure, sustainable and competitive energy markets, there have to be many efforts made in the legislative and implementation areas. There are several specific problems to wind energy including: grid interconnectivity, production efficiency, cost of technology, financial support mechanisms, and environmental impacts to assess (Leung and Yang, 2012; Kaldellis and Zafirakis, 2011). Moreover, wind turbines present the problem of intermittency and lower energy payback time, which is further more discouraging to investors (*ibid*.).

Governments and financial institutions are taking action in creating incentives for investors in many forms. Some of the most common incentives are reduction in taxation, price setting, tradable certificates, quotas, loans, and many others. In the case of financial institutions, such as banks and equity funds, renewable energy projects can be funded through corporate lending, project finance, direct funding or refinancing a project (Justice, 2009). When it comes to public efforts to incentivize investments in renewable energy, different governments choose different incentive frameworks they believe will encourage investors to engage and eventually increase energy production. However, there can be diverse issues related to incentives, for instance, constant switching from one type of incentive to another, which is reflected in instability, uncertainty and riskiness of this type of investments (*ibid*.), or different outcomes of incentive frameworks on investment growth and development of RE technology. Consequently, this riskiness and uncertainty is recognized in difficulty to attract investors and their low willingness to invest (Justice, 2009). Due to these considerations, investment in winde energy, with its potential for returns, is considered to be risky.

In spite of the riskiness and uncertainty of the investment, wind energy attracts the newest investments in energy (Aguilar and Cai, 2010). Yet, there is a large variety investors in wind energy, and each group of investors is driven by different factors and it is influenced by governmental policies not to the same extent. Private investors can take the shape of equity funds, venture capital firms, family businesses, community funds, banks, insurance companies, academic institutions, corporate investors, pension funds, farmers, capital markets etc. Each group of investors reacts to the changing environment in a different manner, which further on has an impact on their placement and amount invested. For the purpose of this study, research was focused specificaly on the group of investors consisting of farmers in Sweden.

1.2 Problem

As wind companies grow beyond national borders, it becomes essential to concentrate on international development in order to secure growth and prosperity. What usually gets overlooked is the potential that lies in local development. Especially, the large territory of privately or publicly owned land in the EU and in Sweden. Thus represents huge potential for the development of numerous projects. Investments in wind energy in large or small scale projects can bring significant changes in the environmental, societal and economical state of affairs of a countryand hence enhance rural and local development (Munday, *et al*., 2011).

The development of rural areas has been recognized as an issue of growing importance within the European Community. By supporting sustainable development in these areas, the EU will support and facilitate the development of micro-businesses, entrepreneurial activity, employment for women and for the young as well as for the elderly (The Council of the European Union, 2006). The primary goal of the European Council is to create value and increase the quality of life in rural areas by encouraging diversification of economic activity (www, ec.europa, 2012, 1). Some initiatives have already been made in this direction, for instance, Future of Rural Energy in Europe (FREE), which is, by recognizing the crucial role of rural areas in sustainable development and reduction in GHG emissions, pledging for a better energy mix that is based on renewable energy sources (www, ecofys, 2012). Similarly, the Federation of Swedish Farmers (LRF) encourages the land owners to take part in developing green industry (www, lrf, 2012, 1). LRF points out that with the number of farmers owning land, which is close to 171,000 farmers; the application of green industry is a key to growth and profitability (www, lrf, 2012, 1, 2). The potential of these rural areas for developing renewable energy projects, especially wind energy, is even the nature of wind projects and their placement is taken into account. Wind energy projects are most often being placed in sparsely populated and more remote localities (Munday, *et al.*, 2011), which points to the already existent trend of installing wind turbines in rural areas. Bearing this in mind, some farmers and local communities already have the advantage of owning land, which can be used when developing on-site projects themselves. Numerous farmers and communities around Europe have already profited from this advantage and engaged in developing their own wind farms, or alternatively investing in wind projects in their area (del Rio and Burguillo, 2009).

Furthermore, bearing in mind the alternative character of wind energy investments, riskiness and retribution, growth perspective and its importance in reaching GHG emission reduction, it is essential to comprehend what are the main drivers and obstacles for investors: in this particular case, farmers. Private investors are led by various objectives and along the way they encounter numerous challenges and obstacles. Farmers, as investors, engage in wind energy investment for diverse reasons having different expectations. When solely assessed, we can better understand farmers and their drives and challenges, and in that manner learn how to stimulate and grow investments to the benefit of all. Among other drivers and obstacles, the impact of governmental incentives needs to be taken into account, as it is the most effective way of stimulating investments. In Sweden the choice of incentive policies has landed on the Tradable Green Certificate (TGC) system, shared together with Norway since the spring of 2012 (Bergek and Jacobsson, 2009). TGC is an incentive system that encourages production of RES, explained more in section 1.6.3 of the definitions of terms.

However, there has been limited empirical evidence of the choice of the incentive framework in Sweden and its impact on farmers' investments in wind energy. Furthermore, the literature shows a gap in analysing the complete investment behaviour of Swedish farmers; what drives them and what obstacles are faced when investing in wind energy and in which way can they benefit from it? This problem will be addressed further on as the primarily research goal of the study.

1.3 Aim

Even though the predictions for wind energy are looking promising, with high energy production and the upcoming productive capacity of new installations, there still remains uncertainty regarding sources of the investments. This study focuses on a small group of specific investors in Sweden: farmers, i.e. family owned businesses which are engaged in agriculture. Namely, the aim of this study is to investigate leading the drives, benefits and challenges that Swedish farmers encounter when investing in wind energy. Furthermore, the relevance and importance of governmental incentives will be assessed, in order to determine how much the Swedish incentive framework drives farmers to engage in wind energy investments. Research questions that will be answered are:

- *What are the main drivers, benefits and obstacles for farmers when investing in wind energy?*
- *Do incentives influence the willingness of farmers to invest in wind energy and to what extent?*

When answering the research questions the analysis will first look at previous literature evidence, in order to investigate the researched field. Further, the research will be supported by a theoretical and conceptual framework. The analysis related to the primary interests of the research follow respectively the following flowthrough: Evidence in the literature, development of a theoretical and conceptual framework to make relevant the analysis, and the collection of empirical evidence through inteviews to establish conclusions to the research questions.

1.4 Delimitations

This study is a result of country specific exploratory research based on a literature review and empirical data. The literature review is based on previous academic publications available through scientific databases. To the best of my knowledge, most important journals and authors from the area have been consulted; however, the possibility that some information is overlooked can not be completely removed. The empirical data relyd on three interviews with Swedish farmers which provids the research with important, however, context and time specific data. Keeping in mind that the relatively low electricity pricing in combination with the timing of the interviews has the potential to bias opinions irrespective of other information, this study is potentially time dependent. Finally, the perspective which is used in the research is reflecting farmers' experience of investments in wind energy. The number of interviewspresented here is not representative of the whole population of farmers in Sweden.

1.5 Outline

The outline of this research is presented below in the Figure 1, representing the logics that this research project follows.

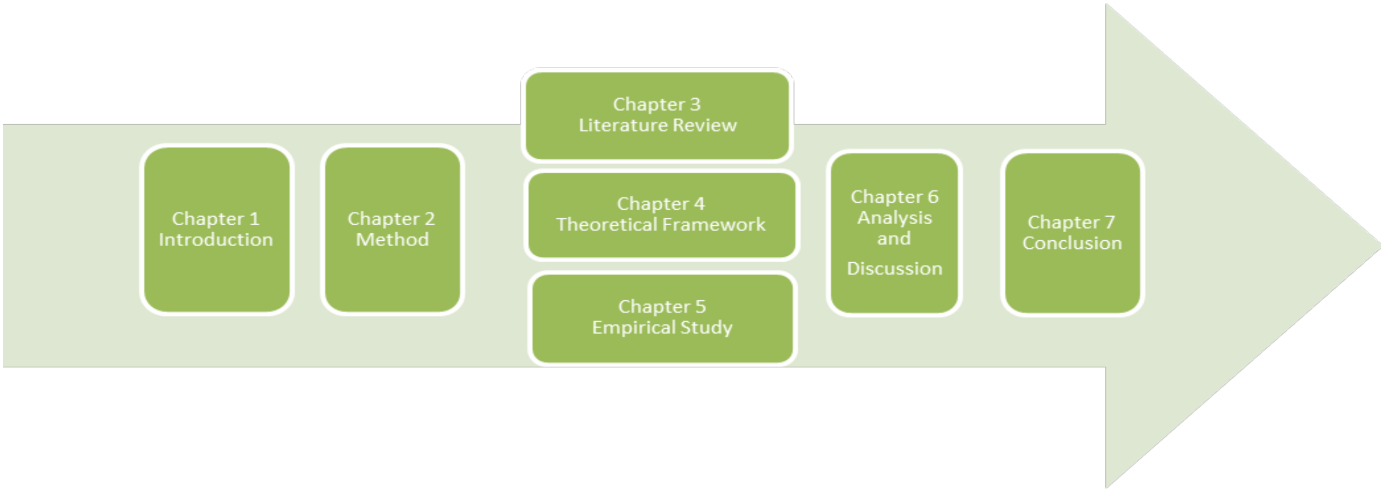

Figure 1 Illustration of outline of the study.

Chapter 1 gives a broad sense of the background and research area covered within this study, the aim and formulation of the inquiry, as well as potential limitations. In Chapter 2, the method of the study is described by systematically introducing and explaining the method of each of the following components of the study. In chapter 3 a literature review is presented to summarize the most important studies and results. Furthermore, chapter 4 discusses important underlying theories, which will be extensively used alongside the empirical studies presented in chapter 5. The findings from chapter 5 together with the theoretical framework from chapter 4 will be analysed in-depth and discussed in chapter 6. Finally, the research paper concludes by summarizing all the findings together in the conclusion chapter.

1.6 Definition of Terms

1.6.1 Renewable Energy (RE)

RE is often regarded as a “Green” energy which comes from environmentally friendly sources. Namely, RE is produced form a source which is reusable, abundant and can be used repeatedly for an unforeseen period of time. RE production is much safer for the environment, GHG emission is negligible and its use has a long term perspective (Johansson, *et al*., 1993). RE is captured from nature’s activity or assets, in different forms, such as wind, water, sun, geo thermal activity and plants. The European Parliament and Commission (2001, p. 20) defined RE in following way:”‘*renewable energy sources*’ shall mean renewable non-fossil energy sources” (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases). RE is considered to be opposite of non-renewable sources, i.e. fossil fuels, which once used cannot be reused (Johansson, *et al*., 1994).

1.6.2 Wind Energy

Wind energy is one type of the renewable energy sources (RES) captured from wind activity. Wind power plants consist of a number of wind turbines (Aubrecht, 1995; Andrews and Jelley, 2007; Coley, 2008). Historically wind turbines have been placed on land, along windy costal areas, or near the shore. However, with the advancement of technology, turbines bagun to be positioned off shore, and recently even floating off shore turbines were places further from the coast in order to catch higher velocity winds and consequently produce more electricity (Aubrecht, 1995; Andrews and Jelley, 2007; Coley, 2008).

Wind turbines consist of a foundation, which secures a turbine to the groun, a tower, which sets the height of a turbine, a nacelle containing a generator which is placed on a top of the tower, and finally a rotor consisting of three or more blades. Wind turbines generate electric energy by harvesting the winds kinetic engery by translating the winds movement to mechanical engery in the turbine through the movement of the blades (Coley, 2008). The amount of electricity depends on a number of factors such as the speed of the wind, the model and size of the turbine, the intermittency of the wind, the area and the placement of the turbines as well as other factors (Saidur, *et al.*, 2011). As mentioned in the literature, there are side effects to wind energy production, i.e., impacts on the environment of the surrounding area and community. The most common negative affects associated with wind turbines, are related to bird and animal impacts, noise pollution, unsightliness, and amongst others the claim that they can cause migranes (Leung and Yang, 2011).

1.6.3 Type of Policy Incentives in EU

1.6.3.1 Tradable Green Certificate (TGC)

The TGC system uses the standard electricity market, where the price of electricity is not different from other standard energy producers. However, on top of electricity price, the renewable energy producers gain a certificate from the government for each MW of electricity fed into the grid. The energy distribution providers are obliged to fulfill the quota for RE, for which they obtain the certificates from a RE producer as proof of the acquisition of electricity. These certificates are further traded in a separate market for green certificates. Morthorst (2000), points out the importance of securing a separate green market so that the development of RES would not be hindered. The author argues that pure market conditions would slow down or even stop the RE capacity installations.

The price of the green certificates is established by following supply and demand (Bergek and Johansson, 2009). TGC are usually accompanied with a quota obligation system, which is set to guarantee a certain percentage of renewable electricity in the market. Most commonly, the consumers or the buyers of the electricity will be obligated to buy a certain amount of electricity coming from RES. Countries that have adopted this form of incentive are Belgium, the United Kingdom (UK), Sweden, Poland, Romania, Italy and Norway (www, REN21, 2012, 1, 2, 3). The expected benefits of the TGC incentive framework are cost-effectiveness, stabile development toward set deployment goals, promoting innovation of the RES, cost reduction trough a double market system (electricity and certificate systems) (Morthorst, 2000). TGCs have been considered an efficient, secure and cost minimization tool, whereas the electricity would be produced and sold at the minimum cost in the competitive electricity market (Bergek and Johansson, 2009). As a result of this competitive market, TGCs are stimulating new technological solutions and promoting innovation (*ibid.*). Furthermore, by adhering to the TGC system, the cost for consumers and society is minimized, as advocated by the EU.

1.6.3.2 Feed-in-Tariff (FIT)

Feed-in-tariffs (FIT) are primary designed to secure a fixed price for the RE producers, by obliging electricity distributors to accept electricity from RE producers and provide them with a fixed, regulated price (Commission of the European Communities, 2008). This policy system has been adopted by many European countries including Denmark (in the 1980s), Germany and Spain (in 1990s), Austria, Bulgaria, Cyprus, Check Republic, Estonia, Finland, France, Greece, Ireland, Hungary, Latvia, Lithuania, Luxemburg, Portugal, Slovakia and Slovenia (www, REN21, 2010, 1, 2, 3). It is currently the dominant policy framework in the EU 15 countries (Fouquet and Johansson, 2008). Since FIT is a framework with a longer history of application, the efficiency, effectiveness and general success in reaching goals set by the EU has already been largely assessed. Morthorst (2000) and Finon and Perez (2007), among others, have shown in their studies that the main advantage of the FIT incentive system is the effectiveness in promoting technology development and diffusion of the RE technology comparing to standard energy sources (Bergek and Johansson, 2009). The FIT system provides a long-term stabile price structure, thus overcoming a important part of market risks. Nevertheless, such system can become burden to the public budget (Morthorst, 2000), and it does not stimulate competitiveness or improvement of cost efficiency (Verhaegen, *et al*., 2009).

1.7 Background to the Research

1.7.1 Expectations of TGC in Sweden

Sweden has followed EU directives (Bergek and Jacobsson, 2009), and consequently the Swedish Government Energy Act of 2002 has adopted quota based system with the TGC incentive system (Wang, 2006). The goal of this system was to secure long-term stability, security of RE supply, competitiveness, and cost efficiency among others.

The quota system obligates consumers or utility companies to buy a certain amount of renewable energy. Until 2006's revision of the TGC system, consumers were obligated to buy a certain quota of renewable electricity; however, the revision only obligated electricity suppliers to fulfill the RE quota. The total amount of renewable electricity supplied, by adhering to the quota is corresponding to goals set by the Swedish government; in 2003 the target was set at 16.9% to be achieved by 2010, which corresponds to 10TWh. In 2006 a new goal was set to reach 17TWh by 2016 (www, Eurelectric, 2011). If quotas are not fulfilled by electricity providers, they are required to pay a penalty. The fee for the penalty is established by the Swedish Parliament, and it currently amounts to 150%, of an average certificate price. The introduction of the penalty is motivated by the belief that the fee would limit fluctuations of certificate price (Verhaegen, *et al*., 2009). Moreover, the same authors suggest that the floor and ceiling prices can equally limit the oscillations of the internal certificate market. The third option, to achieve stability of the TGC system is to form international markets which are broader and more stable. However, international market would bring more difficulties in observing the achievements of targets on national level. And other condition, which is hardly obtainable, is reciprocity and full awareness and acceptance of other countries' goals. Moreover, there are many kinds of TGC even within one country, for instance Belgium, and other EU countries (*ibid.*). Hence, it is more transparent and easier to follow target achievements in individual markets (Verhaegen, *et al*., 2009).

The targets mentioned, in percentage of a RE in total energy supply, have a lot to do with forming a competitive market. Toke (2007) suggests that if policy makers set too ambitious TGC quotas, producers will not be motivated to compete; there will be fewer competitors and consequently the lack of competitiveness would lead to a higher price of electricity. On the other hand, if the set targets are ambitious, challenging, but reachable, producers will be motivated to compete, they will be numerous, and subsequently gradually decrease the prices of electricity (Toke, 2007). Morthorst (2000) argued for the importance of setting the quota st an early stage, in order to enable appropriate development and growth of RES. Furthermore, the author pointed out that RE technologies take time to develop and construct on site. Wind energy power plants can take up to 2-3 years to fully install. Therefore, it is an essential to RE producers to have stabile and long term support, i.e. the TGC system.

The Swedish government is expecting TGC to decrease total social and economic cost, and at the same time minimize consumers cost. Bergek and Jacobsson (2009), in their translation of the Swedish Government directive form 2002, pointe out that consumers cost can be decreased only if the competitiveness between energy producers is promoted, which would consequently ensure the low prices for the consumers. RE producers participate in a separate market for green certificates, which is referred to as a “Distinct market for environmental value” by (Verhaegen, *et al*., 2009). This separate market system is reattributing RES producers, adding a premium for ptovision of environmental benefits to standard energy prices (*ibid.*). One further expectation from the Swedish government is to enhance new technological developments, in the form of R&D and applied innovative solutions. This particular improvement would derive from a strong competition of renewable sources, whereas RE producers compete in the market to provide a lower cost of energy, i.e. to be more cost efficient, which is achievable trough new technological developments and innovation (Bergek and Jacobsson, 2009).

1.7.2 Renewable Energy in Sweden

According to Morthorst (2000), achieving the targeted GHG emission reduction is correlated with liberalization of electricity markets. The author saw the expansion of RES partly due to liberalization of the market and rapid improvements of technologies combined with the governmental support in terms of incentives and subsidies (*ibid.*). The Swedish electricity market was liberated in 1996, when consumers could choose from which energy producer they would be supplied. It also gave a space to smaller producers to connect to the grid, and decrease the influence of large electricity companies (Morthorst, 2000; Wang, 2006).

Before the liberalization of the market the total electricity production in 1990 in Sweden was 141.7 TWh. Hydro power and nuclear power represented 92% of the production in Sweden, with 71.4 TWh and 65.2 TWh respectively. Wind energy was not present at that time, while thermal power represented 5.1 TWh. Subsequent to the liberalization, in 1999, hydro power still represented the majority of the contribution in the Swedish electricity market with 70. 9 TWh, followed by nuclear energy with 70.2 TWh. Wind energy was promoted for the first time in 1997 when 0.2 TWh of electricity was produced, 0.3 TWh in 1998, and 0.4 TWh in 1999. In 2002 there was a slight decrease in hydroelectric energy production, 66.0 TWh electricity was fed into the grid, while nuclear kept constant with 70.2 TWh. Wind energy has still a small contribution of 0.6 TWh (Wang, 2006), although the growth rate of wind energy was 20% comparing to the levels in 2001. Since nuclear and hydro were dominant and economically affordable at the same time, the Swedish Government did not perceive the need to develop other RESs. Moreover in 2002, Sweden was the largest consumer per capita of nuclear energy in the world. The goal of reducing emissions was achievable, since nuclear energy and hydroelectric energy are low GHG emissions technologies.

Hydroelectric, nuclear and biomass energy production system have been in the basis for previous success in reducing GHG emissions (Wang, 2006), however, the growing concern about security and waste management of nuclear power plants, has led the Swedish government to engage in more environmentally friendly and secure energy sources (*ibid.*). The main expectation of the Swedish government regarding the promotion of RES largely concerns the decrease of non-renewable sources. Wang (2006) wrote extensively about the Swedish reach out to increase RESs with a goal of decreasing reliance on nuclear power. He also affirmed that Sweden is increasingly looking for ways to phase out nuclear energy, and at the same time meet GHG emission goals for the upcoming years. In conclusion, RE promotion in Sweden has a twofold importance, firstly it will help phase out the current nuclear power plants and secure a safer environment, and secondly it is seen as an important tool in decreasing GHG emissions and meeting the EU as well as national targets in upcoming years.

1.7.3 Wind Energy Incentives in Sweden

In Sweden subsidies for wind production started off with a grant of 25% of the total investment cost in 1991, and they grew to 35% in 1993. After initial subsidies, since the distribution was somewhat unstable and unpredictable, the funding was discontinued until 1997, when Swedish governments offered subsidies amounting to 15% of investment cost (Nilsson, *et al*., 2004). This was seen as an initial incentive for wind energy power plants installations, with 372 new wind turbines by 2002 (*ibid.*). However, the subsidies that were offered expired by the end of 2002 when other special measures for supporting wind energy were introduced (Wang 2006). The Swedish government proposed transitional regime, which would specifically target wind energy, until the green certificate system would be inclusive of wind energy. Hence, an environmental bonus, similar to subsidy system, was presented in form of tax relief (Wang, 2006). This system was gradually phased out after the TGC was introduces in 2003 (*ibid*.). Besides tax reduction and a sub sequential TGC system, the government offered technological support for large-scale wind power plants.

2 Methodology

"Defining and redefining problems, formulating hypothesis or suggesting solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis"

Kothari, 2004, page 1

2.1 Short Introduction to Methodology of the Research

This research is a combination of the exploratory, descriptive and analytical types of the research. In order to gain a needed knowledge and perspective, the research starts off with exploratory research, by collecting the data and subsequent exploration of the problem area and getting a better idea of the scope of the issue. The method used in the research was a systematic collection of secondary data and extensive internet research, alongside primary data collection in form of the interviews, two telephone interviews and one face to face interview. The second stage of the studies is related to data analysis and assessment with the purpose of establishing relations and interconnections between theorethical and empirical data, and it is representing descriptive part of the research. Finally, the third and the last part of the research is conclusive, descriptive or in other words "connecting the dots" part of the research, denominated as explanatory research (Bhattacherjee, 2012). This part of the research "seeks to answer why and how types of questions" (Bhattacherjee, 2012, p. 15), by discussing and analyzing results, and systematically presenting them in form of graphs and tables. An inductive logic process is used to gather knowledge and evidence that can help construct in the future of a certain concept or allow for pattern formulation.

2.2 Literature Review

The methodology of the literature review is composed mainly of key word research, in depth journal research and of literature from particular authors of interest. Data used falls into following groups: articles from journals, books, reviews, company and governmental reports, and publications from industry related bodies, published governmental documents and, international body's publications.

All data collected has been retrieved systematically during several phases including
1st phase: key word research,
2nd phase: journal and library research,
3rd phase: selection of suitable data.

1st phase:
The starting point was the exploration of the research engines: "Web of knowledge", "ScienceDirect", "Scopus", "Google Scholar" and "Google". First, generic and broad terms were used to conduct initial research in order to gain general knowledge and understanding of the area of interest. After the general ideas were understood, new more specific key terms were introduced and the search took a more focused shape.

Key words used: renewable energy, green energy, wind energy, wind power, wind power generation, wind power policy, renewable energy incentives, renewable policy, renewable support, support schemes wind energy, financing green/renewable energy Sweden/EU, feed-in-tariffs, tradable green certificates, community investments, farmers etc.

2nd phase:
In the second phase, after having collected a significant number of articles and reports, the research was continued by in-deepth journal content scanning of several journals, such as “Renewable energy”, “Energy policy” and “Wind energy”. Furthermore, to support the data and build a solid theoretical background, books from the university library have been used in. The table below (Table 1) shows the areas of research that have been taken into consideration, along with a number of articles consulted on that topic.

Table 1 Article assessment

Article topic	Number of articles
Renewable energy	58
Wind energy	14
Support and Policies	24
Sweden	10

**Some articles include more than one of above mentioned topics*

3rd phase:
The third phase of the research was a practical screening of the usefulness of the collected literature. Around 115 articles, reviews and books have been collected; however, not all of them are relevant to the subject of interest. In that case the most of the recent articles were selected; reassuring that the most up to date information has been brought tlight. Table 2 shows the number of articles and year of publishing in decending order from the oldest articles toward the newest.

Table 2 Assessment of number of articles and their year of publishing

Article year	Number of articles
1998	2
1999	2
2000	2
2001	3
2003	2
2004	3
2005	3
2006	8
2007	11
2008	6
2009	12
2010	7
2011	29
2012	24
Total of articles	114

The number of articles has increased in recent years, showing that the area of RE is becoming more attractive. This study relies on 114 articles, from which only some articles were included as references and subsequently supported the research. Only articles and reports treating the current European state have been considered, to keep focus. While research RE, it became apparent that there are a number of gaps in ciritcal areas of information, which points to the need for further evaluation in the future.

2.3 Theoretical and Conceptual Framework

Following the aim of the study, the following theories were chosen, believing they describe and fit the best observed phenomenon. These are: sustainable business development, the push–pull theory of entrepreneurship and the farm diversification concept.

The theoretical concept explains the willingness to engage with "greener" investment. The sustainable business development concept is introduced as a guide to howbusinesses to operate in a more responsible way and invest in a sustainable future. The push and pull theory of entrepreneurship describes the motivations and decisive factors for entrepreneurs to start up their own businesses, and become self-employed. The push and pull theory brings out two groups of factors. The first is a group that includes factors pulling individuals to self-employment, positive motivational factors, and the second factor group pushes individuals to become self-employed. This secong group of factors is mainly seen as negative factors. Specifically related to the area of this research, a concept of public investment and support is included as one of the factors pulling toward wind energy investments. Within the perspective of wind energy, this concept reveals how much public support is connected to farmers' willingness to invest in wind energy. Finally, the farm diversification concept aids in assessing the reasons behind the decision to start new activities on or off the farm, or within the same business unit. It shades some light on the factors that prompt the decision to develop new activities and analyses the surrounding circumstances and the environment.

2.4 Data Analysis

Data analysis was preceded by correlating and assessing empirical evidence, along with the chosen theories and concepts. Empirical evidence is collected through interviews and consequently they are transcribed and reported in the respective chapter. The empirical data is divided into 4 sections, the first describing personal information of interviewees, the second is regarding experience with wind investment, the third is treating TGC experience and finally the forth section is regarding the future perspective. The second and third sections are mainly used in content analysis. The data retrieved form interviews is broken down into the sub units, including drivers, obstacles, benefits of wind energy investment and TGC experience, and these were processed and analysed together with the theoretical and conceptual framework, by such allowing understanding of phenomenon and further discussion. Content analysis is used in this research work due to its systemic approach and full analysis of the empirics.

2.5 Choice of Country

The country of choice has been selected based on several parameters. Firstly, it is a matter of proximity, familiarity and personal affection with the country. Secondly, the data availability, meaning the easily reachable and accessible reliable databases, journals and reports are available in the English language. Moreover, most of the web sites and official reports are offered in Swedish as well in English language. Thirdly, with respect to a short window for interviewing potential local investors, Sweden was a natural choice. Furthermore, Sweden is a member of the EU and it is one of the most developed countries in the world, which can be established just by observing gross domestic product (GDP) and GDP per capita. The country is inhabited by almost 9.5million people in 2012 (www, scb, 2012) and the GDP per capita is on the rise, to the amount of about 370 thousand Swedish Kroner (SEK) at the end of 2011. Sweden is among the fifteen most advanced economies of the world; this is due to many factors, such as the education system, agricultural policies, industrialization and international cooperation (www, Sweden, 2012, 1). Evidently, Sweden is in a period of economic growth, inflation is controlled down to 1,1 per cent and unemployment is at 7,7 per cent. Taking into the account economic strength and rather contained impact of the financial crisis, mainly because of stabile financial system and use of SEK as official currency, Sweden can be considered as a fairly stable economy (www, Sweden, 2012, 2).

As for the legal framework and other non-legally obliging agreements in the area of renewable energy, by being a member of EU, Sweden has committed to reduce its oil dependence and support renewable energy sources (Coincil of the European Communities, 2008). Furthermore, Sweden committed to a number of non-binding agreements, such as the Kyoto protocol, and has participated in numerous conventions and conferences on the topic of climate change and environmental issues. Moreover, Sweden has introduced different incentives to encourage producers and investors to be further engaged with renewable energy (European Parliament and Council 2001, 2009). In conclusion, being a economically and regulatory strong and stable country, Sweden is a “safe choice” for a wide range of investors.

2.6 Choice of Sector

As previously mentioned, economic strength and stability encourages investments. Furthermore, being in a time of increasing environmental concerns, excessive CO_2 emissions and their impact on global warming and climate change, is leading governments to encourage more responsible conduct in industrial and domestic behaviour. The European Commission has taken into account these factors and demanded to seek an increase sustainable energy production, with a decrease in fissile fuels, and stimulating renewable energy production. Moreover, it has set challenging but motivating goal of reaching 20 per cent of the total energy production from the renewable energies by year 2020 (Commission of the European Communities, 2007a).

Having chosen the country, it was decided to consider the wind energy sector for number of reasons, as it is a very important sector of the energy supply in Sweden. Wind energy makes up 4,5 per cent of the total energy productionn of electricity. The total of 2907 MW of capacity installed by 2011 in Sweden represents 8 % of total EU wind power plants (www, EWEA, 5). There is a clear increase in the amount of solar energy production in Sweden, making it of particular interest for this study. There are a number of projects currently underway, and Swedish farmers comprise a number of the investers. Small local powerplans are being jointly formed. This is relevant to the presence of government incentives in the form of tradable green certificates.

2.7 Choice of Interviews

The empirical part of the research was done in Sweden by conducting three interviews, one face to face interview and two telephone interviews. The interview was chosen as the most appropriate method, since the goal was to gain deeper understating of which aspects are important to potential Swedish investors in the agricultural sector.

An interview by phone is a more flexible method, which provides the researcher with contextual and unique insights to the study. Constrains in terms of time and distance were overcome due to the possibility to conduct telephone interviews. The telephone interviews were the best way to reach farmers that are situated in more remote areas. Telephone interviews are quick, direct, and carry a lower cost, in terms of economic resources and time (Bhattacherjee, 2012). Further, the choice of doing interviews was preferred to other techniques, such as email surveys or inquiries, due to the reduction of the bias of understanding and time constrains the study presented. Face to face interviews, however, are time consuming and can bear higher financial costs. Nonetheless, it is much more efficient and resourceful technique, allowing greater degree of confidence and information shared by the interviewee than are other methods. In comparison, telephone interviews are less preferred, due to a risk of information bias and language barriers, which can be overcome with face to face interaction. The case study method was not possible, due to a lack of information and time.

The choice of individual interviews was made by following a purposive sampling method, and exclusively selecting farmers and land owners upon advisory by Lantbrukarnas Riksförbund's (LRF – Federation of Swedish Farmers) member, Mr. Nilsson. Mister Nilsson was a member of the project facilitating and monitoring Swedish farmers who are involved with wind energy investments. Therefore, he was considered a knowledgeable person in the area and his suggestions valid. Mister Nilsson suggested four farmers from the Skåne region in the south of Sweden, out of which two agreed to be interviewed. Due to privacy concerns, the names shall remain anonymous. The first interview was completed by a telephone on 27th July 2012, and the second on 31st July 2012. The interviews were considered successful. However, language barriers provide a difficult obstacle in doing interviews. The interviews were held in English, and interviewed were Swedish individuals with limited knowledge of English language, which presented obstacle to the communication.. Nonetheless, all the questions were answered. The third interview was concluded on the 8th of August 2012, with an economic agronomist employed with the Swedish Agricultural University (SLU).

The interviews were based on two sets of interview questions. First set of questions was intended for farmers whichhave already invested in wind energywithout dedicating a part of their land for the installment of turbines. The second set of questions was composed for farmers who devoted a portion of their land to development of wind turbines. The questionnaires contain 17 and 19 open ended questions respectively, covering four sections regarding personal information, wind investments, experience with the TGC, and future perspective (see Appendix). All respondents completed the questionnaires and the interviews were considered successful. Also, participation levels of interviewees were low due to the timing of the harvest.

3 Literature Review

The literature review proceeded as follows; first, previously written literature about the presence of investments in the area of RES, wind energy in particular, is presented by quoting and stating earlier authors from the research field. The factors that determine the willingness to invest are assessed in first section; furthermore same experience from farmers' perspective is featured in a following section. This chapter provides background information to the study about previous findings from the prominent authors of this academic field, intended to provide answers to the research questions. However, it is possible, which the delimitation to this literature review, that there are more authors and literature data, which has been missed to address.

3.1 Investments in Wind Energy

The literature review starts up with the introduction of previous literature findings from the area of investment in wind energy. First, section 3.1.1 assesses and summarizes findings around investments in wind energy and factors that determine such investments. The second section of this literature review treats more specific topic of investments in wind energy by specific group of investors, i.e. farmers.

3.1.1 Factors Determining Willingness to Invest in Wind Energy

Wind energy projects, although varying in size and capacity of production across the world, are mostly dominated by a large scale projects (Schaefer, *et al.*, 2012), and require substantial investments. The need for financial support of wind energy investments varies significantly in the case of on-shore power plants, off-shore or even emerging technology of floating off-shore turbines. Respectively, each type of power plant attracts a different kind of investors, which are all driven by different motivations. Bearing this in mind, to meet the demand of investments, there is a necessity of a vast variety of investors (Schaefer, *et al*., 2012). However, some authors such as Masini and Menichetti (2012) are of an opinion that currently there is not a lack of investors, but that there is a lack of appropriate incentives.

It has been suggested by the literature, that the investments in wind energy, as it equally stands for other renewable sources, is depending on three main factors: the relationship between risk and returns, prior expectations, and beliefs and policy preferences (Masini and Menichetti, 2012). Perception of the risks in relation to returns is one of the factors that determine the willingness to invest (Justice, 2009), yet more investigation is required in the field of renewable technology investments (Masini and Menichetti, 2012). Private sector can play crucial role in financing RES, in particular of wind energy projects (The same authors have concluded that investors do not prefer to invest in innovative solutions, but rather in mature and secure technologies. Furthermore, investors seem to opt for an investment in technologies that have already overcome the “Valley of death” (Masini and Menichetti, 2012). Therefore, investors can be reluctant to invest in wind energy risk wise due to the technology uncertainty (*ibid*.).

However, Masini and Menichetti (2012) state that it has been proven that there is recurring outstanding financial performance of RES, comparing to the conventional sources of energy production. In fact, there are many studies indicating the positive relationship between an environmentally and socially responsible investment and a positive financial gain (Masini and Menichetti, 2012). Moreover, the presence of renewable technology investments in a portfolio improves its performance. Nevertheless, this fact has been overlooked many times by the policy makers, regardless of its importance in creating policies. Perhaps, the reason is the vagueness and uncertainty of correlations of risks and returns (*ibid*.). Namely, Masini and Menichetti (2012) argue in their article that this unclear correlation can be the outcome of human input, described in concept of "Behavioral finance". Basically, most often overlooked, human interactions are not omitted from the financial decision making, resulting with unclear financial analysis. Furthermore, knowledge, expectations and beliefs are reflected in prior investment decisions and whether and how successful they were (Masini and Menichetti, 2012). Therefore, it is often to see certain misconceptions, expectations and prior believes from previous investment experiences applied to new wind energy projects, which would result in unclear financial analysis.

Depending on a country's policy framework, profitability of an investment in wind energy is partly determined by selling energy to the market (fed into a grid) and other percentage by subsidies or other incentive arrangement (Baringo and Conejo, 2011). It is crucial to observe the nature of correlation between choice of policy and profitability of the project, and how can the choice of framework influence the riskiness of the whole project. Investors mainly look at type of the incentives that policy offers, level of support, duration of the support and length of a period that the policy will be in vigor. If the policy is changing very often, investors will not find it stable and secure enough to commit for a longer time period. "*Commitment, stability, reliability and predictability are all elements that increase confidence of market actors, reduce regulatory risk and hence significantly reduce the cost of capital.*" (Masini and Menichetti, 2012, p. 29). Therefore, the type of policy is crucial factor to determine the willingness to invest in wind energy projects.

3.1.2 Farmers' and Community Investment in Wind Energy

Recently is increasingly common to have local community's involvement in project investments, and in some cases, even the full ownership over the wind energy projects. In the case of Denmark and Germany, a local ownership showed to be easing the planning and financing. It also increases acceptance within a community while creating energy independence and sense of self-reliance and decreasing dependence on large producers (Toke, 2005).

Warren and McFadyen (2010) have confirmed in their study about wind investments of Scottish farmer's that the ownership of wind turbines by local community members is influencing the perception of positive economic impacts and general positive attitude toward wind farm developments and installations in an area. Community self-reliance, general improvement of planning and socio-economic cohesion are the main out-coming benefits of a small scale, community owned wind power plant (Toke, *et al.*, 2008). Overall, by engaging local communities, wind projects can be easier accepted and implemented by the community (Toke, *et al.*, 2008; Toke, 2005). Moreover, the same author (2008, p. 1140) points out to the importance of engagement of the local communities in wind power projects that "*involve large numbers of people investing in wind power, hence enlarging the pro-wind power lobby at a both local and national level*". Considering the fact that in Denmark, Germany and Holland large percentage of wind turbines is owned by the farmers clearly shows the significance of their presence in the renewable energy industry (Mosher and Corscadden, 2012). In Denmark, more than 64% of wind turbines are owned by the farmers. In Holland that number is slightly lower, 60% (*ibid.*). Other European countries are set out on the same path, not only engaging with the wind energy projects, but also other types of RES, and slowly passing the trend to the North American continent (Mosher and Corscadden, 2012).

Community ownership and engagement of farmers and small family businesses is attracting increasing attention in Europe for other reasons as well (Mosher and Corscadden, 2012). Many authors, such as del Rio and Burguillo (2008); Munday, *et al.* (2011); Reise, *et al*. (2011); Mosher and Corscadden (2012), brings to attention the importance of developing RE projects in smaller communities for successful rural development. Munday, *et al*. (2011), point out that RE project development and engagement of community can contribute to sustainable development of rural areas and increase of living standard. Depending on the type and characteristics of agricultural land, some types of renewables should be preferred over the others. Del Rio and Burguillo (2008) claim that if the farmers poses certain amount of arable land, it is favorable to engage in bio energy production. The same authors note that RE projects can diversify the agricultural land; whereas farmers choose to dedicate a part of their land for RE development, for instance grow high energy crops for use in bio fuels production, and other part of their land for crops production for domestic purpose. Furthermore, farmers or farmers on a community level can perform vertical integration and themselves produce biofuels. In this manner the community and local economy would gain the most, entailing socio-economic benefits much as employment, education and income distribution (Munday, *et al*., 2011).

Munday, *et al.* (2011), explains that the successful RE project is the outcome of a natural surrounding and a nature of RE project. Considering a disposition of the terrain, land quality, and variety of other factors each location can be suited best for some type of RE technology. Namely, in the case of wind energy, depending on a location and a complexity of the terrain in rural areas, it is favorable to implement smaller power plant projects, such as small scale wind energy turbines, that are adaptable and suitable for specific and demanding areas. Bolinger (2011, p. 1) defines community wind projects as ‘‘*relatively small utility-scale wind power projects that sell power on the whole sale market and that are developed and owned primarily by local investors*’’. Depending on preference of an ownership farmers can chose to organize into cooperation, i.e. community level ownership, whereas there are many farmers that share ownership over a wind projects. Or as an alternative each farmer owns and manages own project (Bolinger and Wiser, 2006).

Contemporaneously, unrelated to a type of ownership, wind projects are contributing to independent and sustainable development of the community and area followed by positive externalities (del Rio and Burguillo, 2008; Munday, *et al.*, 2011). Del Rio and Burguillo (2008), argue that development of RE projects can play an important part in a creation of the jobs and development of the local industry. Furthermore, this can reduce the unemployment rates, motivate population to stay in the community and consequently rejuvenate the population leading to a better social cohesion. It is also reasoned that the land diversification and expansion of RE projects create positive economic benefits (del Rio and Burguillo, 2008). In this light, Munday, *et al.* (2011, p. 2), underline the high perspectives for a development of RE projects in rural areas and emphasize that "*renewable energy in general, and wind energy in particular, represent an opportunity for sustainable rural development*". In the case of wind energy del Rio and Burguillo (2008) and Munday, *et al.* (2011), emphasize the impact of community ownership on the acceptance of wind energy projects and environmental benefits, in terms of a decreased air pollution. It is perceived that the local cohesion; engagements in projects and human relations in an area had modest improvements. However, population fixation, employment creation, that is the largest with wind energy projects compared to all RES, and income distribution are seen as benefits for a local community (Munday, *et al.*, 2011). Table 3 summarizes the most of drives, benefits and obstacles previously mentioned in the literature review.

Table 3 Willingness to Invest in Wind Energy by farmers observed trough drives, benefits and perceived obstacles

Willingness to Invest in Wind Energy		
Drivers	Benefits	Obstacles
¤ Economical benefits *(Justice, 2009)* ¤ Policy incentives *(Masini and Menichetti, 2012)* ¤ Positive expectations & believes *(Masini and Menichetti, 2012)* ¤ Pollution prevention & reduction of CO_2 emissions *(Munday, et al., 2011)* ¤ Energy security *(Aguilar and Cai, 2010)*	¤ Socio-economic cohesion *(Toke, et al., 2008)* ¤ Rural development *(Mosher and Corscadden, 2012)* ¤ Autonomy & energy security *(Toke, 2005)* ¤ Employment & education *(Munday, et al. 2011)* ¤ Farm diversification *(del Rio and Burguillo, 2008)* ¤ Industry development *(del Rio and Burguillo, 2008)* ¤ Acceptance of wind energy projects *(Toke, et al., 2008; Toke, 2005)*	¤ Unequal distribution of economic benefits *(Toke, 2007; Yin, 2011)* ¤ Risk assessment in temrs of wind speed, operation & maintainance risk, financing & regulations *(Bolinger and Wiser, 2006)* ¤ Lack of appropriate incentives *(Masini and Menichetti, 2012; Bolinger and Wiser, 2006)* ¤Technology uncertainty *(Masini and Menichetti, 2012)*

Figure 3 summarizes drivers, benefits and obstacles that are found trough out the literature research. First, there are general drivers, which are similar to all of the investors in global, added pollution prevention and reduction of CO_2 emissions, which might not be universal to all of the investors. Furthermore, benefits for the farmers in particular are listed and the third list represents obstacles for the farmers that invest in wind energy.

Furthermore, the academia has brought to attention the impacts of different support schemes on a RE project development and investments of local communities. Munday, *et al.* (2011) in analyze their study the outcomes of different support schemes in the UK and other North European countries. They point out that FIT system had much success in Denmark and Germany with encouraging investments of the community investors and their general acceptance and cooperation. These two countries had exceptional growth of RES during the past decades mainly due to a long term governmental support, ownership diversification and consequent manufacturing developments and capacity formation (Munday *et al.*, 2011; Mosher and Corscadden, 2012). In their article, Mosher and Corscadden (2012) highlight that the countries that are most progressive in the implementation of community owned RE projects are those that adhere to a FIT system, namely already mentioned Denmark and Germany. It is called to attention that such community owned on-farm RE projects develop long-term community support in form of cooperation, rural community engagements, lobbying groups and general understanding and awareness (Mosher and Corscadden, 2012). It is viewed as an outcome of implementation of the FIT policy support system (*ibid*.).

On the other hand, support schemes like TGC which are more market oriented, have stimulated competition, consequently resulting in a rivalry between large companies with a negligible presence of a small scale community or farmer owned power plants. Toke (2007), argues that in a cases of local ownership of the wind projects, TGC are disadvantageous for the owners because of their small scale and difficulties to reach brake even point. This lack of support to local communities and small scale projects is strongly correlated to slow rural development and lack of socio-economic benefits in the countries adhering to the TGC system (Munday, *et al.,* 2011).

However, some short-term and long term benefits are present, such as economic benefits in term of employment, profits, rents and royalties (*ibid.*). Nonetheless, in the case of UK, benefits are rarely distributed to the individuals since the management of the project is put into the hands of developers and community fund. In Wales, such funds often take a form of a charity funds and consequent profits are distributed to schools, churches, sports clubs etc. The communities and individual owners rarely see direct economic benefit. Bolinger and Wiser (2006) point to the same situation developing in USA, where farmers and local communities leave the projects to commercial wind development agencies, rather than owning them individually or on a community level. Consequently farmers let the developers use their land and manage projects. In return farmers receive compensation, much smaller than what they would have received if they had owned and managed projects directly (Yin, 2012). Hence, the singular farmer, or a farmer at a community level could benefit much more from a private ownership, rather than with an agreement of project developers. However, the risk the farmers overtake with commercially owned turbines is far less than the one they would be undertaking by owning them themselves. Risk of low wind speed, turbine construction, operations, maintenance, financial and regulatory issues are just some of the risks that farmers avoid by collaborating with a wind development agency (Bolinger and Wiser, 2006). Thus, it is a matter of striking a balance between risks and returns that communities and farmers are facing.

In Sweden, state of matters is quite similar, whereas there are companies, or better project developers, that offer to farmers to lease their land and install wind turbines, or alternatively, to help farmers with their own projects by committing to support financially a part of their project. They are “wind energy project planners, which means that the company helps customers establish turnkey wind turbines for electricity generation” (www, eolusvind, 2012), due to its “built up experience” in the energy market, securing greatest returns for the customer and company. Operating wind energy companies in Sweden are: Goteborg Energi, O2, Oresunds Kraft, Eolus Vind, Gothia Vind, Arise Wind power, E-on, Forum, Svenska Kraftnat, Statkraft, Energy Norge, Lulea Energy, Vestas etc. Further, the literature review will treat second part of the researched area, i.e. investigating the impact of the TGC incentive system on farmer’s willingness to invest in wind energy.

3.2 Role of Incentives

This section reveals the most important findings in the area of policy incentives, in particular TGC and its influence on wind energy development. Firstly, broader picture of incentives and current policies in the EU are presented together with specific incentives intended to support the growth of wind energy production. Lastly, researched impacts of the TGC system on the growth of RES and wind energy in Sweden are revealed to include current situation in Sweden.

3.2.1 Role of Policies and Incentives

Subsequently to Kyoto protocol, the EU has taken upon them to accomplish high goals on a road to combating climate change. The GHG emission reduction is one of those goals. Further, targets reflec, among others, the use of RES and its increase of 15% by 2010 comparing to the levels from 1997. The EU has further expanded the target to increase RES production by 20% by the 2020 comparing to the levels from 2007, and increase in RES production by 60%-80% by the year 2050 comparing to the levels from 1990 (Commission of the European Communities, 2011a; European Parliament and Council, 2007; European Renewable Energy Council, 2011).

It has been largely discussed how to go about the process of choosing an incentive framework for the EU countries (Council of the European Communities, 2007; Bergek and Jacobsson, 2009). A wide EU community has called up to an attention the need of harmonization of individual EU countries' policies in order to lower the cost of attaining set targets. The European Commission initially opted for a policy that would be based on a tradable green certificate incentive system (Jacobsson *et al*., 2009). However, since many countries have adopted diverse support schemes in different points of time, there have been difficulties to determine which policy should be adopted as unique across all EU countries (Toke, 2007; Verhaegen, *et al*., 2009). Thus, the EU has given a certain liberty to individual countries to choose their own incentive policies. Overall conclusion was that, due to circumstances existing in different EU countries, it impossible to form single European market supported with a single incentive system.

Many alternatives have been assessed by policy makers and among academics, and they have highlighted some expectations in terms of benefits and drawbacks of each policy tool. Bergek and Jacobsson (2009) have brought to the attention that there is a certain degree of tradeoff in choosing one policy framework over another, and it is up to a country to decide what is the most needed in particular point of time. However, the European community has focused mainly on two different incentive regimes, namely "Feed-in-tariffs" and "Tradable green certificates" (Toke, 2005; 2007). They are discussed further in 1.6.3 section of the introduction chapter.

Additional support mechanisms "in order to make the market more simple, transparent and compatible with a liberalized electricity market" (Verhaegen, *et al*., 2009, p. 212) are a way to strengthen further the TGC system. They suggest that FIT incentive could be coupled with the TGC to guarantee a minimum certificate price. This combination of the two incentive systems can help to stabilize fluctuations and secure stability for the electricity producers. Both incentive systmes alone have their weak points. Morthorst (2000), claims that, especially in a case of Denmark, there is a need to pass on to TGC incentive system. This change would bring a relief from the budgetary expenses of the FIT system and secure further a competitiveness of RES. The TGC incentive system, compared to FIT incentive system, encourages larger capacity investments by which excluding smaller investors (Boomsma, *et al.,* 2012).

3.2.2 Results of TGC in Sweden

Promotion of renewable energy in Sweden was done in different occasions by introducing investment subsidies, subsidies for research and technology demonstration, tax policies, emission tax, tax relief for renewable energy and other. The Swedish government has introduced a range of taxes during 1990's targeting the over use of fossil fuels and emissions of CO_2 and NOx. In 2000 Sweden has implemented green tax reform by introducing a CO_2 tax increases (Wang, 2006). Also, the same year, Sweden has opted for a tradable green certificate system.

One of the expectations and the crucial determinant to select TGC incentive system was a need to meet policy goals by the increase in RES electricity generation. The TGC system was adopted in 2003 in Sweden with expiration date in 2030. The Swedish government set a target at 16.9%, i.e. increase of 10TWh in production capacity to reach by 2010 compared to levels in 2002. Consequently, the target was raised in 2006 to achieve 17 TWh in 10 years' period (www, Eurelectric, 2011). In 2009 the Swedish government set a new challenging goal to 25 TWh of production capacity to be achieved by 2020, which represents 50% of renewable energy production overall and 40 % reduction in GHG emissions by 2020 (www, Sweden.gov, 2009).

Since the time TGC system was introduced, RE capacity has seen remarkable growth. In 2008 RE electricity amounted to 15TWh in production capacity, and the most of energy came from biomass source (10.4TWh), while the wind energy composed only 2 TWh in 2008. Overall 8.5% was achieved in all RES by 2008. The increase was attained mainly in already existing and operating facilities, whereas new production power plants produced only 2.5 TWh by 2008. Many factors have hindered a full RE growth and positive impact of TGC system, including waiting time for construction permissions, short time frame of application, increase of electricity prices and others. Although the introduction of TGC incentive system was fruitful, some authors have suggested that TGC is not the most determent growth factor of RE producton. Bergek and Jacobsson (2010) have suggested that the growth of the RES capacity could have happened even without policy intervention. Among influencing factors there were some positive ones that drove the investments in RES such as the growing concern about climate change, demand for RES (Masini and Menichetti, 2012), willingness to invest in alternative sources of energy comparing to standard energy sources etc. Therefore, meeting the expectation of an increased share of the RES in electricity market by adhering to the TGC system is met, however it is questionable. The Figure 4, bellow shows a list of obstacles and drives that have largely influenced a growth of RES and wind energy in particular.

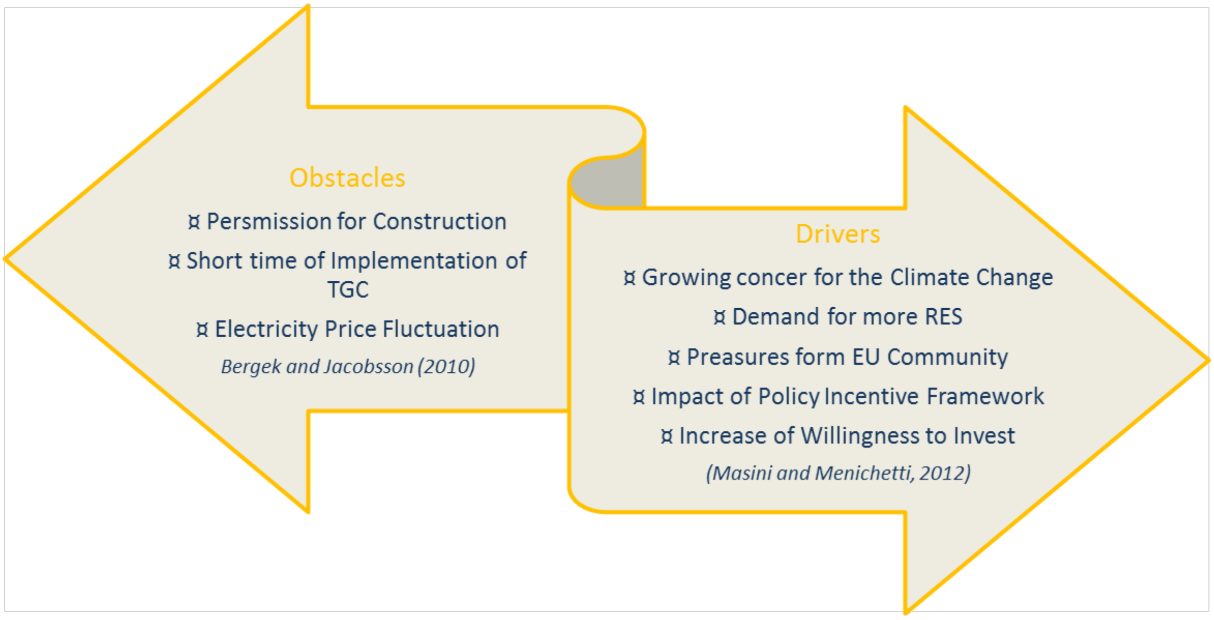

Figure 2 Obstacles and Drivers to Wind Energy capacity increase in EU

Figure 2 shows more drives than obstacles, which have set in motion the wind development in the EU and subsequently in Sweden as well. The governmental incentives are seen as drives, and at the same time a certain degree of riskiness, since the time of implementation is short and there is a degree of uncertainty to it, mostly about the lasting period and changes to other incentive frameworks.

The TGC system is destined to support growth of RES targeting newer, underdeveloped and not fully commercialized sources (Bergek and Jacobsson, 2009). Namely, TGC are meant to help grow wind power, supporting existing and new plants, biomass power plants, wave energy, solar and geothermal power plants. Hydro power plants, as already developed RES, have been granted limited support by 2012 or 2014, depending if the plant had obtained previous support. The TGCs are intended to aim all RES in equal manner, receiving equal amount of support. Government concluded that the targeted support to a particular energy source would be distortion the competition, because RES should be competing on equal terms (Wang, 2006). Thus, TGC system is set out to provide equal benefit to any RE producer, whereas each MWh would receive the same amount of support, no matter which producer it is. Therefore, TGC are considered “technology neutral”.

However, there are some issues concerning the TGC entering competitive market. Those issues can be mainly seen in form of “Windfall profits” and higher cost for the consumers. Namely, Bregek and Jacobsson (2009) and Jacobsson, (2010), notice in their articles that the TGCs are mirroring marginal costs of new RE investments. In that way, each renewable technology is competing with its marginal cost for a new investment. When summed up, all marginal costs add up to overall additional cost or RES comparing to conventional energy sources. However, pitfall of this competitive market system is in at least two different but connected occasions. Firstly, inequality of RES in terms of rents or “Windfall profits”, reflected in each technology’s marginal cost of investment and amount that the technology is receiving from trading renewable certificates (Finon and Perez, 2007). Bereg and Jacobsson (2009) explain that there is a substantial difference between needs for investment of different technologies, taking for instance hydro energy and wind energy, whereas hydro energy is already mature energy source which had had incentives previously. Since mature technologies have lover marginal costs, comparing to a total marginal cost of RES, they will present with excess value. This excess of value is resulting from receiving the price for TGC, which is corresponding to marginal cost of new investments. Since new investments and cost of production are already low in mature technologies, this excess value is seen as extra profit, i.e. “Windfall profit” (Bergek and Jacobsson, 2010). The authors argue also, that even though it was needed to include all RES in TGC policy framework in order to secure liquidity and competitiveness of certificate system, those technologies create “Windfall profits”. This kind of rent is overcompensating in monetary terms to “older” technologies, each time that new technology enters the TGC system. New technologies raise the marginal cost, and subsequently the price of renewable certificates. Thus other technologies are overcompensated so that the newer technologies can be successfully functioning with a support of TGC system (Jacobsson, *et al*., 2009).

Therefore, as a result of excess rents, the TGC is creating high cost for consumers. The overall cost for consumers is reflected in VAT (value-added tax), administrative and transaction cost, and support to producers of renewable energy (payment for certificates) (Bergek and Jacobsson, 2009). Secondly, Bergek and Jacobsson (2009) note that the uniform, “technology neutral”, incentive system while promoting the competitiveness between RE technologies for investments, is overlooking an important issue. Namely, more developed fully commercialized technologies have lover cost, therefore are more eligible for investments. Consequently, most cost-efficient technologies are attracting investors, whereas less developed emerging technologies wait for a longer time (Toke, 2007; Jacobsson, *et al*., 2009). Therefore, the Swedish TGC system is not promoting innovation and technological development in most efficient way, simply because it favorites already low cost technologies, and disadvantages new high cost innovations (Toke, 2007; Jacobsson, *et al.*, 2009, Bergek and Jacobsson, 2010). Therefore expectations of the TGC system are met in limited and partial manner, shown below in Figure 3, sourced mainly form Toke, 2007; Jacobsson, *et al.*, 2009, Bergek and Jacobsson, 2010.

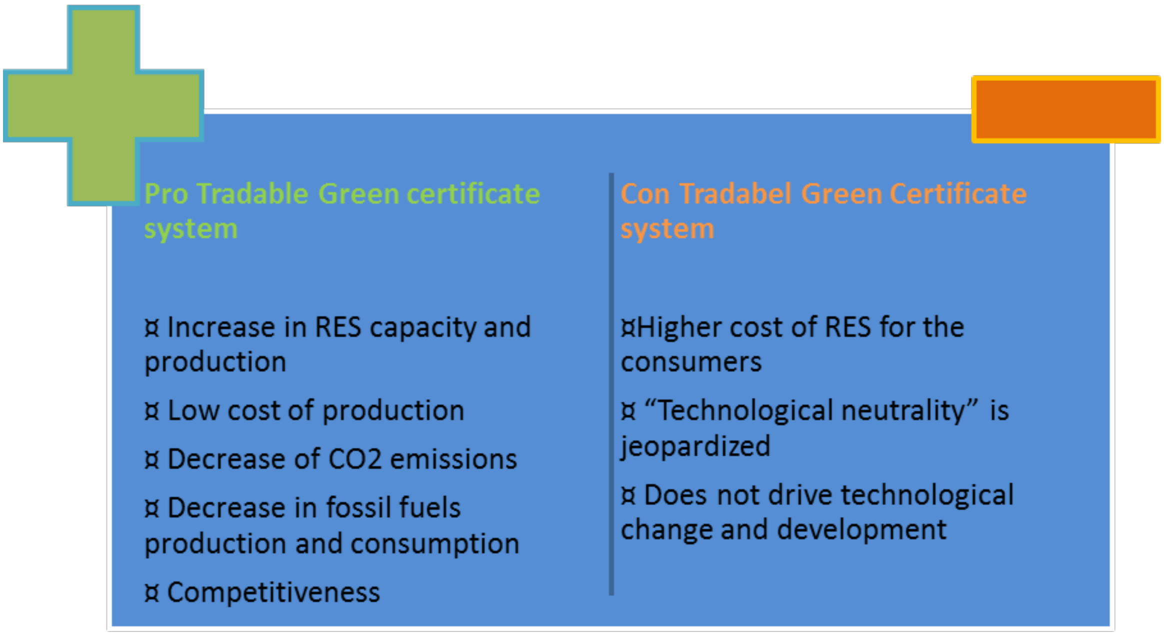

Figure 3 Pro's and Con's of Tradable Green Certificate system

Figure 3 shows on the left part of the graph positive impacts of TGC system, amongst increase in RES capacity, low CO_2 emissions, competitiveness, decrease of fossil fuels dependency and low cost of production. On other side of the graph are negative impacts of TGC, such as high cost for consumers, fail to drive innovation and jeopardized technology neutrality. Thus, one can observe that not all foreseen benefits are met.

3.3 Summary of the Literature Review

Literature review has presented, general situation when it comes to factors that determine investments in wind energy, summarized by grouping most prominent drives, obstacles and benefits for the investors. Furthermore, next subsection was dedicated to assessing farmer's investments in wind energy and what are the most determining and driving forces. Following section was dedicated to investigate the impacts of policies in the EU and Sweden and in particular investigating results of TGC framework currently adhered to in Sweden. The literature review showed a gap indicating need for more empirical data.

Although wind energy is the dominant RES in energy expansion in the EU, judging form the volume and capacity of installations, there is a lack of empirical research about rural locations. Especially scarce empirical evidence is in the area of TGC incentive support and its impact on investments. Very few authors have described correlation between TGC and farmers investments in wind energy. Some authors have addressed community investments in FIT policy framework countries, such as Germany, Holland and Denmark. Furthermore, some articles treated expansion of farmers' engagement in wind project in the US. However, there is a significant gap in research to be filled. To best of my knowledge, articles available do not clearly explain the relationship between willingness of farmers, individually or at community level, to invest in wind energy projects and TGC incentives. Furthermore, benefits and drawbacks of such relationship have been neglected in research. Also, drivers and obstacles that are influencing willingness of farmers to invest in successful and long lasting investment wind projects have not yet been addressed by the academia. More relevant to this research, is gap in empirical data in case of Sweden, since it is the country where much of land is owned by farmers. Therefore, empirical part of this research will attempt to address these gaps in academic literature, by assessing drivers and obstacles of farmers investing in wind energy and furthermore investigating the nature of a relationship between willingness of farmers to invest in wind energy projects and the governmental incentives in form of TGC.

4 Theoretical and Conceptual Framework

Considering the vast and yet specific area of the research, the theoretical framework encompasses three different concepts as follows: Sustainable Business Development (SBD), Push-Pull Theory of Entrepreneurship and Farm Diversification. Each of thise concepts and theories has a purpose of explaining a part of the researched area and are presented in following sections.

4.1 Sustainable Business Development

“*The certains of one age are the problems of next*”

(R.H. Tawney, 1922).

The most widely spread understanding of a business is the one of limited responsibility of managerial conduct, focusing on mare “money making” and taking limited responsibilities over their side effects on a surrounding environment and society (www, colorado.edu, 2012). The same source writes that corporate executives are only responsible of wellbeing of their employees and the production that conforms to basic rules embodied in the law and ethical custom (www, colorado.edu, 2012). In economic terms, what Friedman was referring to is the concept of “Homo economicus”, whereas person or investor is seen as a perfectly rational individual with interests of profit maximization. The only purpose of business in this context would be wealth maximization (Richardson, 2008). However, in recent decades, there has been change in views of corporation and general business management, introducing the notion of “Sustainable Business Development” (SBD) and changing the traditional view of leading businesses.

Sustainable Development (SD) is the most widespread concept used in almost every area of today’s society (Richardson, 2008). It is in essence of all environmental laws and development concepts in a modern society. SD promotes economic growth that does not diminish potential of environmental resources to meet needs of future generations (Richardson, 2008; Rainey, 2006; WBCSD, 1999). SD ties closely to a concept of Sustainability, Social Responsibility (SR) and Corporate Social Responsibility (CSR) that are fundamentally representing the same needs of society for safer, environmentally friendly, healthier products what would create less waste and environmental degradation of natural resources (Rainey, 2006). SBD concept roots in environmental management, pollution minimization and waste management, which lead to formulation of legal frameworks and regulations protecting environment and livelihoods (Rainey, 2006). However, it was not until the economic growth of world economies that the essence of SBD was fully recognized. The production and consumption growth followed by introduction of environmental laws, industry regulations, and voluntary compliance systems. Some of the most important and influential compliance systems are Pollution Prevention (P2), Operational Management (OM), Environmental Management System (EMS), Life Cycle Analysis (LCA), ISO standards etc. This compliance systems oblige companies to engage with investments in R&D, sustainable product design, manage their supply chain in responsible manner, and manage their accounting, marketing, sales and public relations according to set of standards that are enhancing SR aspects (Rainey, 2006). SBD underlines the importance of incorporating economic, social and environmental aspects, known as Triple Bottom Line (TBL) (Gimenez, *et al*., 2012), into ones managerial framework to ensure profitability of investment and at the same time respect of environmental and social needs (Rainey, 2006).

Even though SBD and sustainability concepts are already well established in the academic and business circles, there are still some authors that are underlining gaps and weak points of these concepts. In particular, several authors have considered concept of SBD and in general sustainability as too vague, undefined and generally unrecognizable (Lantos, 2001; Frankentel, 2001; Mc Williams and Siegel, 2001; Kakabadse *et al*., 2005; Idown, 2009; Carroll, 1991; Elkington, 1997, from Rainey, 2006). Moreover, it has been even discussed that imposing CSR and SR on businesses is immoral, by violating the rights of the corporate owners to act on their own will and decide for themselves whether to implement SR aspects into their operations (Masaka, 2008). Indeed, in reality, businesses are often restricted not only by lack of interest of their managers, but also by the imperfect information and general pre-determined appraisal that CSR investments are non-profitable (Richardson, 2008). Therefore, companies are inclined to consider socially responsible operations and investments as a cost for the company. In conclusion, investors tend to undervalue the environmental and social aspects of investment, and overlook the long-term prospective over a short-term profitability (Richardson, 2008).

However, SBD, CSR and other concepts formed around the sustainability concept, continue to progress and develop. Such example is a development of CSR concept in the area of finance, applied to an investment decision making. Socially Responsible Investment (SRI) represents a socially, environmentally and ethically responsible investment (Richardson, 2008). SRI concept has its origins in 18th century when certain religion groups have considered some businesses as “sinful”, such as slavery and toxin production. The Jewish law prohibits some special business transactions because of its unethicality (Richardson, 2008). SRI has as its core characteristics value creating, long-termism, and minimization of environmental degradation (Richardson, 2008). Also, it incorporates environmental, social and governance (ESG) factors in its decision making practices, whereby enhancing financial analysis and promoting forward thinking investments, from which the shareholders will benefit as well (Richardson, 2008). Moreover, the importance of not only avoiding certain hazardous investments, but also importance of investing in a good, “green”, type of an investment is underlined (*ibid.*). “Today, socially responsible investing is less about what don’t you invest in and more about what do you invest in” (Richardson, 2008, p. 15).

4.2 Push-Pull Theory of Entrepreneurship

The push and pull theory of entrepreneurship discusses factors that drive or force individuals to change their career path or even start their own entrepreneurship (Kolvereid, 2006; Schjoedt and Shaver, 2007; Kirkwood, 2009). The push-pull theory sources from motivational theories of self-employment; whereas direction, efforts and determination are the main factors of motivation to start up own business (Schjoedt and Shaver, 2007). This theory is centralized around a life satisfaction, and it is ultimately guided by pull factor that are positive drives toward new ventures and self employment (Kirkwood, 2009). On the other hand, push factors are negatively influencing forces driving individuals to start up their own businesses or change in some significant way their careers. Similarly, the same principle can be applied to already self-employed individuals, which are additionally pushed or pulled to change their careers. For instance, already self-employed person can realize the need to start a new business due to changes of circumstances and environment, and further diversify already existing business. The push factors can be dissatisfaction at work, unemployment, being fired, lack of career perspectives, redundancy or just change of a working area. Increasingly important push drives are family related factors, such as need to spend more time together with family members, independency and management of time, marriage brake-up, family obligations or other sorts of commitment (Kirkwood, 2009). It has been also recognized that women are more propene to engage with self-employment for family reasons. However, family factors can be considered to some degree as positive drivers, whereas desire for independence and monetary gain would be realized by developing a family business (Schjoedt and Shaver, 2007). In the literature, positive driving, pull factors are mainly related to a realization of economic autonomy, self-realization, investor realization, career advancement, challenges, risk-taking, sizing opportunity, lifestyle and other (Kolvereid, 2006; Schjoedt and Shaver, 2007; Kirkwood, 2009).

Furthermore, the pull and push factors can be more determining and relevant when considering underlying differences between genders. As already mentioned, women are more propense to self-employ. Monetary remuneration is more decisive in the case of men, whereas women do not consider monetary aspect as the highest ranked when determing weather to self-employ. Underlying fact that in many countries there is a unequal presence of genders in business, resoluted with the generalization that woman are less of an entrepreneurs and risk takers (Kirkwood, 2009). However, the number of women entrepreneurs has an uprising trend, and even countries in development are supporting women entrepreneurs with a help of international agencies and non-governmental institutions (*ibid.*).

Unsurprisingly, push factors have shown less success of self-employed in creating new businesses. It is expected, Schjoedt and Shaver (2007) argue, that individuals that are practically forced to self-employ will show less motivation and determination. The individuals that are pulled into self-employment, however, are more propense to prosper (Kirkwood, 2009). The practice has shown that the pull and push factors can overlap with other circumstantial factors and in those situations one option has to be preferred over another. For instance, self-employment motivated by an opportunity or independency can be overruled by a need of security and monetary stability, in which case person will keep the security of his old job position. Therefore, the actual choice to self-employ is a final product of circumstances and pull and push factors (Kolvereid, 2006).

In interest of this research, it is useful to introduce a specific group of pull factors specific to this interest area. The public support, in form of TGC is going to be assessed as a separate pull factor, and driving force toward wind energy investments.

4.2.1 Public Investment and Support

Public investment is expenditure for specifically selected projects whic are characterized by long life span and of importance to a society (United Nations, 2009). Public financing is most often related to funding of infrastructure projects (www, REN21, 2012), such as railway system, roads, ports, bridges, governmental buildings, energy generation, telecommunication support, energy production stations along with grid connections, sewage and water supply, and many other (United Nations, 2009). Furthermore, the governmental financing is not limited only to infrastructure investments, but also investments in education, health, agriculture, sports etc. (*ibid.*).

Public investment can take a shape of a direct public financing and fiscal incentives, which are both of essential importance and factors that enhance growth of the economy. Direct financing from the national governments, and in past few decades also funding from the international institutions such as the EU, are playing a key role in the development of international relations and improvement of overall economy (United Nations, 2009). Public fundings range from a small, one time projects, to a more time and resource requiring projects that might take several decades to accomplish (*ibid.*). Thus, the public financing is dedicated to provide basic support for citizens, by ensuring that appropriate infrastructure and service support is in place. Consequently, not only will individual citizens enjoy, for instance public health services, but it will be contribution to the whole society for a longer period of time, adding to social security and wellbeing (United Nations, 2009).

Next to a direct public financing, fiscal instruments and regulatory policies are playing a key role in supporting and encouraging investments of the private sector. Many fiscal incentives and financing strategies have been implemented in different countries to promote new and not mature technologies (www, ren21, 2012, 3). For the sake of simplicity, the incentives that different governments have been setting in their policies are categorized into technology-push and market-pull (Burer, 2009). Technology push incentives focus on the new technologies, which are still in an early stages of development, whereas market-pull policies can be deployed even in a more mature stages of technology development (*ibid.).* The first set of policies includes a range of incentives which support development of innovative technologies, such as the renewable energy technologies. Those policies include governmental grants, R&D grants, investment subsidies, tax breaks, government venture capital funds etc. As for the market-pull policies, they incorporate incentives which are aiming at deployment of already commercialized technologies and the new fast growing technologies (Burer, 2009). The climate policy and environmental policies are the type of market-pull policies that use special incentives to stimulate desired market behavior (*ibid*.). The most common incentives of these policies are Feed-in-Tariffs (FIT), Tax credits, subsidies, CO_2 tax, Renewable Portfolio Standards (RPS), Renewable Certificate Trading (RCT), Renewable Green Certificates (RGC), Technology Performance Standards (TPS), Public procurement and others.

The public investment has huge importance in meeting national policy goals and achieving objectives of international community's goals, set in treaties and agreements (United Nations, 2009). Further, public financing, in a form of investments, loans, grants, tax deductibility and other financial incentives, is crucial in supporting renewable energy investments and enhancing its growth. Therefore, the role of public financing is crucial in securing energy supply, further growth and achieving goals of GHG emissions reduction.

However, there are numerous challenges related to the public investments. Primarily, financial budget of individual countries, or international community budget, is limited in its resources; therefore there is a need to carefully select potential investments. Furthermore, if necessary, there will be cutbacks in financing of low priority investments, otherwise other sources of financing will be put in place, starting from the increase of taxes, charging use, domestic or international borrowings, privatization etc. (United Nations, 2009).

4.3 Farm Diversification

Farm diversification can be seen as a multiplication of farm activities besides primary production that would bring more income to the farm owner (Barbieri and Mahoney, 2009). It is to some extend an adjustment strategy, which consists of engaging with a range of additional activities, which bare minor importance comparing to a primary agricultural production (Ilbery, 1991). In some cases, it is a "*means to maximize their chances form economic survival*" (Northcote and Alonso, 2011, p. 237), by "*doing different*" (Ilbery, 1991, p. 208). Contrarily, Alsos and Carter (2006) point out, that diversification can be seen as a means for the further growth, in case primary agricultural activity is not gainful enough, farmers can develop new activities to boost growth and prosperity. The same author suggests that both drivers are possible to be drivers of farm diversification, since in some cases farmers have to expand and growth their production in order to survive. In fact, when planning growth strategies farmers often decide to diversify (Alsos and Carter, 2006). Nordic countries, Norway, Sweden and Denmark, have recognized this particular trend in agricultural sector (*ibid*.).

Earlier researchers coined the notion of a farm diversification around risk reduction, whereas one business, i.e. one farm, would have multiple ventures, sourcing from diverse production lines (Hansson, *et al*., 2010). Notion of risk reduction, as a drive of diversification resides in a need to secure incoming revenues, even when the agricultural output has downturns. It is argued that diversifying a farm is a way to manage the changing environment and it represents another entrepreneurial reaction to external signals. Hansson, *et. al*. (2010) points out that the high dependency on single farm activity can put the land owner in vulnerable position against all environmental threats.

Many writers have defined differently what actually farm diversification is, arguing that the term of diversification should include only the activities that are held on a farm, by which are excluding off farm activities (Ilbery, 1991). On the other hand, Alsos and Carter (2006) introduce the notions of multiple business ownership (portfolio entrepreneurship) and farm pluriactivity, to include both activities and resources on and off the farm. Yet, this definition based only on place of farm activities, has been often seen as too restrictive, and some authors have broaden it to include off farm activities as well (Northcote and Alonso, 2011). Overall, for the purpose of this study the broader definition of farm diversification will be used, taking into account activities on and off farm, incorporating existing or totally new skills and resources.

Regardless of the place of diversifying activities, they are always outside of primary agricultural production and are not expected to benefit from common agricultural support policy (Ilbery, 1991). Furthermore, thise activities can use the same or new resources for the entirely new product or service (Alsos and Carter, 2006). As Ilbery (1991) noted the diversification can relate to labor, resources, capital and land. Indeed, farmers can choose to redirect existing resources and skills into creating totally new product, such as for instance a summer cottage to rent out, or using existing land for development of eco-tourism or other recreational activities (Barbieri and Mahoney, 2009). Some of diversifying activities are food processing at the farm (kind of vertical integration of the supply chain), marketing and sales (Ilbergy, 1991), mixed farming, tourism, education (Northcote and Alonso, 2011), machinery services, livestock breading, food shop, land lease etc. (Barbieri and Machoney, 2009).

Naturally, the decision to diversify agricultural activity depends on many factors. In their study, Northcote and Alonso (2011) have suggested that factors such as age, farm size, farm type, education and ethnical background play important role in understanding the underlying conditions prevailing in the decision making. Also, they note that thise factors can be divided into internal (i.e. on farm) and external factors (social and economic) that eventually form a diversification decision. Most often, the decision to diversify is an outcome of already existing resources and skills, such as facilities, location, labor capacity, and lifestyle etc., and entrepreneurial behavior, environmental, social and economic pressures (*ibid*.). Skills and experience gained from primary farm activity are frequently used for the educational purpose, training, consulting, presentational activities, and provision of services (Barbieri and Mahoney, 2009).

4.4 Summary of the Theoretical and Conceptual Framework

The theoretical framework of this research aims at connecting empirical part of the study with the theories from economical and managerial area, aspiring to explain and validate the study. Alongside with empirical part of the research, this study encompasses theories and concepts that were considered relevant. Those are Sustainable Business Development (SBD), Push and Pull Theory of Entrepreneurship and Farm Diversification. Each of those concepts and theories has a purpose of explaining the nature of interest area.

Firstly, the concept of Sustainable Business development wasintroduced with a purpose to explore the drivers and benefits of developing sustainable, future oriented businesses; and businesses which goods and services are contributing to the overall welfare of the society (Karlsson and Nasir, 2000; Robertson, 2005; D'Amato, 2008; Tawnery, 1922). SBD is considered to be one of the driving and beneficial forces of investments in wind energy projects. This concept of SBD is utilized to give meaning and provide understanding of empirical data, and answer the first research question.

In continuation, Push and Pull theory of entrepreneurship is brought into the theoretical framework, with an intention to give support to answering first research question. This theory helps to assess and define the driving forces of self-employment and understanding better the underlining motivations. Public investment and support is presented as a separate pull factor in order to present kinds of governmental actions and interventions. The importance of financial support mechanisms is underlined as a driving force of investment in a renewable technology sector. Furthermore, it is supporting the analysis and discussion section with purpose of giving an answer to the first and second research question.

The concept of Farm Diversification is explanatory of decisions to engage with development of side activities besides the primary agricultural activity. In particular, the concept describes some of the drives and reasons for the choice to develop new activities on or off the farm.

Figure 4 shows graphically the supportive theoretical and conceptional framework of this research project. Graphically represented in the figure, there is a presence of other theories and concepts, which were not chosen to give support in this research project.

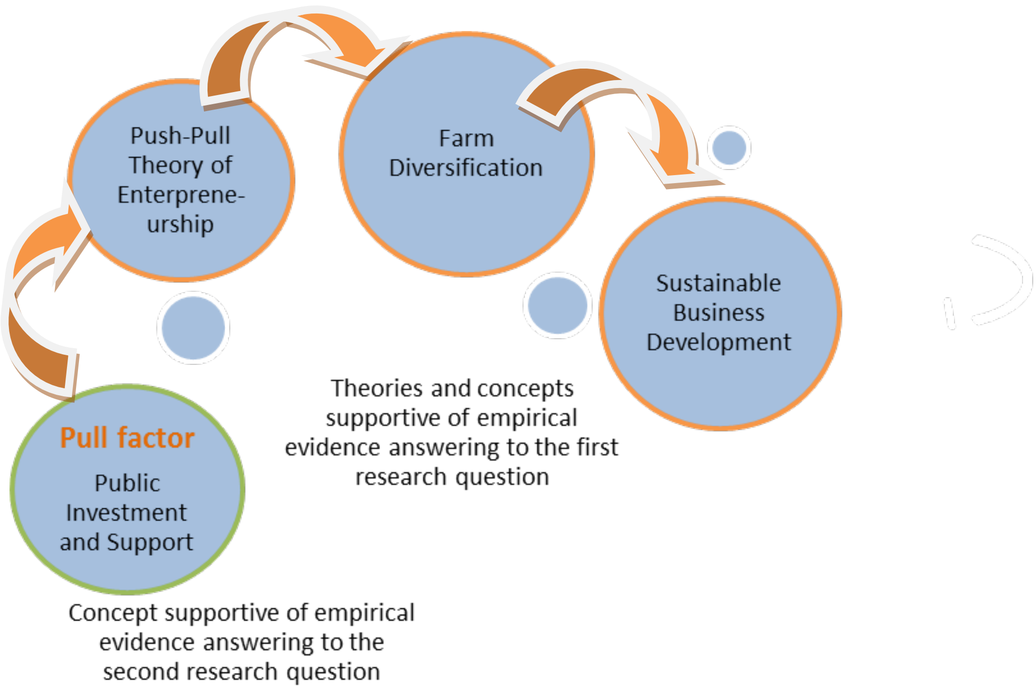

Figure 4 Conceptual and Theoretical support of the Study

Figure 4 presents graphically intended train of interrelations, wheras the pull factor, in form of public investment and support, would help scatter the decision to diversify a farm and activities on farm. In result, farm diversification, as a result of stimulus of pull and push factors, contributes to sustainable business development. Respectivelly, development of the wind energy project, as a form of farm diversification, with support of TGC, a pull factor, is bringing sustainability aspect to the farm development.

5 Empirics

5.1 Background to Empirics

As discussed previously in section 2.6, interview technique was considered the most flexible and appropriate technique to investigate the complex and demanding topic as this in matter. Hence, it was decided to engage with 2 telephone interviews and 1 face to face interview. The interviewees were selected using expert sampling technique, whereas only individuals that possess specific skills, competences or are in specific situation were chosen. Interviewees were contacted and subjected to individual interviews by phone in teo cases and one in person interview. There are two sets of questions prepared. First one is dedicated to a group of farmers that do not dedicate a certain part of their land for development of wind turbines, and the second set of questions is designated to farmers which dedicate a part of their land for development of wind turbines (see Appendix 1). Due to the anonymity concerns, the respondents will remain anonymous, referred as Interviewed 1/2/3. The interviews ranged in length from 20 to 45 minutes and they were all conducted in the end of July and the beginning of August. The first interview was conducted on July 27th 2012, 8am with duration of 25 minutes. The respondent answered all questions and confirmed validity on July 28th 2012. The second interview was completed on 31st of July 2012, 9am with duration of 20 minutes. The questions were confirmed immediately due to the time constrains of the interviewed. The third interview was conducted in person on 8th of August 9am in Uppsala. The interview lasted for 45 minutes and confirmation of transcription was not required.

5.2 First Interview

5.2.1 Personal Information

The respondent is a female from Skån region, located in the South of Sweden. She is 50 years old and has been involved with agriculture since she was 22 years old, when she got married to a farmer. Since then, her husband and she started the production of agricultural products, mainly crops such as potatoes, carrots, sugar beets, sweet ray etc. They do not have any live stock on their farm. She and her husband currently own about 500 hectares of arable land in Skåne region.

5.2.2 Wind Energy Investment

The family first engaged with investments in wind energy in 2007, when they decided to allow a company to place two wind turbines on a part of their land. A company called Eoulus, a company that leases land and develops wind projects (www, eolusvind, 2012), approached the family with the offer to lease a part of their land and the family agreed. Subsequently to the agreement, two turbines were installed and put into a production. Two years have passed and the family was approached once more to lease another part of their land. This time, the family decided to invest and purchase one turbine to run on their own. They thought it was a good opportunity, since they saw the initial success of the already installed turbines. On this occasion, the company installed two more turbines, one owned by the company and one by the family. Currently around 1000 m² of their land is dedicated to generation of wind energy with a total capacity of 2.4 MWh. Swedish home owners are not yet allowed to power their homes with electricity which was produced in their privately owned power plants, but they ought to supply it to a grid. Therefore, all electricity produced from their turbine, the family sells to a distributor and retailer “E-on”, which is UK based company and operates all around the world (www, eonenergy, 2012). The family’s investment was independent of any support of the community. The only support they needed was of financial nature and for that purpose they took a loan form a bank in order to start the investment.

The decision to invest in a wind turbine is mainly due to the financial profitability of the wind projects, hope to gain enough money to secure pension. Further, they mention weather difficulties and unpredictability of agricultural yield as second and crucial drive toward the investment. Since the weather is unpredictable, their primary agricultural activity bears great risk. The family felt that it is a good idea to start other activities so that even if the yield was not satisfactory, they would have other sources of income to rely on. Even more, the family has started previous to wind investment a side business of renting out summer cottages in Skåne region. Therefore, the family developed another two activities aside from primary agricultural activity: the house renting business, renting of parts of their land and owning a wind turbine. Important drives were sustainability issues such as energy security, CO_2 emissions and over dependency on fossil fuels, even though they have not experienced energy scarcity or any problems of the kind.

Their experience has been overall satisfactory. There were no problems during the installation. It took long time before all the paperwork was ready and it was around 2 years before they started building the turbine. The company, Eolus, took care of all the paperwork. All turbines lay far away from the nearest neighbour, so there were no issues of environmental impact noted by the family or any of the surrounding houses. At first, the turbine was making satisfactory profits, however, the price of electricity has been very variable recently and currently it is quite low causing family to endure losses. Interviewee 1 says that the prices going up and down during long time is not good for them and that they get less paid for their electricity. The interviewed says that in the beginning the experience was quite positive, but now they are dissatisfied.

5.2.3 Experience with TGC System

Interviewee 1 was familiar with TGC system and claims that they are using it for financial benefits it provides. She says there are no legislative or operational difficulties and that everything proceeds without any problems. Although it is beneficial, viewing it a “bonus” to regular electricity price, the family still encounters losses. Therefore, as the interviewed 1 noted, fixed price for renewable energy would be much more preferable (FIT). Further, she claims they knew about TGC benefits before they made the investment, however, it was not decisive factor and they would have made the investment regardless of TGC existence.

5.2.4 Future Perspective

Already mentioned, the overall satisfaction of this family about their wind energy experience is very dependent on the variability of electricity prices. Even though the initial experience was quite good, due to high electricity prices and rising profits, the change in electricity prices had high impact on the profit making. Furthermore, in despite of the presence of supportive system, TGC, the family is still enduring losse. Yet, they plan to use this support, because as she said is a kind of “bonus” that helps to some extent. In continuation, the interviewed responded that in the future they do not plan to invest any more in wind energy, perhaps better choice would be bio fuels, but, however it is doubtful they will invest further.

5.3 Second Interview

5.3.1 Personal Information

Interviewed 2 is a male, married and has two children. He lives in South of Sweden, Skåne, and owns a farm. He has been previously employed as fire fighter; however he changed his career path towards self-employed farmer since 1984. Together with his wife he grows potatoes, horse radish and corn as their primary agricultural activity.

5.3.2 Wind Energy Investment

The interviewee started thinking of investing in wind turbines back in 2005, because he recognized good wind conditions in the area and thought the wind turbines installment was a good investment. The family chose to invest without help of a company, and engaged in investment on their own. In 2007 they contacted a company called Enercon, German Wind Company that has offices around the Europe and installed turbines all over the world (www, enercon, 2012). Interviewed 2 approached the company and informed themselves about the price of turbines and services. Later on, interviewee 2 started the legal procedure that took around 4 years, due to some complications. After the legal documentation was arranged and signed, three turbines were installed and started operating on the area of 3000 m^2. The electricity they produce is further on sold to a company “E-on”, although this year there was better price offered from another distributor “Pixier”. Since producers have a liberty to choose and change distributors for each year they choose this year a different distributor.

The family recognized, besides the good wind conditions, immediate need to address issues surrounding fossil fuels, such as high dependency on fossil fuels and emissions of CO_2. The interviewee 2 says that they cannot rely only on oil production, and they thought it was really good investment for the future and the environment. Also, price of electricity prompted them to think about the future even more and they thought they can earn a substantial sum by investingin wind energy production. The experience with wind power is quite good; the interviewed says he made many connections with the people from the branch, which can be a benefit for the future.

5.3.3 Experience with TGC System and Future Perspective

Experience with TGC system is very good; there have not encountered any problems so far. The interviewed recognized the TGC as a very good option for the environment and support of renewable energy. It was very important to the family, while thinking whether to invest or not, he claims they would have not invested if there was not for TGC. However, he says that other type of support would be more preferable, in particular having a fixed price of the energy for the RE sources.

TGC is helpful to some extent, however, this year the price of electricity has been very low and it is almost half of what it was last year. Interviewee 2 says that even with the TGC support family encounters losses. Yet, the support is very important, and they will continue to rely on TGC support. They plan to invest more in biofuels technology.

5.4 Third Interview

5.4.1 Personal Information

The interviewee 3 is male, married, and has four children. He is from island of Gotland situated in the South of Sweden, where his family owns a small portion of land. The interviewee is not farmer; he does not develop agriculture activity, due to the change of living and working location. However, he is still very involved and active in the local community, where he returns quite often. He is currently working as a consultant to government on rural and community development, and working at the Swedish Agricultural University, SLU.

5.4.2 Wind Energy Investment

He and his family made a first wind investment around 25 years ago by taking a part in a shared membership cooperative. The cooperative had 32 members, i.e. families, which had an ownership over shares of the cooperative. This first investment consisted of 5 small scale turbines in Gotland, which recently came to the end of a life span.

The second investment was made right after the first generation turbines were taken down. Together with 5 other community cooperatives, consisting of 250 families each, have reached decision to invest in one large turbine reaching out 150 meters in highs. It was community decision, yet every household had to take a decision to confirm their participation. The second generation turbine investment required more capital than the community cooperatives could provide, therefore they installed the turbine with the administrative and financial help of a wind energy company, "O_2", sharing the ownership over the turbine. Altogether, the community, where the interviewee is a member, has 5 shares in the ownership of the turbine. The land where the turbine is set is rented from land owners, in the area which is very suited for wind exploitation and largely used in the past 2 decades.

The respondent enlisted interest in renewable energy, curiosity in providing new solutions for the environment, self-reliability, and solid economic stability as main drives of the investment. Using non-oil energy along with sustainability issues, energy security and environmental concerns are important drives. Most of all, interviewee expressed the notion of community building and sense of membership as an important motivation to take a part in the investment. He also pointed out that joining the group of people that share a vision, both from a social and individual identity aspect, is creating a sense of social cohesion and belonging. Also, he said that the community members can have a number of reasons and drives to place investment in wind or any other kind of renewable energy, and the crucial one being profit making. However, profitability is not a primary concern or drive for him personally; nevertheless, economic feasibility is desirable.

For the interviewee, the experience with wind energy investment has been developing during a long time, lot of changes happened since the first time his family invested till the current day. At the time of first investment, the farmers, or a cooperative, could invest in energy just as much energy they consume, which represented a limit to their investments. Years down the line, there were technical constrains, whereas the cable transmitting the energy to the mainland was limited in capacity, so the investments could not continue for a short while. However, they did not perceive any other obstacles of legislative or operative kind. The investment procedure went quite fast, however, paperwork required the change in the organizational structure, imposing a new structure of a shareholding company. Also, the meetings were needed to arrange signing the contracts with each family, it went smoothly in their case. The company “O_2” took care of preparations, meeting organization, paperwork and final installment of the turbine.

The interviewee offered somewhat additional view on the investment rents, saying that next to rents for the land and capital, there needs to be a rent dedicating a certain part of profits to a local community. And that is exactly what they did, the shareholding company and the wind energy company decided to setting a part 0.5% of profits to be dedicated to the community fund. The reason is that the windmill affects them in many ways, noise, transport etc.; therefore the community should receive a return of some kind. As the respondent sees it, this should affect future community investments and wind energy acceptability in the area. Perceived benefits have been expressed mainly through obtaining knowledge, relations community building aspects, and a possibility to contribute to a positive social change. Economic part was not interesting at all for the respondent, and it is more important that the investment is meaningful. The technology and good timing have granted them profits and to avoid losses, which others might have.

5.4.3 Experience with TGC System and Future Perspective

The respondent is aware of TGC, however, he is not knowledgeable about the procedure. Shareholding company manages TGC procedures and the trading. In general, TGCs facilitate investment, and it should attract investment, however, it is more important for the wind companies and it was not a driving force for the interviewee. Attracting forms of incentives for the respondent was the previously mentioned rent for the community, which would subsequently motivate more farmers to invest, because they would see tangible benefits from the investment in their own community. Moreover, he sees the future law on singular household energy production, and obligatory acceptance of that energy by distributers, as a good incentive. In that manner, one family can produce and consume green energy, almost to the point of self-sufficiency, and whatever is left can be fed into a grid. Legislation is also very important, securing stabile incentive support and making possible for consumers to be supplied with self produced green energy. The respondent believes that if there are consumers that want to be supplied only with RE, there should be providers of such and it would ultimately incentivize the investments and production of RE, in return creating more stable RE demand and supply.

The respondent expressed a desire to invest more in wind energy. Yet, his family and him decided to invest in a new solar energy system, solar vent combining heating and electricity, which can be used in their summer house to keep constant temperature trough out the year. Overall, the investment was satisfactory and it brought many new ideas and inspirations.

5.5 Summary of the Empirics

The empirical part of research work presented three interviews with Swedish farmers. The interviewees took part in answering four section questionnaires, respectively representing personal information, experience with wind energy investments, experience with TGC system and future perspective (Appendix 1). Sections about experiences with wind energy investments and TGC were intended to provide empirical data to support and answer research questions. The answers varied depending on respondents; however, the overall results were reported in Table 4 summarizing perceived drivers, benefits, obstacles and experience with TGC of respondents.

Table 4 Willingness to invest in wind energy based on empirical evidence from three interviews

Willingness to Invest in Wind Energy Farmers' Experience			
Drivers	Obstacles and Drawbacks	Benefits	TGC experience
*Economic benefit *Rent from a land *Provide for a pension *Weather unpredictability *Unpredictability of agricultural yield *Good wind conditions *Interest in RE & environmental concerns *Energy security & self-reliability *New solutions & decrease the use of fossil fuels *Community building & self-identity	*Price variability & losses *Investment cost & loans *Legal & bureucratical complexity *Time consuming paperwork procedure *Changing of legal regimes *Technological & capacity constrains *Impact on the environment & local community	*Economic benefit *Diversification of farms' activity *Alternative source of income *Building connections from the field *Social & community cohesion *"Community rent" *Knowledge *Contribution to the change and decrease of fossil fuels dependency	*"Bonus" to standard electricity price *Buffers the losses *Incentives environmentally friendly investments *Fixed prices for renewable electricity would be preferable to TGC *Not crucial for investment decision-making, especially for the community investment

First two respondents, conventional farmers, were driven toward wind investment mainly by the economic benefits, unpredictability of the weather conditions and hence agricultural yield, good wind conditions, need for alternative source of income and rent made from leasing a land portion. The third interviewee, due to the fact that he does not owns the land, expressed some additional drives such as community building, energy security, fossil fuel over dependence and interest in providing new solutions for the environment and sustainability. Yet, when it comes to the obstacles and drawbacks of the investment, all of them experienced high investment costs, electricity price variability, time consuming procedures, the too much paperwork, and legislative and bureaucratically difficulties. The second interviewee had additional legal complications, due to the absence of wind energy company/project developer, which most often takes care of the paperwork and other legal matters. The third interviewee observed that there are externalities reflected on a local community created by the wind energy projects; the other two interviewees did not notice such impacts.

Economic benefits, alternative source of income, building connections form the field and knowledge are main out coming benefits perceived by the respondents. In the first two cases, more pronounced were the benefits perceived on a farm level, such as diversification of the farm activity and spreading the risk; whereas in the third interview community building, connections, benefits in form of community rent and contribution to the change were more pronounced benefits. As for the experience with TGC, the first and second interviewed farmers were aware of them and dealt with them directly, as to a difference from the third interviewed which did not deal with them directly. Overall experience was quite positive, especially in the time of low prices, representing a “buffer” for the encountered losses. When asked if TGC is a “deal braker” regarding the decision to invest in wind energy, the opinions were split, the first respondent saying it was not and second saying it was a “deal braker”. The third interviewed had a positive attitude toward TGC, however, he would have made the investment even without presence of TGCs.

6 Analysis and Discussion

Analysis and discussion chapter aims to address empirical findings of this research together with a support of theoretical and conceptual framework. Accordingly, it is intended to bring the gathered data from interviews and analyze it together with chosen theories and concepts, filling a final goal of answering two research questions posed in the section 1.3. Therefore, section 6.1 will address the first research question: "*What are the main drivers, benefits and obstacles of farmers when investing in wind energy?"*. While section 6.2 will answer to the second research question: "*Do incentives influence the willingness of farmers to invest in wind energy and to which extend?"*. Finally, Analysis chapter is followed by a summarized conclusions and recommendations for the future policy makers and future research.

6.1 Wind Energy Investments from Farmers' Perspective

The empirical part of the research revealed many case specific and particular information regarding interviewed Swedish farmers. The evidence collected from three interviews made it possible to deduce worthy information and finally answer the research questions. In first instance, drives, benefits and obstacles regarding the wind investments are brought to light, by which addresses first research question.

6.1.1 Drivers of Wind Energy Investment

Firstly, empirics presented driving factors toward wind investments, and the most important drive is to gain economic benefits from selling electricity to energy companies, which was also pointed out by Masini and Machinetti's study (2012). First two interviewees expressed the economic drive as a main driving factor toward the investment. The profits that come from selling electricity is intended to provide future financial security as a form of compensation or even a pension for one interviewed family. Therefore, economic feasibility is desirable and necessary for achieving satisfaction with the investment; however, it is not the only one.

Farmers are quite concerned about environmental and sustainability issues, mostly in relation to the over dependency on fossil fuels and energy security. Wang (2006) also pointed out that strong awareness and inclination towards renewable energy is a great driving force of investment in general. Also, Munday *et al.* (2011) and Aguilar and Cai (2010) brought up environmental issues and issue of energy security as driving forces, confirmed also in the interviews. Many believe that supply from fossil fuels is not good for the environment, and are looking for ways to decrease their supply and dependency on electricity deriving from those energy sources. Moreover, since in Sweden is possible to choose electricity provider, one of the farmers changed to provider which supplies only electricity coming from RES. The farmer in question hopes to create in the future self-reliant and self-sufficient electricity supply combining wind electricity and solar systems. For the time being it is not possible to supply a household from own wind energy turbine, however, as it is an increasing trend in Europe, legislation is going to see some changes regarding this topic, as the third interviewee expects. Thus, in the future it is expected to consume self-produced wind energy and sell electricity that is left over, hence making possible a self-sufficient electricity production.

These drivers are reflected in pull-push theory of entrepreneurship. Pull-push theory of entrepreneurship describes and categorizes driving forces of self-employment, and in this particular case, it is used to assess driving forces of farm diversification, i.e. investment in wind energy. Mentioned previously in the section dedicated to this theory, farmers can already be self-employed; however, wind investment can be seen as yet another business development. This development adheres to the principles of pull and push factors leading the farmers to develop even further into another business. In this perspective, drivers toward the wind energy investment are going to be assessed as pull and push factors of farm diversification. Namely, drivers deducted from empirical evidence, in light of this theory can be perceived as pull factors, i.e. the positive factors pulling a farmer to diversify his farm and invest in wind turbines. Similarly, push factors of farm diversification are those that have negative connotation, and constrain or force a farmer to diversify a farm.

Thus, economic factor and environmental issues are reflected in pull-push theory of entrepreneurship as strong pull factors. Farmers are figuratively pulled into wind energy investments due to solid expectations of future profits. A wind energy investment is seen as good opportunity for independent business and at the same time chance for further growth and prosperity. Another pull factors, leading to a wind investment realization, and consequently to farm diversification, are good wind conditions in the area and right disposition of the land. Finally, one farmer pointed out as an important drive the community building, where group of families take a part in wind investment and can develop a feeling of belonging and community. Thus, bringing closer the community, creating a sense of belonging and developing self-identity is an important pull drive toward an investment. It is also interesting to observe that previously mentioned differences of pull factors between women and men are not perceived from this empirical data. Namely, the decision of investment in wind energy is taken on a family level, thus it did not matter whether the interviewee was woman or man. Also, since the decision of farm diversification has quite substantial financial impact, it is only important what overall family's pull-push factors are.

As for the push factors, they apply similarly to a choice of developing a new wind energy venture. It is not unlikely that besides pull factors there are a number of push factors guiding the decision of an investment. In a case of the interviewed farmers, two main push factors are weather unpredictability and uncertainty of agricultural yield. This drives fit perfectly with most commonly cited reason of farm diversification, i.e. risk diversification. In particular, farmers who decided to develop wind turbines were pushed into it because weather conditions and variable agricultural production from primary agricultural activity was jeopardizing their financial feasibility and survival. Hence, they decided to diversify the risk of depending only on one farm activity and singular source of income, and developed another activity on a farm outside the primary agricultural activity. Therefore, having a secondary source of income is allowing further economic growth of a farm, and at the same time it is reducing the risk of depending solely on one source of income. An installation of wind turbines and investment in community wind projects are not the only form of farm diversification on the farms of interviewed farmers. First interviewee mentioned the cottage renting, which they have started even before the wind investment, and interviewee three mentioned that he invested in as well in another form of RE investment, solar energy. One can observe that drivers towards wind investments are twofold, consisting of pull and push factors at the same time.

6.1.2 Obstacles and Downsides to Investment in Wind Energy

Moving to implications of farmers' decision to diversify activities on their farms' by investing in wind turbines, various obstacles and benefits have been observed in the literature as well in the interviews. Firstly, most difficulties have been perceived dealing with paperwork and bureaucratic procedures. As Masini and Menichetti (2012), and Bolinger and Wiser (2006) observed in their articles, even when using services and support of commercial wind companies, farmers encounter long waiting period and complicated bureaucratic procedures. The first interviewed farmer waited for two years before the construction begun, and second farmer waited almost four years, due to the fact that he did not use the services of commercial wind company. Further, the farmer which did not consult or collaborated with a commercial company had legal complications and had to hire a lawyer, which prolonged further the procedure. This situation confirms Bolinger and Wiser (2006) study, which argue that the involvement of commercial companies, or project developers, can help farmers to reduce downturn risk of a project. Also, commercial wind developers can contribute to a risk reduction by offering economic support, and in that manner secure financial feasibility of a project. This is what third farmer experienced with a community level investment when they did not have enough monetary resources and they invited company to participate financially in the investment.

However, there have been developments that brought uncertainty to projects, which could not be neglected or avoided even with an envolvement of commercial companies. The price variability has reflected to great extend on a success of wind energy projects. Sweden currently has a period of low electricity prices, which caused the farmers to endure loses since the beginning of a year. Yet, when the price of electricity was higher, farmers were enjoying profits from investment; nevertheless, current prices are causing dissatisfaction related to the investment. Further obstacles are technological and capacity constraints, which were perceived mainly by the third farmer. This situation is due to the long experience with wind investment, now around 25 years, and technology changed significantly during the time. There have been some technological difficulties and capacity constrains given by early regulations of wind energy investments. At first, it was possible to invest just as much as it was consumed, giving a limited investment opportunities. Lastly, the third interviewee pointed out some social issues, where the community bears a certain weight of the wind investments. The wind energy power plants can have many impacts on a local community, for instance during the construction, managing waste, building of the new roads and grid, transportation and other kind of disturbances. Once the wind turbines are in place, they can be perceived as an obstruction to a view and produce a sound that can be disturbing to people living in the nearby.

6.1.3 Benefits of Investment in Wind Energy

Continuing on the previously mentioned downside of wind investments, the impact made by the wind farms on a local community, can be overcome in one way by dedicating a certain percentage of profits as a community rent, as Yin (2012) described in his study. In this manner, as the community of the third interviewed farmer did, the small percentage of profits always goes to local community's fund. From there, the money can be used to develop projects and even to start up additional wind turbines construction. Thus, as Toke (2005) notices, community involvement leads to wind energy acceptance and less resistance to develop new ones. The community investment brings other benefits, such as social cohesion, community building, knowledge and networking, pointed out by the interviewees. Overall, it is great sign of rural development and contribution towards new solutions and better future on a local level. As Mosher and Corscadden (2012) argue in their article, local communities have great role in forming sustainable future. The investments in wind energy by the community members play a great role in forming sustainable communities and especially a way to act locally on a global goal of combating climate change and reduction of CO_2 emissions.

First two interviewed farmers, which diversified their farms and dedicated a part of their land to develop turbines, perceived economic benefits. As Northcote and Alonso (2001, p. 237) observed, it is a good way for farmers to:" Maximize their chances for economic survivor". Farmers received secondary income from selling the electricity to distributers and moreover they received compensation in amount of the price of TGC for each MW of electricity they produced. Therefore, even when the prices are low, there is a buffer in a form of certificate price to cover the losses. However, currently the losses with selling the electricity are that high that even the price of TGC is not enough to cover them; nevertheless the situation is expected to change soon with a reform of the regulation. There is additional benefit of having alternative source of income next to the income from primary agricultural activity, and that is risk diversification. Namely, farmers experienced in past variability of agricultural yield influenced by weather conditions. This endangered their ability to survive solely depending on agricultural profits, therefore having alternative source of income hedges their risk of economic survival.

6.2 The Impact of TGC on Wind Energy Investment

Previous findings on the topic of governmental incentives provided mostly the evidence in form of comparison between countries and comparison between two dominant European incentive frameworks, TGC and FIT. Bergek and Jacobsson (2009) investigated the incentive system in Sweden, however, there was little attention given to farmers and community investment in Sweden. Hence, the empirical data gathered trough conducted interviews were intended to cover this gap in evidence. The respondents were asked to enlist some drives that led them to investment in wind energy, and subsequently they responded to a section dedicated to the TGC system and their experience with the TGC and wind investment. Firstly, the respondents did not enlist TGC as a main driver of investment; however, when asked specifically about TGC they responded that the presence of TGC is important and helpful. The first respondent said that TGC presence was not decisive of wether to invest in wind energy and that the family would have invested either way. The second responded said that the family would have not invested if there was not governmental support. The TGC was seen as a sort of "bonus" to already existinig income from selling the electricity, and at the same time as a buffer to cover incurring losses. In the third interview, the situation was somewhat different, since the farmer did not deal in person with the TGCs but it was managed on a community level with a help of a commerical company. Nevertheless, his attitude toward TGC is in general positive, however the presence of TGC is not crucial in a decision making. Perhaps, the importance is not perceived since the benefits of TGC are distributed between all of the community members, whereas singular farmer sees more direct and substantial financial benefit. Also, there were no problems to deal with the TGC paperwork or functioning.

In a light of push-pull theory of entrepreneurship, the TGC incentive system is certainly a pull factor since it influences positively and motivates farmers to invest in wind energy. Furthermore, it is an important element of risk minimization of investments and it provides sense of secure and stabile investment. In spite of TGC's somewhat limited importance as a pull factor, it is an important factor driving toward a sustainable investment, and as one interviewee saw it, an environmentally friendly tool. Furthermore, as the concern about climate change is growing, TGC system is a factor that further motivates and guides investors toward an environmentally friendly investments (Masini and Menichetti, 2012). One can observe that TGCs, as a governmental tool in combating climate change, are successful in evoking investments, however with some limitations. Farmers found TGC helpful; however, they said that the prices of electricity are still oscillating too much, and in particular this year to an extend of enduring losses. Hence, the farmers would prefer having fixed prices when selling their electricity, as the FIT incentive system offers. Moreover, Schaefer, *et al*. (2012) wrote in their article that the FIT system is more suitable and incentivizing for smaller communities and individual farmers than the TGC syste.

7 Conclusions

Wind energy has become very important source of renewable energy in Europe, and in some countries the dominant source of electricity supply. The growth of production is due to an increase of investments and rapid spread of wind energy technology throughout the Europe and world. Certainly, this was recognized by the academia and many studies have investigated what stands behind this strong growing trend, who are the investors and what are their motives. Many have investigated major investor groups, including venture capital, private equity funds, banks and pension funds, however, little evidence was provided about motives and challenges of smaller and less significant groups of investors. In particular, farmers and community investments have been given little attention, in spite of their raising importance for the future of wind energy development. Moreover, in relation to farmers' investments, there are few articles investigating the impact of governmental incentives and their effectiveness in driving the decisions of investment. Further, the motivations of farmers' to invest are unclear and failed to be addressed. To fill the gap, this study has investigated farmers in Sweden, aiming to understand drivers, obstacles, and benefits of investments in wind energy and their experience with the TGC incentive system in Sweden. The study has incorporated empirical evidence from three interviews with farmers from the South of Sweden, and analysed together with the theoretical and conceptual framework, consisting of push-pull theory, sustainable business development and farm diversification.

The results are consistent with previous literature findings, however, enriched by a Swedish perspective and farmers' experiences. Main drivers have been found to be economic benefits, weather and agricultural yield unpredictability, good wind conditions, energy security and over dependence on fossil fuels, and community building. These drivers are identified as pull and push factors toward investment, compliant with the pull-push theory of entrepreneurship. Consequently, obstacles to investment were recognized in form of the price variability, losses, time consuming legal and bureaucratically procedures. Nonetheless, benefits of the wind investment are plentiful and can be translated mostly in economic benefits, diversification of farms and risks, social cohesion and community building, knowledge and contribution to a better and sustainable future. As for experiences with the TGC, farmers found governmental incentives very helpful, especially in a time of lower electricity prices and being subjected to losses. TGC is reflected in the push-pull theory of entrepreneurship as a pull factor leading to farm diversification. Further, TGCs influence positively a decision to invest, yet it is not the most important pull factor driving that decision. Also, the presence of TGCs is more important to singular farmers with comparison to farmers that at community level. Nevertheless, investment in wind energy is bringing many benefits, and amongst them perception of sustainable and responsible business development. Moreover, development of wind turbines on farm level is a significant improvement and big step in decrease of CO_2 emissions on a local level, indicating that small communities have an important role in creating sustainable future.

7.1 Future Policy Recommendations

Future perspectives of the wind energy development lies in positive and fruitful relationship between farmers and incentives offered by the government, and in understanding the nature of farmers' willingness to invest in wind energy projects. So far, one can observe from the interviews, that variable prices of electricity are currently damaging the experience farmers are having with wind energy investment, and that TGC compensation is not enough to avoid losses. Due to this fact, wind investments are still instable and insecure, and TGC is not helpful enough. Verhaegen, *et al*. (2009), argue it would be useful to integrate FIT in TGC. Namely, if there would be a minimum fixed price for renewable energy, this risk of price variability could be overcome, and consequently it would provide TGC with a long term stability. Verhaegen, *et al*. (2009) says that along with the minimum fixed prices, farmers should get the price of TGC. In conclusion, minimum fixed prices would annulate the risk of losses and TGC compensation would provide additional value for the renewable energy provided.

An additional improvement in regulation, which is currently in ongoing process, is to allow and make possible for the producers of renewable energy to be at the same time the consumers of electricity that they produce. This improvement can significantly decrease the cost of electricity for the renewable energy producers, by which omits the cost of electricity, because it would be produced with no cost, and being left only with the initial technology investment. Moreover, the energy can be fed into a grid and sold to renewable energy providers, and that can present additional profit for the families. In this manner, not only those families can be electricity self-reliant, but also they would be sustainable and independent, leading perhaps even to sustainable communities.

7.2 Recommendations for the Future Research

Future research can take more quantitative steps, in form of interviews with larger number of farmers encompassing regions or even broader geographical areas. In particular, a comparison between farmers which already invested in wind energy and those that still have not would be very useful in many ways. Firstly, drivers and perhaps obstacles could be perceived much more clearly, in respect to non-investing farmers which would help realize missing key pull factors. In a case of broader research about farmers that have already invested, significant evidence could be retrieved by deducting key obstacles and benefits of wind investment. By doing so, these obstacles could be used by the wind companies and governmental institutions to meliorate and improve incentive system and legislation.

Also, it would be interesting to investigate TGC incentive system impact on different RES, aiming to see the results of TGC in encouraging farmers to invest in different RES technologies in Sweden. Furthermore, regarding TGC, this study has noted some difference in preferences toward TGC between farmer as an investor and community investment. By performing comparative study, these differences in attitudes toward TGC could be much more clearly identified. Comparative study can help investigate importance of TGC in community investments or on a singular farmers' level, as a drive of rural development. Moreover, by identifying differences of attitudes and importance given to TGC, government can target bmore efficiently groups of farmers or communities and stimulate investments in wind energy in more adequate manner.

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Appendix 1: Survey questionnaire

Qustionnair 1

Farmers who are independent investors in wind energy projects. (Farmers who invest part of their income in wind energy projects and who do not dedicate the part of their land when making investment)

Part I: Personal Information

1. Can you tell something about your slef (age, marriage status, education)
2. For how long have you been a farmer and what is your primal agricultural farm activity, farm size?

Part II: Wind Energy

3. When did you first invest in wind energy and have you invested in anty other renewable energy as well?
4. Did you make your investment on individual basis or within community?
5. What made you invest in wind energy?
6. How big drive did sustainability issues play in your investment? (Energy security, CO_2 emissions form fossile fuels, agricultural yield variability etc.)
7. How can you describe your experience? Did you encounter any difficulties, obstacles of financial, legislative or operational kind?
8. What are perceived benefits coming from that investment?
9. Do you have energy supply from this wind power plant? Do you know how big is yearly energy production, to whom do you sell it to?

Part III: Incentives and TGC

10. Do you use any governmental incentive on basis of your investment in wind energy?
11. How encouraging TGC was? Were there any particular obstacles?
12. What are the benefits coming from using TGC incentive system?
13. How much did TGC influence your decision to invest in wind energy and how much was it due to other factors (enlist some of them)?
14. Would you have made the investment even if you did not use TGC system?
15. If you could choose any incentive form that could help your investment better, what it would be?

Part IV: Future

16. Do you plan to invest more in wind energy, or any other renewable energy project? Are you satisfied with what it provided to you?
17. Do you plan to use TGC in any future investment in wind energy?

Questionnair 2

Farmers that when investing in wind energy dedicate a part of their agricultural land to purpose of developing on-site wind energy projects.

Part I: Personal Information

1. Can you tell something about your slef (age, marriage status, education, current employment, how did you become a farmer)
2. For how long have you been a farmer and what is your primal agricultural farm activity, farm size?

Part II: Wind Energy

3. When did you first invest in wind energy (or any other RE)?
4. When did you first dedicate the part of your land to install wind energy turbines?
5. Did you install just once or did you install capacity in several occasions and how big part of your land (m^2, hectars) are wind turbines occuplying?
6. Do you have energy supply from this wind power plant? Do you know how big is yearly energy production, to whom do you sell it to?
7. Did you make your investment on individual basis or within community?
8. What made you invest in wind energy and turn part of your agricyultural land in wind energy power plant?
9. How big drive did sustainability issues play in your investment? (Energy security, CO2 emissions form fossile fuels etc.)
10. How can you describe your experience? Did you encounter any difficulties, obstacles of financial, legislative or operational kind?
11. What are perceived benefits coming from that investment?

Part III: Incentives and TGC

12. Do you use any governmental incentive on basis of your investment in wind energy?
13. How encouraging TGC was? Were there any particular obstacles or difficulties?
14. What are the benefits coming from using TGC incentive system?
15. How much did TGC influence your decision to invest in wind energy (on scale of 1-7, one being non influential, 7 being the most influencing) and how much was it due to other factors (enlist some of them)?
16. Would you have made the investment even if you did not use TGC system?
17. If you could choose any incentive form that could help your investment better, what it would be?

Part IV: Future

18. Do you plan to invest more in wind energy, or any other renewable energy project? Are you satisfied with what it provided to you?
19. Do you plan to use TGC in any future investment in wind energy?