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THE EUROPEAN UNION

- THE CLIMATE CHANGE PACKAGE -
- RENEWABLE ENERGY DIRECTIVE 2009/28/EC -

FOR THE TIMES THEY ARE A-CHANGIN'…

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Abbreviations

CAGR	→	Compound Annual Growth Rate
CCS	→	Carbon Capture and Storage
COP	→	Conference of the Parties (in the UNFCCC)
CDM	→	Clean Development Mechanism (Kyoto)
ECSC	→	European Coal and Steel Community
ECCP	→	European Climate Change Program (2000-2004)
ECCP II	→	European Climate Change Program II (2005-)
ECJ	→	European Court of Justice
EEG	→	Gesetz für den Vorrang Erneuerbarer Energien (Erneuerbare-Energien-Gesetz; Renewable Energy Sources Act)
EJ	→	Exajoule: 1 EJ = 10^{18} J
ENDS	→	Environmental Data Service
EREC	→	European Renewable Energy Council
EREF	→	European Renewable Energy Federation
EU	→	European Union
EU ETS	→	European Unions Emissions Trading Scheme
EWEA	→	Wind Power Trade Association
GHG	→	Greenhouse gas
IET	→	International Emission Trading
IEA	→	International Energy Agency
IMF	→	International Monetary Fund
IPCC	→	Intergovernmental Panel on Climate Change
JI	→	Joint Implementation (Kyoto)
Ktoe	→	Kilo-ton oil equivalent
KLIF	→	Klima- og forurensingsdirektoratet (Clima and Pollution Agency, Norway)
LI	→	Liberal Intergovernmentalism
PV	→	Photovoltaic (convertion of solar radiation into energy)
RED	→	Renewable Energy Directive
REPAP	→	Renew.Energy Policy Action Paving the Way towards 2020
RES	→	Renewable Energy Sources
RES – H	→	Renewable Energy Sources – Heating and cooling
RES – E	→	Renewable Energy Sources – Electricity
RES – T	→	Renewable Energy Sources – Transport
Mtoe	→	Million-ton oil equivalent
MS	→	Member States (of the European Union)
MW	→	Megawatt
NAP	→	National Allocation Plan
NREAP	→	National Renewable Energy Action Plan
SEA	→	Swedish Energy Agency
TWh	→	Terrawatthour (a billion kilowatt-hours are 1 TWh)
UN	→	United Nations
UNCED	→	UN Convention on Environment and Development
UNFCCC	→	United Nations Framework Convention on Climate Change
WWF	→	World Wildlife Fund

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Executive Summary

The following general problem for discussion has been chosen:

Why did the EU decide on targets concerning renewable energy sources and why exactly these targets? What are the European Union and the nation-states doing to reach these targets, during the implementation process, and is it possible to say something about the level of achievement at this point?

The European Union is at a threshold concerning their future energy policy. If the electricity grids are not upgraded, obsolete plant not replaced by competitive and cleaner alternatives and energy is used more efficiently throughout the whole energy chain; competitiveness, security of supply and climate objectives will be undermined. The renewable energy directive sets the targets to be reached by 2020, including a target of 20% renewable energy sources. Each Member States target is calculated starting with their exit level in 2005, adding a flat increase to all the Member States of 5.5%, and then adding an additional increase based on the country's GDP decided upon the individual targets.

Together the Member States expect to more than double their total renewable energy consumption. The share of RES in electricity consumption is predicted to increase to 34.3% in 2020, wind energy and hydropower being the largest contributors. Renewable heating and cooling should reach 22.2% in 2020, with biomass being by far the largest contributor. The share of renewables in transport is forecast to reach 11.27% of diesel and petrol consumption.

Only two countries have reported the need of the cooperation mechanisms, in order to reach their goal. Half of the Member States predicts surpassing their binding targets, and the rest foresee they will reach the target. The Netherlands has a goal of 14% reached by 2020, while Sweden's goal is 49%. The Dutch government does not predict to surpass their goal, although indications points to 15.5%, not yet confirmed. Sweden predicts to reach 50.2%. The Swedish NREAP splits its target into 62.9% RES-E, 62.2% RES-H and 13.8% RES-T. The Dutch NREAPs splits the overall target in the following way: RES-E 37%, RES-H 8.7% and RES-T 10.3%.

The targets for 2010 were not met, nor were the targets binding either. The year 2020 will be the key year for measuring the Unions effort. Several actors (e.g. EREC 2011) emphasize largely how the EU could have set even more ambitious targets, and reaching them. Estimations from the industry suggest 24.4%.

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I feel privileged to have had the opportunity to study such an important and interesting field during my Master of Science studies. The two-year Master of Science program has not only broadened my opportunities professionally. In addition it has affected and developed me personally. European integration theory and studying the development of the European Union has introduced me to new dimensions in my understanding of the region, as well as the political processes. I have gained knowledge and understanding of the challenges we are facing concerning climate change, hinders in relation to implement renewable energy sources and the effort the Union is doing to reach the targets. Hopefully changing the pattern that we are all following in our everyday lives.

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SandraWestermark Messel

1.0 Introduction

In 1997 the European Commission presented a White Paper, which shaped the policies of the renewable energy sources at the time. The White Paper for a Community Strategy and Action Plan (EC COM (97) 599) contained little, if any concrete policies, but it made a foundation. In 2001 the Directive on Renewable Electricity (2001/77/EC) was published, based on the White Paper from 1997, and in 2003 came the Directive on biofuels (2003/30/EC). Still, at that time, there were no laws binding the Member States to any targets or policies. Not until 2009.

The European Climate Change Programme (ECCP I) was introduced in 2000; a program set out to make sure the EU reaches its Kyoto targets. In 2005 the second European Climate Change Programme (ECCP II) was started. To reduce the EU's vulnerability to the impact of climate change, the European Commission presented a policy paper, a White Paper, presenting the framework for adaptation measures and policies (The European Commission 2010b). The ECCP II consists of an ECCP I review, divided into transport, energy, supply, energy demand, non-CO_2 gases and agriculture. It also includes aviation, CO_2 and cars, carbon capture, and storage. In March 2007 the leaders of the EU approved an integrated approach to climate and energy policy; including combating climate change and increasing the EU's energy security while strengthening its competitiveness. Europe set out to be a highly energy-efficient, low carbon economy (IPCC 2007). This strategy is called the 20-20-20-programme, proposed in a legislative package in 2008, becoming law in 2009. This package sets the targets for each country by 2020; on average 20 percent decrease in CO_2 emission, 20 percent reduction in energy consumption and reaching a target of 20 percent renewable energy sources. The EU has also agreed to raise their binding target to 30% on the condition that developing countries ratify comparable emission reductions and *'that economically more advanced countries make a contribution commensurate with their respective responsibility and capability'* (The European Commission 2010a). This remains EU policy today. Since these agreements were developed and approved, the economic crisis has 'put a lid' on Europe, putting huge pressure onto businesses and communities across Europe, as well as causing huge stress on public finances. At the same time, it has confirmed that there are huge opportunities for Europe in building a resource-efficient society (The European Commission 2010a).

PART I – AREA OF INTEREST

2.0 Topic of Interest and the Research Questions

Until the 18th century our civilization got all the energy from renewable energy sources such as wood, wind, water, and muscle. The Industrial Revolution changed all this. There might not be an acute shortage of our fossil fuels, but the limit is approaching, rapidly. The fossil energy sources release CO_2 when combusted. This is believed to be the source of the climate challenges and changes the world is experiencing today. Can we get back to the eighteenth century energy sources, with the level of consumption being what it is in the world today? The level of consumption is increasing by the minute, much due to the rise of the Asian standard of living and their economical growth.

2.1 Motivation for the Thesis

In March 2007 The European Council by the presidency stated that the EU "(…) *is committed to transforming Europe into a highly energy-efficient and low greenhouse-gas-emitting economy and decides that, until a global and comprehensive post-2012 agreement is concluded, and without prejudice to its position in international negotiations, the EU makes a firm independent commitment to achieve at least a 20 % reduction of greenhouse gas emissions by 2020 compared to 1990"* (The European Council 2007, 12).

In the same document they also endorsed keeping the rise of global average temperatures to less than 2 degrees Celsius above pre-industrial levels. The world's economies are linked through trade and capital flow, and it is essential that international agreements make the basis for the solution of the biggest challenge the world has ever faced (Mullins 2005). The 1992 United Nations framework for such cooperation is provided by the 1992 United Nations Framework Convention on Climate Change (UNFCCC), working as a supplement to the 1997 Kyoto Protocol (Mullins 2005). The core of this treaty is that the developed countries are legally bound to reduce greenhouse gas emissions (GHG). National Action Plans (NAPs) have been set up for each country to execute these cuts towards the year 2020. The renewable energy part of the Climate Package is outlined in the National Renewable Energy Action Plans (NREAPs). This thesis will take a closer look at these NREAPs, especially in consideration to the case studies. How have the different countries chosen to reach the targets in 2020, and

what challenges and strategies are they facing? Are the targets even within reach? Could they be set even higher? How has the financial crisis effected the implementation of the directive, since these two events happened fairly at the same time? Can we already say something about the grade of achievement level of the directive? These, and several more are initial questions I considered.

2.2 The EU Climate Change Package

In 2007 EU endorsed and ratified an agreement on a common approach concerning actions to be taken concerning global climate change, called the EU Climate Change Package[1]. The agreement was reached by the European Parliament and Council in December 2008, and became law in June 2009 (The European Commission 2010d). An important aspect of this agreement is that this will commit the EU to further reduce its emissions also after the Kyoto agreement expires in 2012 (The European Union 2007). In the core of the Climate Package there is four pieces of complementary legislation (The European Commission 2010d). First, the Emission Trading System (EU ETS) is at the centre as EU's perhaps key tool for effectively cutting emissions. This is also characterised as one of the most important contributions of the European Climate Change Program (ECCP), launched in 2000. This program had as objective to outline strategies as to how the EU could reach its Kyoto goals. The EU ETS is also the largest transmission scheme in the world. Second, transport, housing, agriculture and waste are not covered in the EU ETS, leaving them known as non-ETS sectors. These are regulated by an 'Effort Sharing Decision', setting independent targets. The national emission limitations have been estimated according to the countries relative wealth, ranging from 20 % decrease to 20% increase. Non-ETS sectors will cut emissions by 10% by 2020 compared to 2005 levels. Third; decreasing EU's dependence on imported energy and reducing greenhouse emissions. This will be reached by national targets for renewable energy, setting the average renewable share across the EU to 2+% by 2020. The level in 2006 was 9,2%. Finally, the use of carbon capture and storage (CSS) was introduced. This is a *'promising family of technologies that capture the carbon dioxide emitted by industrial emitted by industrial processes and store it in underground geological formations where it cannot contribute to global warming'* (The European

[1] From now on to be denoted as the Climate Package.

Commission 2010d). CCS's viability needs to be tested and demonstration plants will be set up by 2015. The legislative proposal will enable governments to provide financial support for CCS pilot plants.

2.2.1 The 20-20-20 goals

The main targets for the climate package can be summarized in three points: A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels, 20% of EU energy consumption to come from renewable resources, and a 20% reduction in primary energy-use, compared with projected levels, to be achieved by improving energy efficiency (The European Commission 2010d). Long term (2050), the Climate Package sets out to reduce the emissions with 60-80% compared to levels in 1990 (The European Union 2007). The EU is by this package setting out an example for other states and cooperation parties to follow:

"The Council's position is an affirmation of the EU's leadership and determination to prevent climate change from reaching dangerous levels. But we can only succeed if the international community moves urgently to strike a comprehensive agreement to reduce global emissions after 2012. The EU has demonstrated its seriousness by committing to an emissions cut of at least 20% even before negotiations start. We now look to other developed countries to show responsibility and follow our example".

Commissioner Dimas (The European Union 2007)

2.2.2 The European Trading System

The European Union Emission Trading System (EU ETS) is a system that is meant to be an advocate for cost-efficiency, and is seen as the best way to minimize the price of reaching the emission target. The system is now a cornerstone in the EU-battle against climate change, and is the largest scheme in the world, including 11 000 power stations and industrial plants in 30 countries (The European Commission 2010c). It works on the "cap and trade" principle, meaning that companies receive emission enabling them to buy or sell from each other, as needed (The European Commission 2010c). Not having enough allowances according to the emissions for that year will lead to heavy fines (The European Commission 2010c). "*The number of allowances is reduced over time so that total emissions fall. In 2020 emissions will be 21% lower than in 2005" (The European Commission 2010c)*.

The first period for the EU ETS was from 2005-2007, and the second period corresponding to the Kyoto engagement period was from 2008-2012. The Climate Package, adopted in 2008, confirmed and set even more ambitious objectives for the EU (Delbosc and Perthuis 2009, 12). As the EU ETS reaches its third trading period in 2013, a series of important changes will be applied to strengthen the system. But the EU has shown that it is possible to trade in GHG emissions, and that the changes that will be made in 2013 will make it even more effective (The European Commission 2010c). *"The EU hopes to link up the ETS with compatible systems around the world to form the backbone of a global carbon market" (The European Commission 2010c).*

This all leads up to my problem for discussion and the corresponding research questions I will try to discuss and provide a plausible answer for.

2.3 Problem for discussion

On the background of the preceding introduction and motivational explanations, the following general problem for discussion has been chosen:

Why did the EU decide on targets concerning renewable energy sources and why these specific targets? What are the European Union and the nation-states doing to implement the directive and reach these targets, and is it possible to say something about the level of achievement at this point?

2.3.1 Research questions

Research question I:
How are renewable energy sources explained and defined by the European Union and why set the target of 20% renewable energy sources in average throughout the Union?

"Rising energy prices and increasing dependence on energy imports jeopardise our security and our competitiveness. Key decisions have to be taken to reduce drastically our emissions and fight climate change" Günther Oettinger 2010 *(The Directorat-General for Energy 2011).* The EU has agreed upon the 20-20-20 targets. For the European Union to be a low-carbon economy with increased energy-security, the renewable target is perhaps the most important point of the three points mentioned. This will in the end turn our dependency on fossil fuels which is polluting, as well as we will run out of the energy source at some time. Is

the 20 percent only a vanity target? The catch phrase *"the 20-20-20 targets in 2020"* does in all honesty seem like a slogan. One of the headlines of the 2020-energy strategy (2011) from the European Commission is *"The price of failure is too high"*. Concerning the general issue of climate change and energy security, the human mankind cannot fail changing its use of fossil fuels and release of carbon. The external costs will be too high. But how would the Union appear if they set a target too high? Why a 20% target? Is the EU too afraid to fail, and therefore setting a target within its frame of security? Failing would not even be an issue, but the target actually ensures that the EU will successfully reach its level of reduction and therefore can make a stronger position as an efficient and strong actor in the world stage.

Research question II:
Why did the EU set different targets for each Member State, how were these numbers calculated and what are they? Are they decided in a fair way?

Each member-state has developed a target in reference to their point of departure. These targets vary with great difference, and looking closer at each sector actually shows how some countries are even allowed increases in their GHG emissions. This is done so the poorer European countries are given the possibility to develop their already started path for establishing a competitive industry. Concerning renewable energy some countries started out around 1% or even 0%, setting targets several 100% higher. On the other side of the scale are the countries that started out with perhaps a 30% level of renewable energy sources, only increasing a couple of percentage points. The countries that already have a higher level are criticized for not being ambitious enough, although reaching levels several percentage points higher than other Member States. There is even given "early starter bonuses" to countries implementing the directive quickly. They have gotten their targets adjusted lower.

The UK has set a target of 15%, Finland 38%, the Netherlands 14% and Malta has the lowest target of 10%. Sweden is set out to reach 49%, and still receive criticism. This can be explained by geographical possibilities. The Nordic countries are blessed with a nature that gives an easier access to renewable energy. Is it then fair to set the goals that much higher? How has the European Union done the calculations concerning the targets?

Research question III:

How are the sectoral targets diversified in relation to technological solutions and what are the targets and the possible solutions?

Each country can decide upon their own mix of strategies to reach their targets. This means that the average of the EU will reach 20%, but that each country has set a target of their own, relative to their point of departure. The general trend is that countries starting out on an already relatively high level are less ambitious then countries starting from a lower level. The renewable energy sector is split into 3 sectors of heating and cooling (RES-H), electricity (RES-E), and transport (RES-T). The transport sector generally has lower targets than the two others, mainly due to the lack of options in this sector. Heating and cooling differentiates mainly because of regional differences in needs. The UK, for example has set very aggressive goals within this sector because regional heating hasn't existed up until this point.

The question is how these levels have been decided, and what are the key motivations for the Member States in deciding on their targets? Is it possible to see any trends within this area? Or what technologies that are most likely to be used? These technologies are mostly defined as solar energy, wind energy, hydroelectric power, tidal power, geothermal energy and biomass. Other solutions might be fuel cells and hydrogen, clean coal and CCS, nuclear energy etc, but these technologies are not included in the renewable energy sector. The world's energy system is bound to change rather radically in the next decades, and the European Union is headed for a shift in their energy supply.

Research question IV:

Why has the Climate Package been successful, or not, since the implementation period started in 2008 (especially in relation to renewable energy)? How do the prospects for the future look at this moment (2011) and is it possible to see effects from the financial crisis?

There were indicative targets to be reached in 2010. Were these met, and if not, what explains this?

The levels that were thought of in the 1990's, for year 2010, were already achieved and surpassed in 2009. Are we seeing the same trend for 2020? Would not setting a higher target lead to more ambitious plans (European Renewable Energy Council 2011). The RES industry estimates that a share of 24.4% can be reached by 2020, why are not the governments supporting this?

The same year as the Climate Package was accepted in 2008, the financial crises became a reality in Europe. Several of the Member States have experienced and still experience severe economic challenges concerning debt. Briefly said the solutions concern cutting costs. Looking at what consequences this has had for the member sates' efforts concerning investments and focus towards reaching the renewable energy targets in 2020 will hopefully provide some insight here. The deadline, the year 2020, is approaching. Estimations today show that there are actually only two countries, Italy and Luxembourg that are not expected to meet their targets. This is already accounted for and they will succeed by buying or receiving cross-boarder cooperation. How do the Member States plan for the next 8-9 years? Are they staying in line with the plans laid out in the National Renewable Energy Action Plans? The European Commission has also communicated large fines for the Member States that do not reach their law-binding targets.

Case studies:

Sweden and the Netherlands: Challenges and strategies outlined in the National Renewable Energy Action Plans (NREAPs).

I will take a closer look at two case studies in relation to the previous questions: How the Netherlands and Sweden have decided to implement and execute directive 2009/28/EC[2]*. The thesis will look closer at the trajectories and forecasts of the chosen cases. The case studies will also provide deeper answers to the first 4 research questions regarding these two countries.*

[2] Directive 2009/28/EC, form now on denoted as the RES Directive can be found here: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF An overview over each Member-States target can be found in the RES Directives Annex I.

The National Renewable Energy Action Plans outlines the choices done by each Member State, their status quo, the planned progress and their calculated trajectories. For the analysis of the EU in total, the roadmap by the Commission and summaries of the NREAPs have been the foundation, here I will be able to go in-depth in to specific NREAPs. The two countries chosen for the case studies are picked for several reasons. First of all they are both countries located in Western Europe and therefore their basis for analysis are comparable. This is in relation to developments throughout the Eastern European region for example, which will make the point of departure different. At the same time as their basis is comparable, the countries are very different concerning geographical characteristics. Sweden has 9 million inhabitants, distributed over 450 000 square kilometres, with a density of 20 inhabitants/km^2. The Netherlands has over 16.5 million inhabitants, distributed over 41 500 km^2, leaving a density of 404 inhabitants/km^2. The foundation for their solutions should be very different. I want to underline that these cases are not done for comparable reasons, but to get insight in two of the Member-States quest for reaching the targets.

Further Sweden is leading the way in the Europe Union with the highest level of renewable energy sources, which makes it a very interesting case to look closer at. Although criticized for not setting more ambitious targets. What are the sectoral targets and why are these goals decided? What does Sweden see as their challenges?

The Netherlands is facing different challenges when it comes to geographic and natural resources than their Swedish colleagues. How have they chosen their path?

The NREAPs build a bridge between ambition and reality, and the European Commission emphasizes on the fact that they should be coherent, comprehensive and effective. The NREAPs will be the framework for the analysis of the case studies. The use of them helps in understanding and learning their strategies.

PART II - THEORY

3.0 European integration theories

'Pure' empirical knowledge of how institutions work might not supply us with the complete picture. The theoretical foundation should also be studied and included (Diez and Wiener 2004). Integration theory is the field of theorizing the process and outcome, while studying the *process* and not a policy outcome. Looking at historic incidents and patterns may lead to a better ability to foresee future developments and institutional behaviour. In this context the search for how 27 Member States have decided their path to achieve the targets of the Climate Package from 2008, is the area of interest. Since the founding in 1958, European nation-states have been part of a process of '*pooling sovereignty generally referred to European integration*' (Wilde 2010). The first decades of the integration process was dominated by neofunctionalists and intergovernmentalists. Neofunctionalists theorized integration as a gradual and self-sustaining process, intergovernmentalists emphasized on the gate-keeping role of the government (Pollack 2001). Pollack points out that the neofunctionalistic view does not suffice to explain the European integration to a large degree. He also observes signs of convergence around a single rationalist approach between realist, liberal and institutionalist approaches. This theory *"assumes fixed preferences and rational behaviour among all actors in EU, and examines the ways in which member governments adopt institutions which subsequently constrain and channel their behaviour" (Pollack 2001, 222).* It is also pointed out how the neofunctionalist and intergovernmentlist approach is not suited in a broader sense than the European Union. How the new institutionalist approach can be generalized in a broader setting (Pollack 2001), making the latter a broader theory.

3.1 Neofunctionalism and intergovernmentalism

> *"The explicit effort to theorize about the process of European Integration began within the field in international relations (IR), where neofunctionalism and intergovernmentalism long remained the dominant schools of thought. With the relaunching of the integration process in the 1980s and 1990s, however, IR scholars have begun to approach the study of the European Union using more general, and generalizable, theoretical approaches" (Pollack 2001).*

The neofunctionalists would describe integration theory with the social element of integration, namely that *'functionally defined actors are core promoters of integration'*. The intergovernmentalist approach on the other hand is more focused on the political processes (Diez and Wiener 2004).

The neofunctionalists further argues that the nation-states are loosing control over integration. The intergovernmentalists see the nation-states as still in control over the process of integration. The neofunctionalists claim that actors have a stronger interest and therefore advocate integration. They also develop a more general social scientific theory of regional integration applicable outside of Europe (Diez and Wiener 2004). Do the Member-States still have control over their environmental agenda? This could be a reasonable question to ask, although it will not be answered in this thesis. Still, there is limited doubt that it was the EU and its institutions that negotiated and pushed towards the Climate Package.

The intergovernmentalists explain 'supranational institution-building as the result of rational decision-making within a historical context' from clear and strong interest of the nation state governments involved (Hoffmann 1966). An important part of the discussion of European integration is whether this was initiated as a rescue of the nation state, or to overcome the nation state on the other hand. This discussion started in the first phase of the continuing integration process. In regards to this case, the argument of the integration process as a way of overcoming the nation state is a reasonable argument in relation to the agreement on the climate change. As mentioned these are obligations to targets that nation-states has not successfully reached by themselves, but that the European Union has successfully agreed upon. It might be reasonable to ask if the Member States still have control over their environmental agenda. This, however, will not be answered in this context or thesis. Still, there is limited doubt concerning the fact that that it was the EU and its institutions that negotiated and pushed toward the Climate Package.

3.1.1 Spillover effect

There are several ways to discuss the integration process, and Wilde (2010) outlines the spillover effect; the debate about European integration was focused on *'explaining the voluntary pooling of sovereignty by European nation-states'*,

explained by two schools. The neofunctionalistic approach argued that the process of integration could be explained by a 'spillover effect', namely that once the nation states pooled the power of one policy field, this also created incentives to collaborate in other policy fields. In a process, the nation states set the terms of the initial agreement, but the determination of the direction is set by regional bureaucrats with 'self-organized' interests to exploit the spillover effect (Schmitter 2004). "*These pullovers occurs when states agree to assign some degree of supra-national responsibility for accomplishing a limited task and then discover that satisfying that function has external effects upon other of their independent activities" (Schmitter 2004, 46).*

The agreement concerning the 20-20-20-targets may be used, as an example of a spillover effect, not necessarily be defined as one. The nation-states have for several years already made attempts to reach agreements both internally and through cooperation with other nation-states. The European Union on the other hand established this agreement already in 2000 with the European Climate Change Programme (ECCP). This might indicate a spillover effect, as cooperation in one area leads to positive effects and clearer motivation for cooperation in other areas. These shared policy initiatives in low-politics areas were first seen to have a potential spillover effect in relation to market policy, later on known as functional spill over (Diez and Wiener 2004).

3.1.2 Neofunctionalist critic

One of the criticisms of theory in general is how an integration theory not only should explain integration, but also disintegration. It should be able to explain why nation states delegate and coordinate their efforts, but also why they decide not to delegate to intergovernmental institutions. Almost all other theories of regional integration are only theories of European integration, and therefore have neglected their capacity for self-reflexivity.

3.2 Liberal Intergovernmentalism

"(...) Liberal intergovernmentalism integrates within a single framework two types of general international relations theory often seen as contradictory: a liberal theory of national preference formation and an intergovernmentalist analysis of interstate bargaining and institutional creation" (Moravcsik 1993,

482). Other theoretical schools are in quest to explain the European integration explains the EU as a 'sui generis'[3]. Since liberal intergovernmentalism uses a more 'consistent and rigorous core of micro foundational assumptions' it allows for the theory to emphasize on the motivations of the actors (Moravcsik and Schimmelfenning 2009). Further on, this is a broad theory, a 'grand theory' trying to explain regional integration. It is not trying to explain one single political activity, and trying to link multiple (liberalism and intergovernmentalism) theories together. Albeit it is noted that the authors (ibid) point to the fact that the LI theory in itself argues that it does not support a monocausal explanation. This shows and underpins that one theory is never enough for explaining integration, it also underlines that this is circumstantial. LI alone is not enough to explain the history of European Integration.

LI uses two assumptions for its analyzes:
Firstly, states are actors, and institutions like the European Union can be studied by treating them as actors, in anarchy. The actors will obtain their goals through bargaining and negotiating, instead of 'centralized authority making and enforcing political decisions' (Moravcsik and Schimmelfenning 2009). The second assumption is that states are rational, that actors seek to maximize their utility in every situation.

There are two stages of the theory; in the first stage the national leaders gathers national interests for the constituencies and these interests will be communicated toward European integration. In the second stage of the process, the national governments bring the preferences to the intergovernmental bargaining table. Here the agreements reflect the relative power of each MS, and supra-international organizations exert little or no influence (Pollack 2001, 225). National preferences are assumed being domestically generated and not derived from a state's security concerns in the international system (ibid). *"In empirical terms, Moravscik argues that major intergovernmental bargains, such as the Single European Act or the Maastricht Treaty, were not driven by supranational entrepreneurs, unintended spillovers from earlier integration, or transnational*

[3] In political science, 'sui generis' is broadly discussed whether to be used about the EU or not, concerning its both intergovernmental and supranational elements. Meaning *'of its own kind'* in Latin.

coalitions of business groups, but rather by a gradual process of preferences convergence among the most powerful Member States, which then struck central bargains amongst themselves and offered side-payments to smaller, reluctant Members States. The institutions adopted in such bargains, finally, do *serve to provide Member States with information and reduce transaction costs, but they do* not *lead to the transfer of authority or loyalty from nation-states to a new centre, as neofunctionalists had predicted" (Pollack 2001, 225-226).*

Moravcsik argues in his paper (1993, 500) that during unilateral negotiations, the bargaining power lies with the country less dependant on the agreement being made. That country enjoys greater bargaining leverage. He continues by describing that 'governments of large, prosperous, relatively self-sufficient countries tend to wield the most influence', because, as mentioned earlier, they have the least to gain on the agreement (ibid). The consequence of this is the need to compromise with the least forthcoming government. This imposes a poorer framework for further and greater co-operation. According to Moravcsik (1993, 501) this then leads to agreements based on 'the lowest common denominator'. This does not mean that it is this country's preference that the agreements are based on. It simply means that the possible agreements are biased constrained by the countries preferences. As an example of how the lowest possible standard does not accordingly become the new standard, we use what Moravcsik calls EU regulations of environmental standards. This points out that these standards, in this case for recycling laws for bottles and packaging, are more acceptable to businesses in Denmark, Germany and the Netherlands than perhaps to other countries in the EU. Producers in both high and low standard countries would benefit, according to Moravcsik, since the low standard countries access the markets with higher standard, and the producers from the higher standard countries would be an integrated market with high EU environmental standards. This, in turn, leads to the conclusion that agreements under the 'lowest common denominator' bargaining 'often create incentives for EU to harmonize at a high level'.

3.2.1 Theoretical criticism of Liberal intergovernmentalism

LI tries to explain that the '*majors steps toward European integration' (Moravscik 1998, 4)* are the intergovernmental conferences and treaty

amendments, which have contributed largely to the change in core policies and the institutional set-up of the EU (Schimmelfenning 2004). The criticism is outlined around how Moravscik has a biased case selection of his analysis, and therefore the theory cannot be generalized. Theories should be based on, or have a high *a priori* explanations, for the *intergovernmental* negotiations focused on '*issues of economic integration and requiring unanimous agreement' (Schimmelfenning 2004)*. Instead, Schimmelfenning claims that these kinds of strategies and decisions, by both the Commission and the Council, have been excluded; it only explains the extraordinary decisions, as a treaty process. Moravcsik agrees upon this characterization of the LI as too narrow to entail general decision-making in the EU, but points out that "*LI works best when decision-making is taking place in decentralized settings under a unanimity requirement rather than in settings of delegated pooled sovereignty under more complex and nuanced decision rules*" (Moravcsik and Schimmelfenning 2009, 74).

3.3 New institutionalism

This theory is used with increasing frequency, and also success, when studying the European Union integration as a process. There were three institutionalist approaches developed in the 80's and 90's. It started out as rational-choice scholars tried to avoid the cycling-problem in the majoritarian decision-making. This problem could be avoided with the use of committees, producing 'structure-induced equilibrium', structuring veto and veto power of various actors in the decision-making process (institutionalize) (Pollack 2004). Further, there is an approach explaining how the legislator deliberately and systematically design political institutions to minimize the transaction costs associated with making public policy, called the 'transaction cost approach'. Originally this is made out of studying the United States Congress, although applicable in other international political contexts, as the European Union (Pollack 2004).

Sociological institutionalism (SI) defines institutions as including informal norms as well as formal rules. Rational choice scholars showed how institutions are defined as the formal rules of the game, leading to cycling and therefore "*subsequent work attempted to formally model these institutions and their effects on the outcomes of collective choices"* (Pollack 2001, 227). Historical institutionalism (HI) took a position between the two camps of SI and

constructivist scholars, claiming that the effects of institutions over time can influence or constrain the behaviour of the actors establishing the institutions. So the HIs cover two sides of the theory, both the rationalist and the SI approach (Pollack 2004), rejecting the functionalist approach. The functionalists define political institutions as deliberately designed by contemporary actors for the efficient performance of specific functions. Examples given by Pollack (2004) are provisions of policy-relevant information, and the adoption of expert and credible policies. No attention is given to the historical side of it. The HIs, in contrast, argue how institutional choices in the past can survive and therefore shape actors later in time (Pollack 2004). The historical-institutionalists go even further in this direction, claiming that political institutions and public policies are characterized by increasing returns. By this meaning that institutions and policies generate incentives for actors to stick with the existing institutions, only slightly adapting them. This will lead to path-dependence, which leads to early decision, providing incentives for actors to perpetuate institutional and policy choices inherited from the past. Even outcomes that are inefficient. Worth noting is also how historical institutionalism is not considered as a distinct school of thought, but as a variant of rational-choice theory, emphasizing on the importance of sequencing and path-dependence in the process of European integration (Pollack 2004).

3.3.1 Applications to European integration

To simplify the development of the study of EU integration, rational choice analyses have examined executive politics and powers, judicial politics (ECJ versus national courts), and legislative politics (decision-making within the Council of Ministers etc) (Pollack 2004). Pollack claims that parts of rational choice literature in the European Union has under-emphasized the concept of the European integration as a process, which will continue to unfold over time. He points to the analyses of the origins and implementation of the single European market programme, and how the authors used historical institutionalism as the theoretical framework (2004, 148). I am only indicating the similarities between the much larger implementation process of the single market and the implementation of the Climate Package, including the EU ETS. The historical institutionalism explains how institutions get an agenda on their own, influencing the people surrounding them, and their path becomes decisive over future development.

3.3.2 Criticism

There are two potential weaknesses of the historical institutionalism. The theory does not explain integration in itself, but is more concerned about the effects of the institutions *"as an intervening variable in EU politics" (Pollack 2004, 154).* Also, the theory is based on assumptions, questioned by amongst other both SIs and constructivists.

3.4 Concluding remarks

The European Union is without doubt a heavily institutionalized international organization, with a mix of intergovernmental and supranational institutions. It is a rapidly growing body of both primary and secondary legislation (Pollack 2004). In this chapter I have summarized neofunctionalism, intergovernmentalism, liberal intergovernmentalism and new institutionalism with a focus on historical institutionalism. These theory makes up the four most discussed theories concerning European integration and provides the thesis with several different views on the previous events and developments, in addition to some indications of future events.

The theories first of all give an overview of how the development in the European integration theory discussion has proceeded over the last decades. From the neofunctionalistic view of how the functionally defined actors are the core promoters of the processes, to intergovernmentalism where the nation-states are still in control and supranational institution building is the result of rational decision-making within an historical context. Historical institutionalism sees the effects of institutions over time can influence or constrain the behaviour of the actors establishing the institutions. The four theories can in some way or the other explain how the progress of the union has proceeded. The liberal intergovernmentalist approach how the European Union should be studied with states as actors and that it is these actors that bring their national preferences to the international governmental bargaining table. Concerning the debate in context with the climate package the large countries did initiate the debate. Countries that are trying to build and develop industries able to compete have hade the option to apply for exemptions from the targets. Some industries within certain countries have even been allowed to increase their emissions or not increase their level of

RES. Liberal intergovernmentalism points to how the initiative came from the nations and not the international or supranational organizations.

The spillover view of the cooperation on the area is an additional view. The explanation gives indications of how this effect occur in relation between nations that already cooperate in one area, might have lower barriers to start cooperation in another policy area.

Part III – Methods and literature

4.0 Methods and objective

Limits to a research project have to be respected; therefore a selection of methods and direction of the project has been made. To answer the research question in the best possible way, these limits make the framework and the foundation of my research and analysis. The EU is focused on reaching their targets on emission cuts. The international society is acting together, trying to solve one of the greatest challenges the world has ever faced. Using two case studies to highlight this will let the nation states provide the reader with examples of how the implementation is carried out in the Member States. This will show how the supranational policies affect the domestic level, both in society and in the economy.

4.1 Methodology and Sources

To be able to conduct my analysis and studies I have relied on a variety of sources, both in terms of academic books, books related to the issues of interest, research papers, scientific journals, NAPs and NREAPs, communication from the Commission, Council and Parliament and legal documents to help solve the puzzle of the research question. This means that both primary and secondary sources have been used, although the research mostly relies on the latter. I want to emphasize on how important it is, when choosing a subject like I have, for information to be very current, since articles and information about the levels and targets quickly become outdated. This has shown to create challenges for the author. Even articles that are only a few years old, in some cases only months, may be outdated. The need to find information and analysis that are recent is time-consuming, but in order to make comparisons with numbers from the same period, this has been necessary.

4.1.1 Structure

Most research projects generally share the same structure, being formed as an hourglass. Starting out with a broad area of interest, the initial problem that the researcher wishes to study is how the European Union is working to reach their targets in 2020. This is broken down into research questions and case studies in order to be able to produce answers to the problem of discussion. The answers coming from the research questions can be used to draw conclusions or make observations concerning the bigger picture.

4.1.2 Qualitative research

In large terms, when writing a thesis you have two options; qualitative or quantitative studies. I will not give a full presentation of the different kinds of methods, but explain why I believe qualitative research has given the best explanation to my research question. Science is not all about quantitative research, numbers and analysis of these; qualitative research is by all means often the basis of deeper understanding. Since qualitative research takes more time and requires greater clarity of goals, it has normally been the quantitative research that has occupied the social sciences arena (Berg 2009). No matter what direction one might choose, it is the quality of the product that is important in the end (Dabbs 1982). As noted by Berg (2009); *"students and graduates of social science programs increasingly use the research of others and conduct research themselves"*. Both understanding previous research, on top of doing your own research is important. It is by combining several lines of sight, several sources and methods, that you obtain a more substantial and complete picture of the symbols or trends you are conducting your research on. This is called triangulation; the use of multiple lines of sight (Berg 2009, 5).

The general goal of a research process is according to Berg (2009) *'to discover answers to questions through the application of systematic procedures'*. In the work with my thesis I have tried to work in a systematic manner, knowing what I want to find out, and having an opinion about how I want to get there, and by which means. Since qualitative research does not provide quantitative measures, we must seek fact by observing and talking to people, using not only academic texts but also opinions, newspaper accounts, and articles on the subject. Following a discussion between current actors might be very rewarding, and their opinion

about the subject, even though it is not objective, might lead to new perspectives on the issue. Having this broad platform to build from, it is important for a qualitative researcher to remain rigorous in his work for answers. In the same way systematic work is important. Berg (2009) advocates that a good test for this is that other scientists can examine the same phenomenon through similar or different methods.

4.1.3 Inductive and deductive reasoning

Most of my research is done by an inductive method, and in some cases deductive method. The deductive method develops from assumptions based on existing theory and data. This obviously then relates to the fact that these analyses are secondary. Doing deductive reasoning works from a more general approach, to the more specific, a so-called "top-down" approach. With this method the researcher would start to imagine a theory about the topic of interest, and then narrow it down to a more specific hypothesis. Further we can collect observations to address the hypothesis, and make us to be able to test the hypothesis, to confirm, or not, the original theory (Trochim 2006).

Inductive method has the opposite way of reasoning, from specific observations to broader generalizations and theories, a so-called "bottom-up" approach. This has been, at least partly, applied in this thesis. Starting out with specific observations and measures, to detect patterns and regularities. Next step is to formulate some tentative hypotheses that we can explore, and end up developing a general conclusion or theory (Trochim 2006). The two methods are fairly different. Inductive reasoning is more open-ended and exploratory. Deductive reasoning is more narrow and concerned with hypothesis testing. A study is seldom only deductive or strictly inductive, most research involves both inductive and deductive processes (Trochim 2006). It can also be characterized as an interdisciplinary work; it is based on diverse disciplines such as economical theory, European integration theory, case studies, institutional economics, supranational spillover effects and more. I have started with some specific observations concerning the targets of the Climate Package of 2009, continued with a broad area of interest concerning how the European Union can and will, if possible, reach the targets, narrowed it down to case studies, and tried to analyze their approaches.

4.2 Case studies

"How can you generalize from a single experiment?" asks Yin (2009, 15). His answers are logical; you don't particularize, you generalize, and the goal with a case study, or two case studies, will be to expand and generalize theories, comparing and analyzing. Case studies can include multiple case studies (ibid) and can also include quantitative evidence. You can use a mix of the two methods, combining quantitative and qualitative evidence (Yin 2009, 19).

The research question I want to look deeper into is the implementation of the Climate Package from 2008, especially with regards to renewable energy. Therefore it would be interesting to compare two countries work with the Climate Package. According to Robert K. Yin (2009), the use of case studies in research projects is one of the most challenging methods. My goal will be to collect, present and analyze data fairly. Case studies do also have rigorous rules, and it is important to make a plan, design the project, collect data and analyze. Basically, the reason a case study will be a good method for this project is because the answers I seek are answers to questions like *how* and *why*. "How has the implementation process developed? What were the problems? Why were there problems? How were these solved?"

4.3 A Critical View

As a thesis is coming to an end, I assume most students would appreciate more time and resources. At least this is the way I feel about it. My subject is a large field of study, and the period of the Climate Package is still only in the early stages. Choosing only two case studies will never give a total overview of the situation, and several case studies should, if there were no limits have been conducted. What this thesis will show on the other hand is how two countries have chosen to solve the demands of the European Union and how they have the will to pursue the targets as nation-states. It gives several indications of what challenges and strategies the members of the union are facing, and how they intend to overcome them.

PART IV – ANALYSIS

5.0 How will the Member States reach their target of RES?

The EU has developed their policy concerning climate and energy as an integrated approach that seeks three key objectives:
Security of supply: To better coordinate the EU's supply of demand for energy within an international context. Competitiveness: To ensure the competitiveness of European economies and the availability of affordable energy. Sustainability: To combat climate change by promoting renewable energy sources and energy efficiency (Research and Innovation DG 2011).

It is the year 1990 that is used as the year of reference for the 20-20-20 targets. The effort to achieve these targets is measured from 2005-levels, as there is a lack of data before this year (Kérébel 2009). Some of the Eastern-European countries tried to reject this and use 2005 as the reference year. The reason being that Eastern Europe experienced major economic restructuring in the 1990s leading to significant decrease in emissions, which now are not taken into account, and therefore increasing their burden (Kérébel 2009).

5.1 What are renewable energy sources?

Renewable energy sources (RES) include wind power, solar power (thermal, photovoltaic and concentrated), hydroelectric power, tidal power, geothermal energy and biomass. These sources are by the EU defined as essential alternatives to fossil fuels (The European Commission 2011d). The use of these energy sources will reduce the GHG emissions, secure the energy supply as it will be more diversified, and reduce the European dependence on unreliable and volatile fossil fuel markets (in particular oil and gas) (The European Commission 2011d). *"The growth of renewable energy sources also stimulates employment in Europe, the creation of new technologies and improves our trade balance"* (The European Commission 2011d).

5.1.1 EUs legislative framework

Renewable energy was up until 2008 driven by a loose legislative framework, setting non-binding targets. This leaned on the Renewable Electricity Directive (2001/77/EC) and the Biofuels Directive (2003/30/EC) which set national indicative targets, including the decision that the EU would reach a share of

renewable energy in electricity generation of 21% by 2010 (The European Commission 2011c). These directives led to unsystematic development throughout the region, where some countries started the work with integrating the directives and some took any action at all. Because the rate of progress has been inadequate, the adoption in 2009 of the RES Directive was needed, so that the development would continue throughout the Union and not just in parts of it. This directive also covers heating and cooling, and legally binding targets, not just indicative (The European Commission 2011c). This directive sets out the formal demands for the NREAPs and structures them. It has turned out to pay off for the goals; the comprehensive and binding regulatory framework is proving catalytic in driving forward renewable energy development. In 2009, 62% of all investments in newly installed electricity generation capacity was made in the renewable corner, mainly wind and solar power (The European Commission 2011c).

It is the economies of scale of the industry across Europe that will drive the production costs down, and therefore keep the industry globally competitive. This also creates a huge potential for jobs (The European Commission 2011a). The Commission outlines that the geographical distributions of technologies (producing solar power where there are more sunny days etc.) will produce low production costs ultimately reflecting in the power price, which will benefit both consumers and producers.

5.1.2 Why a 20% target in renewable energy sources?

Deciding on a target for the European Member States entailed a complicated and complex round of negotiations, ending up in a shared effort between the countries. The targets for reaching the RES can be defined as a step towards the 20% reduction in GHG emissions. The 20% reduction is compared to 1990-levels, and using 2005 levels, it would represent a 14% reduction. These targets are split into EU ETS sectors and Non EU ETS sectors, whereas the first group reaches around 21% and the last group 10%, according to the 2005 levels (The European Commission 2011d). As mentioned, questions are raised about why the 1990-levels are used as a baseline. Apparently, this was one of the years with the most comparable data where the MS could agree. Also, this is in the period where the discussion actually took place on the agendas.

The allocation of the reduction targets has been made on the basis of pure cost efficiency. This causes high compliance costs compared to GDP for poorer Member States (The European Commission 2011d). Some of the poorer Member States might even see an increase in their transport sector, at the same time there is a goal of significant equalisation in all the Members States (The European Commission 2011d). This approach has tried to increase fairness. Each Member State got a 5.5% increase on top of their reported renewable energy source level in 2005, and an additional level was decided based on their GDP/inhabitants. Some of the countries that had a high point of departure also got an "early starter bonus", meaning that their additional figures adjusted by the GDP was scaled down, because of the bonus.

The figure 5.2 shows every member country and their development towards 2020. As we can see there are huge differences between the Member States, both in starting point and in the final target. According to the Commissions Climate Action the targets are differentiated with a Gini-coefficient[4] of only 0.19, which is estimated to be a fair differentiation (for comparison Sweden is the country in the world with the lowest Gini-value concerning income, and that number is 0.23, indicating how low 0.19 is) (The European Commission 2011d).

[4]The Gini-coefficient is a measurement method used on measuring equality or inequality of a distribution. The value is given between 0 and 1, 1 being maximal inequality. It is used within economics, health, science, ecology, chemistry and so on.

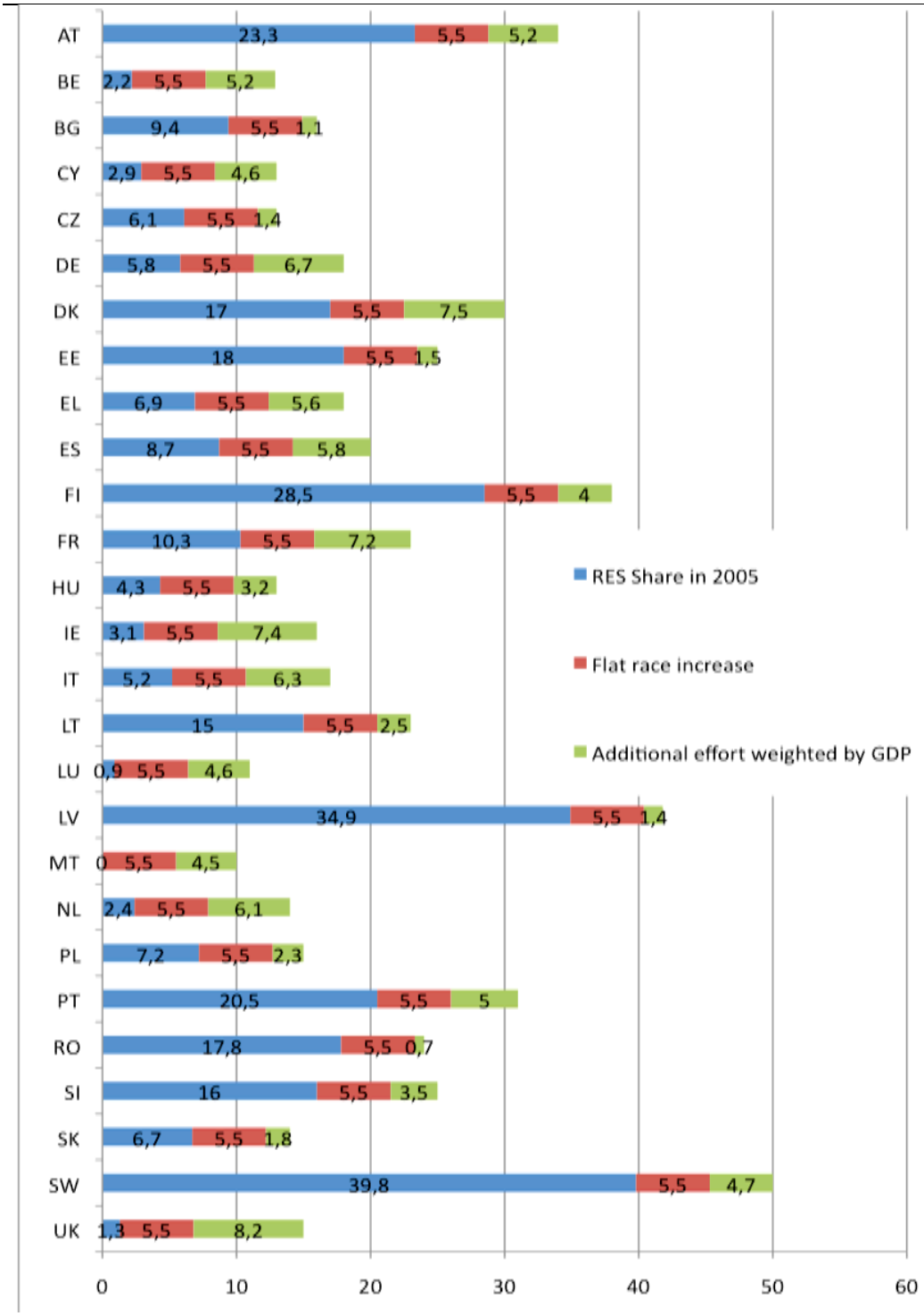
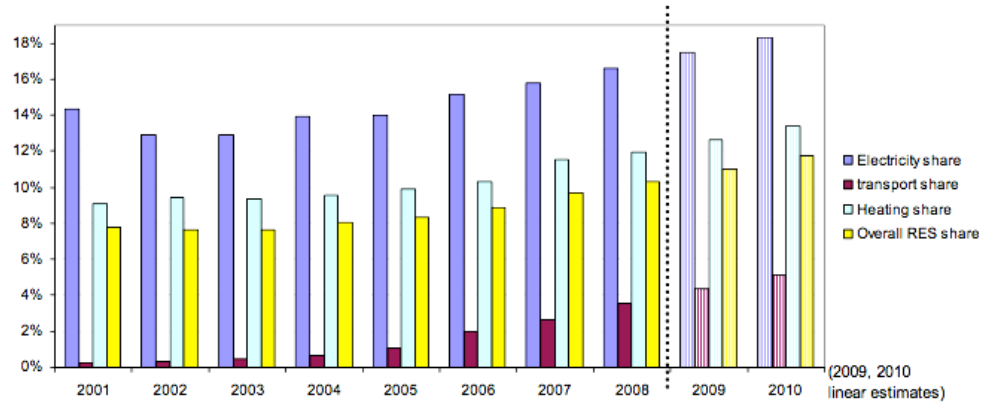


Figure 5.1 Member States RES Effort (The European Commission 2011d).

5.2 Targets in 2010

Figure 5.2 shows the trajectory of the renewable energy sources for the last decade. The overall RES share has gone up from 8,5 % in 2005 to an estimated 12% in 2010. The targets for 2010 included a share of renewable energy in the electricity generation of 21% and a share of renewables replacing petrol and diesel in transport by 5,75%. The EU as a whole reached 18% for the share of renewable energy in electricity, instead of the target of 21%.



Figur 5.2 Sectoral and overall growth of renewables in the EU (The European Commission 2011d).

For transportation the EU reached 5.1% instead of the target of 5.75%. This is also visible from the graph above. As we will see later in this chapter it is expected that the rate of growth will increase in the period to come. Early indications as direct results of the NREAPs shows that the new approach is paying off and that the new comprehensive and binding regulatory framework is proving catalytic in driving the renewable energy development forward, towards 2020 (The European Commission 2011c, 4).

The last decade the EU has increased their ambitions concerning renewable energy goals considerably. In 2001 the EU called for urgent action since RES were not prioritized throughout the Union. A goal of 12 % RES within 2010 was set but already in 2009 the new target of 20% RES by 2020 was established. In 2007, renewable energy covered 13.1% of global primary energy supply, and 17,9 % of global electricity production (International Energy Agency 2007).

The targets set in the 1990s were seen as ambitious targets for 2010, although in 2009 they were already achieved or even exceeded by some renewable energy technologies (European Renewable Energy Council 2011). To give another example on how some projections have worked out we will take a look at the Commissions White paper for a Community Strategy and Action Plan from 1997. These were the projections made for 2010.

- With a cumulative installed capacity of 84 GW at the end of 2010, wind energy largely exceeded the White Paper 40 GW target.

- The 2010 target for PV was 3 GW of installed capacity while reality show nine times this figure in Europe with an estimated installed capacity of above 27 GW.
- Geothermal heat had already exceeded three times the installed capacity projected in the White Paper with 13 GWth instead of just 5 GWth.

(European Renewable Energy Council 2011).

These numbers show that there are rapid progresses in the sector of some technologies, while other technologies are lagging behind. The progress in the field of heating and cooling was much slower than in the field of electricity and the European Renewable Energy Council (2011). This points to how this can be explained by the lack of dedicated legislation. With the RES Directive the heating and cooling sector was included, and the gap is starting to close. *"However, a strong effort will be required in the next decade to bring the heating sector up to the same speed as the electricity sector where progress over the last years has been impressive (European Renewable Energy Council 2011).* The European Union could still raise the targets with a probable certainty of the Member States reaching them, now that the legislative framework, which has only been there since 2009, is present. In 2014 there will be an assessment of the effective functioning of support schemes and cooperation mechanisms in the light of the review. This review will help and facilitate the development of cooperation mechanisms and prepare the ground for further development in the European Union.

In 2010 there were installed more renewable electricity capacity in the EU than ever before, compared to 13.3GW in 2008, 17.3GW in 2009, installations reached 22.6GW in 2010.

5.3 RES versus fossil fuels today

By switching to renewable energy sources, the European Union could cut consumption of fossil fuels by 200m-300m tonnes a year and reduce CO_2-emissions by 600m-900m tonnes a year (The European Commission 2010e).

Renewable energy sources represented 10.23% of final energy consumption in 2008, from 8.5% in 2005.A general summery of the situation today includes that

we are facing fuel shortages, skyrocketing energy prices, climate change, nuclear contamination, catastrophic oil spills, and energy wars. We are dependent on non-renewable energy such as oil, natural gas, coal and nuclear power, instead of sustainable, provident energy supply. The good news is that the technology to turn the situation, the basics for the transition already exists (Kamal 2011). Renewable energy is crucial for reaching a low-carbon economy, an economy we need to reach if we want to keep the global warming under 2 degrees Celsius. The European Environment Agency estimates that of the 20% target the transport sector will represent 12%, the electricity sector 45% and the heating and cooling sector will represent 43%. By 2020, 36% of the electricity will be supplied by RES. In the heating and cooling sector the number is estimated to 21.9% and transportation is seen to have reached 11.5%, overtaking the initial goal of 10% (ENDS 2010, 2).

Countries expecting to surpass their goals, will be in a position where they can help their neighbours through the cooperation mechanisms, described in the Renewable Energy Directive. Actually, half of the Member States, namely Austria, Bulgaria, Czech Republic, Denmark, Germany, Greece, Spain, France, Lithuania, Malta, the Netherlands, Slovenia and Sweden expect to exceed their binding targets. Only Italy and Luxembourg have set out to be recipients of cross-border cooperation (ENDS 2010). Looking at the MSs in general, the countries with the lowest 2020 targets have the most ambitious plans, compared with their level of point of departure. This includes for example the Netherlands and the UK. They are starting from a low level of penetration and have a long way to go to reach the targets required under the renewable energy directive (ENDS 2010). Countries like Austria and Sweden have targets over 4 times as high as the Netherlands, although relative to the level of departure they are not as impressive.

5.4 Member States targets trajectory in RES – an overview

	Reference	Indicative trajectory				Target
	2005 [%]	2011-2012 [%]	2013-2014 [%]	2015-2016 [%]	2017-2018 [%]	2020 [%]
Belgium	2.2	4.4	5.4	7.1	9.2	13
Bulgaria	9.4	10.7	11.4	12.4	13.7	16
Czech Republic	6.1	7.5	8.2	9.2	10.6	13
Denmark	17.0	19.6	20.9	22.9	25.5	30
Germany	5.8	8.2	9.5	11.3	13.7	18
Estonia	18.0	19.4	20.1	21.2	22.6	25
Ireland	3.1	5.7	7.0	8.9	11.5	16
Greece	6.9	9.1	10.2	11.9	14.1	18
Spain	8.7	11.0	12.1	13.8	16.0	20
France	10.3	12.8	14.1	16.0	18.6	23
Italy	5.2	7.6	8.7	10.5	12.9	17
Cyprus	2.9	4.9	5.9	7.4	9.5	13
Latvia	32.6	34.1	34.8	35.9	37.4	40
Lithuania	15.0	16.6	17.4	18.6	20.2	23
Luxembourg	0.9	2.9	3.9	5.4	7.5	11
Hungary	4.3	6.0	6.9	8.2	10.0	13
Malta	0.0	2.0	3.0	4.5	6.5	10
Netherlands	2.4	4.7	5.9	7.6	9.9	14
Austria	23.3	25.4	26.5	28.1	30.3	34
Poland	7.2	8.8	9.5	10.7	12.3	15
Portugal	20.5	22.6	23.7	25.2	27.3	31
Romania	17.8	19.0	19.7	20.6	21.8	24
Slovenia	16.0	17.8	18.7	20.1	21.9	25
Slovakia	6.7	8.2	8.9	10.0	11.4	14
Finland	28.5	30.4	31.4	32.8	34.7	38
Sweden	39.8	41.6	42.6	43.9	45.8	49
United Kingdom	1.3	4.0	5.4	7.5	10.2	15

Firgure 5.3: The EU Member States targets for RES (Beurskens and Hekkenberg 2011)

The RES Directive sets out interim targets for each country, shown in the table above. The targets will be, and already are crucial for monitoring the progress of the Member States. EREC suggests that these indicative targets should be mandatory to avoid delays throughout the period (EREC 2008). They also suggest heavy fines for not staying on the trajectory, to give incentives to invest in renewable energy.

Generally in the Union, targets for electricity are the highest and plans for increasing renewable energy in electricity generation are the ones best communicated and explained. Targets for heating and cooling come in second place. Some Member States already have a very well developed renewable heating and cooling system; others have barely anything at all (ENDS 2010, 6). Transport has the lowest targets at 10%.

We can paint a picture of the Member States already holding a high level of RES, but only committing to modest growth. The table above represent the trajectories put together by the European Environmental Agency, based on the NREAPs. The

hand-in of the reports in 2010 was done to make a comparison easier, in addition to monitoring the countries' progress. As we see from the table, the average goal in 2020 is 21.04 %, coherent with the 20-20-20-goal. The difference between the countries on the other hand, is rather significant. The Netherlands may have a target slightly lower than expected. Countries like Spain, Latvia, Estonia, Slovenia and Italy all have targets rising above the Dutch goal. In January 2007 the Dutch government reported the following to the Commission: *"In its climate policy, the Netherlands set a global target of 5% renewable energy by 2010, and 10% by 2020. According to the EU Directive, the RES-E share of the Netherlands should reach 9% of the gross electricity consumption in 2010" (The Dutch Government 2007).*

Bulgaria is starting on 9%, according to their NREAP, ending on 16% by 2020, representing a 77% increase from the level of 2010. Germany, representing a 72% increase, from today's 9% to reach a goal of 15.5% renewables by 2020 (Environmental Data Service 2010). Germany has also received criticism for not being offensive enough, rather having the same goals as countries starting from a lower level. The spokesperson for the German Renewable Energy Federation (BEE) states the following: "*The heating sector accounts for more than half of energy consumption in Germany. (...) There is an urgent need for a change in renewables [in that sector] otherwise it would be difficult to reach the German climate protection goals" (Environmental Data Service 2010, 6).*

Italy relies mostly on natural gas for heating, and the Italian renewable energy association (APER) admits that restructuring the countries' electricity grid from national to a locally distributed source, as biomass is a huge challenge. Poland has a share of renewables to 6.2 %, Lithuania at 8 % and the Czech republic is at 7.6 %. Despite this, their targets for 2020 are respectively 19.43 %, 21 % and 12.7%. Finland's 2020 target is only 6 percentage points up, from 26 % to 33 % share of renewables (ENDS 2010). Taking a look at the sectors of interest, it is the transport sector that has the lowest targets overall in each Member State. The targets stay around the 10% EU target with the UK and Ireland having set targets of 10 percent by 2020, up from about 3 percent each in 2010. Looking at the Netherlands neighbouring countries, Germany's 2020 target for transport is 13.2% up from 7.3 % in 2010. France has gone from a 2010 share of 6.5 % to a target of

10,5 %, and in Austria, where the other sector targets are quite high, the transport target is only 11.4 %, up from 6.8 % in 2010, representing only 4.6 percentage points (ENDS 2010, 7). Further, Spain sets a 18.8 percentage 2020 target, reporting a level of 7.4 percent in 2010.

5.4.1 Integrating RES into the infrastructure - Smart Grids

On of the biggest challenges pointed out by the Commission is how to integrate the renewable energy sources into the European grid. The plan of the smart grids set policy directions to drive forward the deployment of future European electricity networks. As pointed out in this thesis the physical hinders of integrating the renewable energy into the grids all over Europe is as big a challenge as actually reaching the level of 20%. Reaching this level will have less impact if the electricity cannot be brought to the citizens or they cannot follow the development. Educating the population about their energy use is an important factor in the work. *"Bringing together latest progress in Information and Communication technologies and network development will allow electricity current to flow exactly where and when it is needed at the cheapest cost" (The European Commission 2011b)*. The smart grids will play a particularly important role for the consumer's ability to follow their actual electricity consumption in real time, giving consumers strong incentives to save both energy and money. Estimates show that smart electricity grids should reduce CO_2-emissions in the EU by 9% and the annual household energy consumption by 10%. The Smart grid will enable the integration of vast amounts of both on-shore and offshore renewable energy and electric vehicles while maintaining availability for conventional power generation and power system adequacy. Without the smart grid, the renewable energy generation will have to be held on hold (The European Commission 2011b).

5.5 Level of Achievement, thus far

EREC called in 2004 for the binding target of 20%, showing that the EU Renewable Energy Industry could foresee to reach the 20% renewable energy consumption target. These estimates based on feasible an annual growth scenario for the different technologies, and these estimates shows how some of the renewable energy sectors could deliver more than 20% (EREC 2008).

The countries that already held a high level of RES do not to set even more

ambitious goals, which is unfortunate. Although they maintain this high level, should not be a reason to rest on their laurels. In fact, it should be a reason to do the opposite. The Member States' projections already show that they will grow at a faster pace than in the period arriving, then in the past period. As mentioned fourteen countries expect to surpass their targets in 2020, and only two countries expect to rely on the use of the cooperation mechanisms.

Looking at the forecasts published a year before the NREAPs lays out a different scenario for the Member States. Here a total of five countries predicted to use the joint cooperation mechanisms, not two as is the situation today. Only ten Member States predicts to surpass their target, and the European Unions average was calculated to surpass the 20% target with only 0.3%, in comparison with 0.7% which is the prediction today (The European Commission 2009). Even more importantly is that an additional three countries expect to succeed their interim numbers in the years prior to 2020. This indicates that the growth rate will actually decrease closing up to 2020.

6.0 European Unions Member States Sectoral Targets

Renewable energy sources represented 10.23% of final energy consumption in 2008, and 19.9% of Europe's electricity consumption in 2009. Of this 19.9% hydropower contributed the largest share with 11.6%, followed by wind with 4.2%, biomass with 3.5%, and solar power with 0.4% (European Renewable Energy Council 2011). From 2008 to 2010, the renewable electricity share of newly installed capacity increased from 57% to 62%. According to Eurostat, the share of RES in heating and cooling reached about 11.9% in 2008, with biomass representing 11.4% of heat consumption, geothermal 0.3%, and solar thermal 0.2% (European Renewable Energy Council 2011). The share of renewables in transport amounted to 3.5% of the gross final energy demand in the transport sector in 2008 according to Eurostat.

Renewable energy sources produced 19.9% of Europe's electricity consumption in 2009, distributed as follows: Hydropower 11.6%, wind 4.2%, biomass 3.5%, and solar power 0.4%. Further, the EREC reports that the share of RES in heating and cooling reached about 11.9% in 2008, with biomass making up for 11.4% of

heat consumption, geothermal 0.3%, and solar thermal 0.2%. In the transportation sector the share of renewables amounted to 3.5% of the gross final energy demand in the transport sector, in 2008 (European Renewable Energy Council 2011). Most of the targets for 2010 were already achieved or even exceeded by some renewable energy technologies in 2009. The European Commission observed how the projections for 2010, from 1997, were exceeded and also how the progress in the heating and cooling sector was much slower than in the electricity sector. This is mostly due to the lack of dedicated legislation. Examples of the targets exceeded, mentioned in the previous chapter, are numerous. Setting high targets could lead to reaching higher levels, even though this means risking not actually reaching the targets, albeit failing at a higher level. Member States combined are expecting to more than double their total consumption in renewable energy, from 103Mtoe to 217Mtoe in 2020. The electricity sector is expected to account for 45% increase, heating and cooling 37% and transport 18% (The European Commission 2011c).

6.1 NREAPs forecast versus RES industry

If we look at the binding targets, comparing the Member State Forecasts in the NREAPs with the RES industries forecasts, the industry foresees, without exceptions, that they can reach higher targets than the ones set in the NREAPs. Already, 25 out of 27 countries expect to reach or exceed their 2020 targets domestically (European Renewable Energy Council 2011). Austria's industry reports 46.4% compared to the Austrian NREAP of 34.2%, Lithuania reports of 31.7% compared to its 24.2% in the NREAP, Sweden 57.1% compared to 50.2%, Hungary 18.3% compared to 14.7%. On average in the EU the NREAPs expects to reach 20.7%, whilst the RES industry in Europe forecasts that they can reach 24.4% within 2020 (EREC 2011b). In the end the industries' effort will play a major role, and considering how they believe they can exceed the targets, the European Union legislation could facilitate the targets even more, especially taking the industries' views.

6.2 Sectoral development – future visions

6.2.1 Heating and cooling sector

The graph below gives an indication of the expected growth of technologies towards the target year of 2020. Until today (2011) there is reported a modest

growth, mostly explained by a lack of support in the framework by the Member States. Considering how the heating and cooling sector was included in the RES Directive, this will change in the time period coming, as Member States already plan to reforms to their grants, feed in tariff regimes and other instruments in the heating sector (The European Commission 2011c). Biomass is, has been and will continue to be the dominant technology, representing 50% of the growth in 2020.

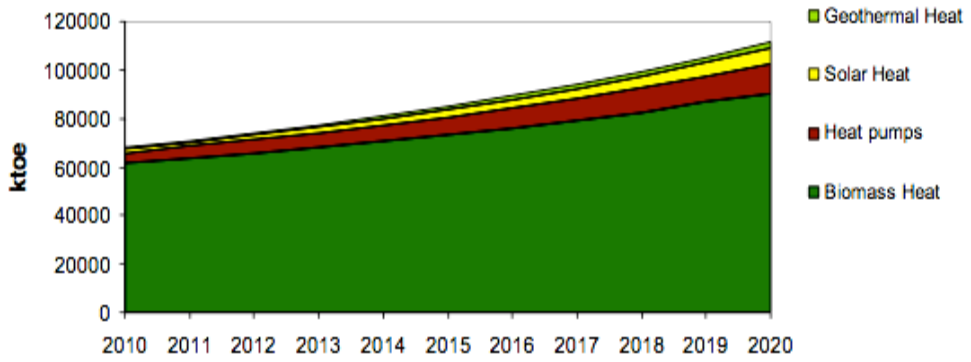


Figure 6.2 EU development of renwable energy in heating and cooling (The European Commission 2011d).

6.2.2 Electricity sector

Considering the targets for 2010, only Denmark, Germany, Hungary, Ireland, Lithuania, Poland and Portugal expect to achieve their targets in 2010. The Commission emphasizes how the renewable part of the electricity sector plays a significant role in reaching the targets for 2020. The graph below indicates the expected trajectory for the period form today until the year 2020. Hydropower is today, and will remain, the biggest contribution, and wind power will experience a rather steep expansion towards 2020. The other four categories of sources represent no big changes, although there is a steady rise in each sector.

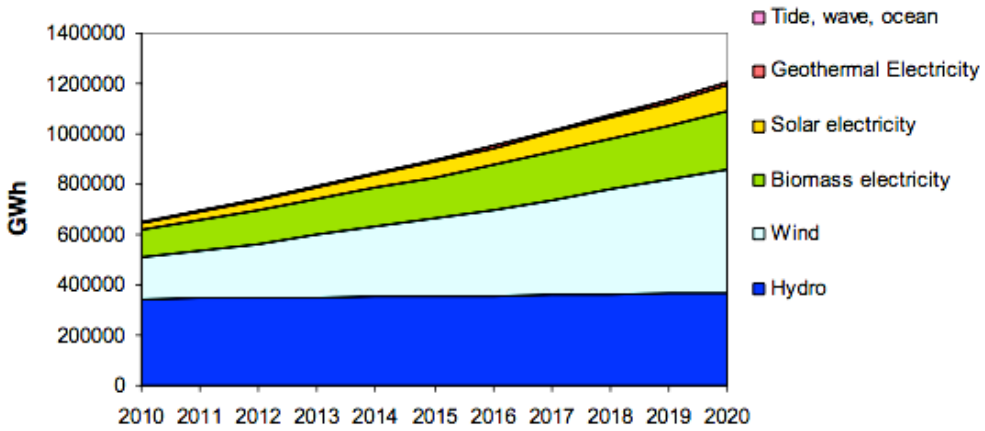


Figure 6.3 EU development of renewable energy in electricity (The European Commission 2011d).

This projected expansion of the RES points out several implications. First of all, as already mentioned, the electricity grid creates major challenges for this sector. It highlights the need to modernize the grid in order to be able to integrate large volumes of electricity from renewable energy. It is especially hard to integrate off-shore production, such as wind mills etc (The European Commission 2011c). It is also emphasized by the Commission how electricity produced from renewable sources also has implications for the electricity market as a whole (2011c). An additional challenge is considering distance to consumption centres, implied grid need, and so forth.

Hydropower, for example, varies with a production rate from 0.1% in Denmark, to 65% in Austria. Of course geographical differences explain most of the differences when they are that clear. What it doesn't explain is why Portugal and Greece, both sunny countries, only made up 0.7 and 0.2 percent of the European market of solar thermal energy (Seifried and Witzel 2010). According to Hansten Berge (ENDS 2010) it is the cooperation mechanisms that will be essential for the countries with relatively high targets, but maybe limited domestic sources. This allows countries to use imported renewables, this is also cheaper, from countries with a surplus. As mentioned only a few countries will have to make use of the system, although EREC and Hansten Berge predicts it will be used in a larger degree as we approach the year 2020. He also emphasizes that the potential in the heating and cooling sector is bigger, than what is estimated today. He acknowledges that making demands on the electricity suppliers is easier than targeting private property owners, although these measures needs to be taken in order for the Union to reach its full potential.

6.2.3 Transport sector

This is the sector with the lowest goals of the three sectors, having a common goal of 10%. A rather strong transport lobby represents the sector, and it is believed to have made a big contribution to the discussion. In addition to this it is emphasized how few options there are in this part of the Action Plan. This relies on the private sector for technical innovation, and therefore it is still the responsibility of the governments to work with the policy for bio fuels. Still there are few concrete plans for this problem area. Only Austria, Finland, Germany, Malta, the Netherlands, Poland, Romania, Spain and Sweden are expected to achieve their

targets by 2010 within the transport sector (The European Commission 2011c). Biofuels will continue to be the dominating source working towards the famous year of 2020. Europe is defined to have the strictest criteria in the world for biofuel sustainability, which is laid out in the RES Directive.

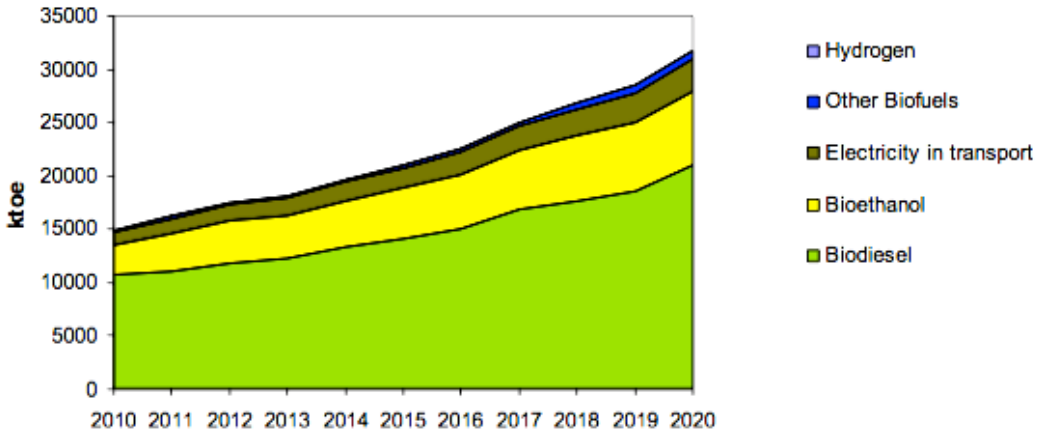


Figure 6.4 EU development of RES in transport (The European Commission 2011d).

7.0 Economical view

7.1 Economic benefits of RES

There is no doubt that considerable efforts and investments are needed in order to make our energy supply sustainable. Renewable energy sources have to make up a large share of the supply. There is a common approach to the economic side of the discussion, assuming energy prices will continue to increase, whilst a recent independent study actually shows the opposite: *"Prices are likely to decrease as a consequence of the growing share of renewables."* The reasoning is logical and illustrated by the following:

> *"Prices on power exchanges are sorted in ascending order. The greater the demand for power, the more power plants with low efficiency rates and higher fuel costs are used. But if a large amount of renewable power is being generated, the worst power plants are no longer used. Supply and demand converges to produce lower exchange prices. On average, power prices in Germany have fallen as a result by as much as 0.76 eurocents per kilowatt-hour"* (Seifried and Witzel 2010, 38).

This shows that the process of reaching the 20-20-20 targets also will benefit the end-consumers in a long-term aspect. We also see how this benefits the society broadly and on a long-term basis.

Electricity and gas markets are not yet working as a single market. Most energy markets remain national in scope and are highly concentrated with numerous barriers to open and fair competition. Often incumbent companies having a *de facto* monopoly position and regulated energy prices further reduce competition in many Member States (The Directorat-General for Energy 2011). Another aspect of the 20-20-20 goals, is that for the EU to be able to meet its target of 20 % renewable energy in 2020, this will create almost 700 000 new jobs within this fairly new sector. Commissioner Dimas (The European Union 2008) advocates that this will be a part of the solution for the financial crisis the EU is going through, as a part of a 'green new deal'.

7.2 Economic costs of the RES scheme

"(...) While they [NREAPs] *display some sound planning and a significant amount of goodwill on the part of the Member States, the plans are just figures on paper. The challenge will be to deliver the investments needed to build capacity."*

(Environmental Data Service 2010, 8)

The fact is that very few of the Member States actually included detailed data on cost and benefits of the measures in their plans. They claim it is too early to make the projections. The plans that do exist are based on calculations and assumptions made by national energy agencies or government departments in earlier reports. These documents are in general not mentioned. Some countries give figures, whilst other countries have chosen to focus on their plans' benefits. Portugal expects to employ about 100,000 green energy professionals, whereas Germany plans to employ around 400,000. Slovenia has reported to invest about €465m for electricity and €442m for heating and cooling. Implementing Luxembourg's plan is estimated to cost around €830m (Environmental Data Service 2010). It will be critical in the near future to get these projections made, and to actually implement the investment cost either in the national budgets, or make efforts to make private companies invest.

The Commission's Communication on infrastructure priorities indicates that more than one trillion Euros is needed between 2011 and 2020 in order to reach the targets (The European Commission 2011c). This is related to replacing or investing in new electricity capacity. As already mentioned, there is a large need

for an upgrade of the electricity grid in order to be able to distribute the renewable energy produced. It is pointed out how new investments should in the renewable electricity sector, and the EU uses a lot of space to communicate this; an indication that the challenge is being taken seriously. They are aiming for a higher level than the 62% of new installations in 2009. The Commission suggests that *"annual capital investment in renewable energy today averages €35bn, and that this needs to be doubled ensuring them to reach their goals" (The European Commission 2011c, 8).* According to the Commission the end consumers today pay for most of the investments, whilst the future prospects plan for investment funding.

7.2.1 Cost of technology

There are several reasons why it is challenging to calculate estimated cost of each technology. E.g. the cost of buying and installing a three-kilowatt photovoltaic (PV) installation is much lower in Germany, than in France (Environmental Data Service 2010). Reliable information on standard cost, worked out by the IEA, does indeed exist. This is called Renewable Energy Essentials. The ENDS does still emphasize that also these numbers must not be taken literally, based on the fact that technology prices drop rapidly. The renewable energy umbrella body European Renewable Energy Council (EREC) estimates that future investments will reach €963bn by 2020, rising to around €1,629bn by 2030. An estimation based on IEA prices shows that funding is required to meet national targets (Environmental Data Service 2010). Concerning the PV, several countries plan massive investments in the near future; Italy and Spain are to invest respectively €19.8-29.7bn and €13.6-20.5bn. Spain will be the largest investment hub for onshore wind power, with 16.3-30.2bn, followed by the UK and Italy. In offshore wind power, the UK will have the highest investment at between €28.3bn and €42.9bn, followed by Germany and the Netherlands with €24-36bn and €12-18bn respectively (Environmental Data Service 2010, 8). Funding, or the renewable energy investments, will cover capital costs, while the operational and maintenance costs are calculated to be low (ENDS 2010).

7.3 Comparing research funding and subsidies

One of the arguments against the development of renewable energy sources is the cost. Taking a look at the German government, however, we see that they spent

nearly five times as much money, €15.3 million, researching nuclear energy than they spent on renewables and energy efficiency between 1974-1999. After the 1992 UN Conference on the Environment and Development in Rio de Janeiro we can see a shift in the focus area of funding. From 2001-2003 Germany invested another €51 million per year in research into renewables and energy efficiency. In 2005-2008 €421 million were set aside for renewables, and €219 millions for nuclear research. This clearly shows that funding for research on nuclear energy is reduced, and the commitment to renewables is increased heavily. When considering the union in total, nuclear funding is still favoured, and between 2003-2006 two thirds of the budget went to nuclear research (Seifried and Witzel 2010). Renewable energy sources, such as solar energy, have not enjoyed the same research funding, and continuing to support this research is important in order for new solutions to be developed. In 1997 a group of experts predicted that approximately €39 billion would be needed by 2010: €29 billion for energy cost, and €10 billion to start-up financing. This would mean saving around €700 million per year over a 14 year scenario. This still constitutes a relatively small amount when compared to subsidies made to other sectors.

7.4 The Financial Crisis in relation to the Climate Package

Europe, and large parts of the world, experienced a severe recession in 2008, as the EU came to an agreement concerning the Climate Package. Europe is not working alone in creating a low-carbon economy. China, Japan and the US are also competing to create a more attractive investment environment by introducing low carbon policy frameworks amongst other. To maintain its important position, Europe cannot begin lagging behind in this development. A shift in the economy, towards a low carbon economy will not only be from a climate point of view. This will also secure energy security as our dependency on oil and gas will decrease. These are challenges not only for DG Climate of Environment, but also for several of the other DGs in the Commission. Energy and climate are the two sides of the same coin. The challenge Europe is facing entails stay at the forefront of this industry, to ensure it grows, at a time when governments are simultaneously faced with the need to curtail spending (ENDS 2010).

Europe has seen a sharp fall in its GDP in 2009, and according to the IMF the decrease is around 4.2%, a number supported by other institutions. In the same

period the Commission had drafted a growth of 2.2% on average until 2010 and 2.4% from 2010 to 2020. Caused by the economic crisis the opposite has been observed. The level of GDP has a direct impact on the emissions and targets because production activities will lead to GHG emissions (Kérébel 2009). The IMF now predicts a flat growth in 2010 and a slower paced growth in 2011, compared to the predictions before the crisis (Kérébel 2009). One of the discourses after the recession is that the EU climate policy is said to be too costly and that the European industries are having a big enough challenges as it is. There is a slow down in demands for goods and products and a downturn in economic and industrial activities. Some actually argue that the slowdown in the economy itself will lead to the targets. It might be too soon to see the effects of the financial crisis on the Climate Package, although there is limited doubt that concerning investments it has had a negative effect (Kérébel 2009).

PART V - CASE STUDIES

It is the National Action Plans (NAPs) that will ensure that the EU eventually will reach their 20-20-20 targets. Concerning the renewable energy target the member sates have developed National Renewable Energy Action Plans (NREAPs). The NREAPs are planned by the countries them selves, and the Commission approves them. The national governments decide on what permits are to be allocated where and to what industries and companies. If a country needs more emission allowances, or is in position to sell some of its allowances it is the Community Independent Transaction Log (CITL) that gathers and stores all the information from the trading between the countries in the national register. By 30 June 2010, the article 4 of the renewable energy directive required Member States to submit National Renewable Energy Action Plans (NREAPs). These were developed in cooperation with the Commission and function as *"detailed roadmaps of how each Member State expects to reach its legally binding 2020 target for the share of renewable energy in their final consummation" (The European Commission 2010f)*. These plans all include technology mix, trajectories to follow, outline of barriers and how to overcome them. The Commission evaluates and asses them (The European Commission 2010f).

8.0 The Netherlands

"The Directorate General for the Environment is responsible for national environmental policy directed to contributing to sustainable economic development and to the health and safety of people by maintaining and improving the quality of the environment. (...) The Netherlands pursues a successful environmental policy that is resulting in cleaner rivers, reduction in carbon emissions, reduction in waste steams, and cleanup of contaminated soil. There are still more challenges such as air quality, climate change, and the depletion of natural resources and biodiversity. The Ministry is committed to sustainable management of the environment within the Netherlands and in the wider EU and global context" (The Minister of Infrastructure and the Environment 2011).

In 2005 the Netherlands started out at 2.4 % RES, and by 2020 the target to reach is 14%. Estimations show that they have the technology and knowledge to live without the non-renewable energy solutions of today. The challenges on the other hand, can be counted as several, starting with an outdated electricity grid.

8.1 The Netherlands today

The Netherlands' main sources of energy today are natural gas, oil and coal. The energy consumption is measure in total to 3,3 EJ and the renewable energy sources are estimated to be around 0,1 EJ, representing around 0,03 % of the total energy consumption (The Dutch Government 2010). The Netherlands has created a strategy to reach the target of 14 % by 2020, and with the substitution method, they estimate reaching 15.5%. 3 main elements are pointed out needed to reach their targets:

- Making the supply of energy cleaner and more efficient through the encouragement of energy savings, the production of renewable energy, and the capture and storage of CO_2.
- The promotion of smoothly running energy markets in which the consumers of energy occupy a central position and in which there is total freedom of energy innovations at a central and local level
- Creation of a healthy and stable investment climate for all energy options by defining a clear framework and procedures, with additional incentives where necessary. (The Dutch Government 2010, 10).

8.2 Renewable energy sources in the Netherlands

The Dutch NREAPs splits the overall target in the following way: RES-E 37%, RES-H 8.7% and RES-T 10.3%. It is expected that they will move beyond their trajectory throughout the period. Worth noting is that even though they assume to reach their target, they do not exclude the possibility of cooperation mechanisms. Despite the comments on these mechanisms they show no indications of either receiving or selling through cooperation in their NREAPs. *"The Netherlands is a significant producer (and exporter) of natural gas and depends on energy imports for oil and hard coal. Electricity is generated mainly from gas and hard coal. The use of renewable energy sources for power generation has been increasing. The Netherlands have a significant installed wind power capacity"* (European Renewable Energy Council 2009).

The RES industry of the Netherlands covers various technologies. Approximately 350 companies and industries are active in the project development. There is reportedly a strong focus on innovations in RES-R&D. Confirming this strong research position is the numerous Dutch technological institutes on wind, solar PV and biomass (Rosende et al. 2010).

8.3 Sectoral targets

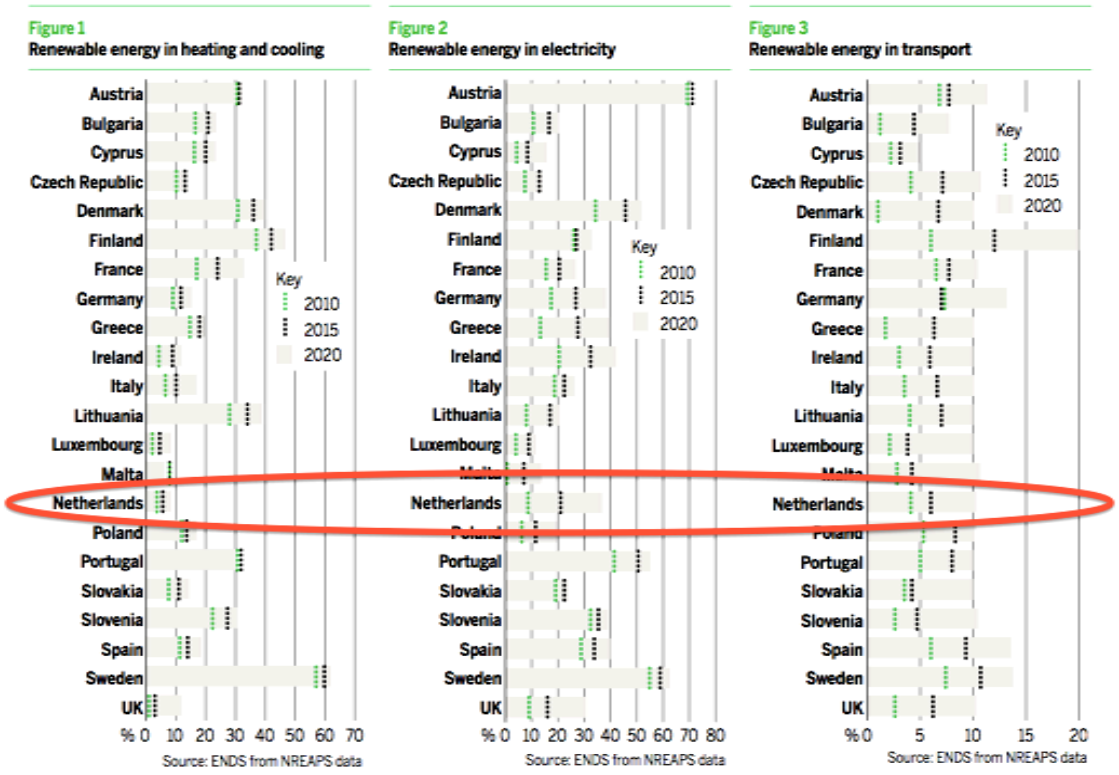


Figure 8.3 Overview of 19 Member States, per sector, (ENDS 2010)

The figure above puts the Netherlands in a context with the rest of the European Union Member States. They have one of the lowest targets in RES-H with hardly any progress from 2010 to 2020. In comparison, another country starting from the same point of departure is the UK, starting from a lower level, but exceeding the Dutch targets. Ireland too starts from a low level, but they too, exceed the Dutch target.

In the RES-E sector the Netherlands show a much higher ambition. Compared to countries from the same point of departure, this shows that the Netherlands exceeds most of them. The Dutch target is also closing up to countries starting from a much higher point of departure, showing more initiative and ambitions in this sector than the RES-H.

Concerning RES-T they have a fairly average point of departure, this sector might be the sector with the most similar goals, ending around 10%. The Dutch goal is right where it should be, at 10%, although the development between 2010 and 2015 could be criticized for not being stronger. This period takes less than a third of the development in total. 6 countries has set out to reach targets significantly higher than the minimum of 10%, Austria, Finland, Sweden, Spain, Germany and the Czech Republic. None of these countries started at a significantly higher level in 2010 than the Netherlands, meaning that their ambition and will is making precedence in the Union.

8.3.1 Heating and cooling sector

The heating and cooling sector the Netherlands has a goal of only 8.7%. In comparison, Ireland and the UK have a target of 12%, and the Nordic country of Denmark, where heating is an obligatory matter, has set the target to 39.8%. This represents an impressing 31.1% percentage points higher then the Netherlands. Still, since Denmark already has a high level of RES in their heating and cooling sector, their target represents little of improvement. The policy of the Dutch government has favoured coal plants, and this explains the low number of 8.6% in 2010 (Environmental Data Service 2010). As in many of the other European countries, the support for RES-H is lower than for the RES-E. The Dutch NREAP

advocates that the RES-H sector will get more attention in the future, closing up to 2020.

In 2010 the European Investment Bank and European Commission approved two new energy efficiency projects under the European Local Energy Assistance programme (ELENA). The projects were aimed at helping cities and regions meet Europe's climate policy goals. The Netherlands has been one of the first countries to get this kind of investment help converting a district-heating network serving 25,000 homes and businesses in the Netherlands to renewable energy sources.

The European Investment Bank Vice President Simon Brooks, responsible for EIB financing in the Netherlands and also the bank's environmental operations, said: "*District heating in northern Europe offers huge potential for energy savings and reducing carbon emissions. This project is a good example of how cities can contribute to meeting the European Union's climate goals and we hope will set an example for others to follow" (Antonovics 2010).*

8.3.2 Electricity sector

The ENDS states that the Netherlands' target concerning RES in the electricity sector is ambitious, although experts question whether current policies can deliver it.

> "*The action plan sets a target of 37% by 2020, representing a 430% increase in ten years. Such an ambitious target would be a stretch at the best of times (...) Neighbouring countries have far more realistic targets, but they are starting from a higher level. Germany, Italy and France are starting from 'teen' levels and aiming to reach the high twenties or – in the case of Germany – a solid 38.6%" (Environmental Data Service 2010, 7).*

The Dutch electricity sector is using a system called SDE (Encouraging Sustainable Energy) through a feed-in (tariff) premium subsidy scheme which supports the production of renewable gas and electricity (European Renewable Energy Council 2011). The new system, SDE+ *"means that mature renewable energy solutions have a better chance of receiving a subsidy" (European Renewable Energy Council 2011, 76).* The industry communicates that they also miss more stability and certainty, and a FiT (Feed-in tariff) is mentioned as a

possible solution. The industry expects 4,628ktoe[5] in consumption for the electricity sector, while the NREAP predicts 4,326ktoe (European Renewable Energy Council 2011).

8.3.3 Transport sector

The Netherlands aims for around 10% in the transport sector, which is comparable with the other Member States. The blending in bio fuels since 2010 has been 5.75%, up from 2.5% in 2005. Contrary to other EU countries, bioethanol is the dominant variety of bio fuel in the Netherlands. In 2004, the total production of 4ktoe referred exclusively to bioethanol (The Dutch Government 2007). The domestic production of bio fuels in the Netherlands is almost exclusively in form of bio ethanol and a small amount biodiesel (Rosende et al. 2010). The national production does not dominate the market. 87% of the total transport fuels consumed from renewable sources will be imported in 2020.

In the north of the Netherlands a policy called the *100.00 voertuigen (vehicles) plan* is implemented. The policy document aims at 100.000 vehicles using renewable energy by the year 2015, which is thought mainly to be realized by using green gas (Maas 2010).

8.4 Financing

Financing the projects is expected to come from the private sector. "*Banks will finance the construction of extra capacity, especially for large projects, with investments being paid back through feed-in tariffs and other support schemes" (ENDS 2010, 8).* But in addition to this, the EU's Strategic Technology plan is expected to invest several billions of Euros in major renewable energy projects. The *RE-thinking 2050* report predicts that cumulative investments will reach €963bn by 2020, and €1,629bn by 2030 (ENDS 2010, 8). According to Jacopo Moccia of the wind power trade association (EWEA), a small or medium sized company can manage a project of around 100MW, which is the average capacity of onshore wind power projects in Western Europe. Because of the straightforward economics in the projects, banks will likely provide funding, he claims. *"Installations in France will get €80/ MW hour produced over their 15-20 year lifetimes. It will take 7-12 years to pay off the loan, which means investors*

[5] That is, 1 ktoe is the amount of energy equivalent to that which is contained in 1000 tons of oil.

will cash in on these projects for about eight years" (Environmental Data Service 2010, 9). Because offshore wind projects are based on technology not yet mature, they are much more complicated and expensive. In comparison with the former calculation, producing one MW hour in France will cost 130€, which is almost 50% up from the on-shore support (Environmental Data Service 2010). The Netherlands represent the third largest investment hub for offshore wind power with €12-18.3bn. The UK being the largest followed by Germany. Concerning onshore wind power, Spain will have the biggest hub, followed by the UK and Italy.

8.4.1 Financial report

The Dutch renewable energy market had a total revenue of $1.8 billion in 2010, representing a compound annual growth rate (CAGR) of 8.9% for the period spanning from 2006 to 2010 (Companies and Markets 2011). *"The market consumption volumes increased with a CAGR of 8.2% between 2006-2010, to reach a total of 12.6 billion kWh in 2010. The performance of the market is forecast to decelerate, with an anticipated CAGR of 7.2% for the five-year period 2010-2015, which is expected to drive the market to a value of $2.5 billion by the end of 2015" (Companies and Markets 2011).*

8.5 Suncities in the Netherlands – a way of compensating

The Dutch Suncities-project is unique and includes 3 local projects of new housing developments of building-integrated PV[6]. Several aspects of the project considered being innovative i.e.:

- The achievement of zero-emission buildings (with PV) on this scale
- The integration of PV in the urban- and energy planning approach, the joint tendering, the cost reductions achieved by this approach and scale, and the interactive dissemination strategy includes 1 410 zero energy houses, with a 2.45 MW PV power. The project has been accomplished in two phases.

The buildings are built with energy saving measures, reducing electricity and heating consumption and other renewable energy options. The challenges include fitting today's PV technology into the urban planning process, energy infrastructure planning, architectural design, and the electrical grid layout by the project developers involved (PV Cycle Association 2011). The implementation of

[6] Photovoltaic (PV) = technology allowing solar radiation to be transformed into energy.

the proposition is to be achieved by joint tendering of PV systems and roof integration (turn-key) which is open to European PV suppliers in order to minimise costs (The Dutch Government 2007).

There are several positive aspects of using PV power, some of which are self-explanatory. Still positive aspects need to be pointed out and emphasized again and again, because of their importance:

- Fuel source is essentially infinite
- PV produces energy without emissions (e.g. GHG)
- PV is a reliable technology (no moving parts, module lifetime > 25 years)
- PV is scalable, modular and flexible: It can be installed in almost any size and in any place
- The materials of PV-Modules and Cells can be recycled

Photovoltaic Energy is sustainable, even in the strict meaning: The energy-pay-back of a module is between 1,5 and 3 years. After this period, the module will have produced more energy than what has been used for its production (PV Cycle Association 2011). The PV segment has experienced strong growth the last couple of years. By 2012, in an optimistic scenario, a capacity equivalent to 44 nuclear reactors, 44GWp could be achieved (PV Cycle Association 2011).

8.6 The Netherlands forecast compared to the trajectory

The Dutch Directorate for Energy and Sustainability released a document called 'Forecast Document' (2011) where they are asked to outline the Netherlands forecast as a response to the RES Directive article (4)3. They report of no current plans of excess production or plans of joint projects with other Member States. The document is one and a half page, including two tables where all the numbers from 2010 to 2020 are 0 (Directorate for Energy and Sustainability 2011). This is the last forecast published, but it has to be noted that it is from the end of 2009, when all the forecasts was published. The Netherlands has increased their projections, as discussed in chapter 8.2. This indicates the rate of growth the country has experienced the last 2-3 years.

9.0 Sweden

Sweden has the highest level and target of the EUs Member States, even before the Climate Package was adopted. Relative to their point of departure their binding national target hold an increase of 25.6%, from 39% to 49%. Their forecast projects that they will reach a level of 50.2%, although this is within the margin of error and is therefore not officially communicated.

9.1 Sweden today

The Swedish energy policy is according to the Swedish government, built on the *"same keystones as the cooperation energy within the EU and aims to reconcile sustainability, competitiveness and security of supply"* (2010). The Swedish government emphasizes on the following key-points:

- The vision for 2050 is to have a sustainable and resource efficient energy supply, with no net emission of greenhouse gases into the atmosphere
- The energy policy will create conditions for an efficient and sustainable energy usage and cost-effective Swedish energy supply with low negative effect on health, the environment and the climate. This will enable sound economic and social development to be promoted in all of Sweden
- The energy policy will contribute to broadening the cooperation with regard to energy, the environment and the climate in the Baltic Sea Region

Over a third of today's energy consumption in Sweden depends on imports, which are mainly made up of oil, imported from Norway, Denmark and Russia. In addition there are small quantities of hard coal imports (The European Commission 2007a). Notably, Sweden has a fairly high share of final energy consumption, compared to other EU Member States. Taking a look at their primary energy supply this mainly depends on nuclear energy, oil and renewable sources. This is distributed as follows: Nuclear energy (37%), renewable sources (26%, 39% in 2008), solid fuels (6%) and gas (2%). The nuclear level is higher than the average in the EU, as is the level of renewable energy sources. At the same time the numbers for solid fuels and gas are lower (The European Commission 2007a). Sweden produces enough nuclear energy to hold a third place among all the EU Member States. Besides nuclear energy, they produce renewable energy, mainly hydro.

9.2 Renewable Energy Sources in Sweden

The Swedish NREAP splits the overall renewable energy target into 62.9% RES-E, 62.2% RES-H and 13.8% RES-T. It is emphasized in numerous articles and documents how disappointing the ambitions in Sweden are. Since the country already holds such a high level of RES, there is no real effort needed in order to reach their binding target of 49%, raised to 50.2% by the Swedish government after 2008. Today's target is actually below the trend from 1996, and sources claim that Sweden reached its target already in 2009 (European Renewable Energy Council 2011, 96).

9.3 Sectoral targets

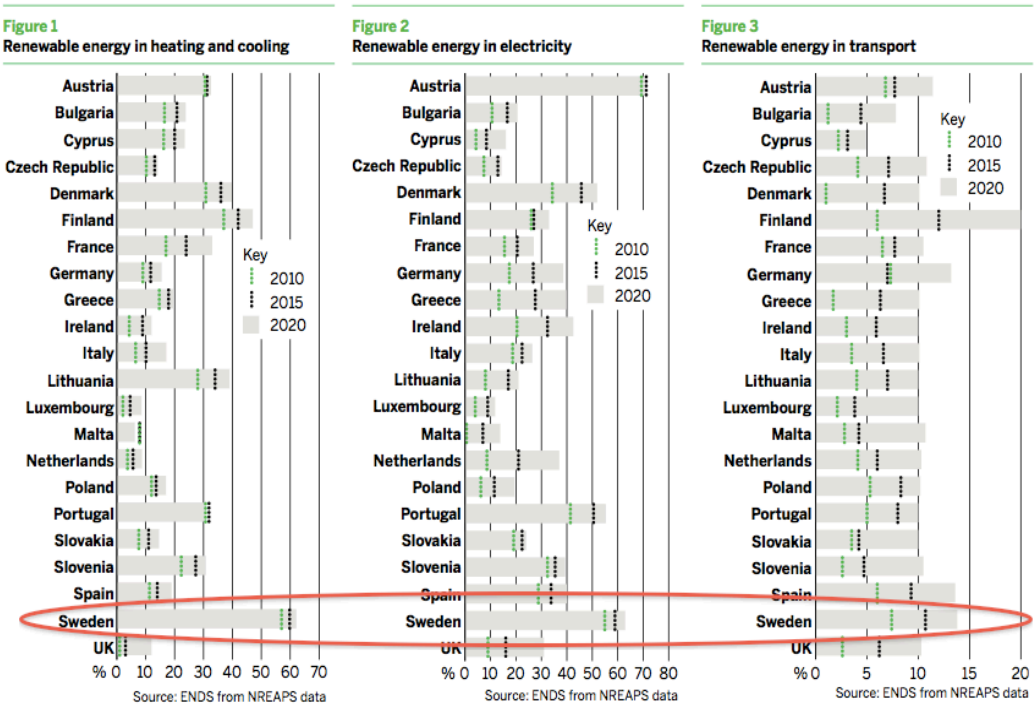


Figure 9.3: Overview of 19 Member States per sector, (ENDS 2010).

9.3.1 Heating and cooling

The use of biomass for RES-H has grown by almost 40% since 1990, was stable between 1997 and 2004. Current use is high and exceeds 5Mtoe. Sweden is the leader in the EU within geothermal heat pumps and an especially strong growth has been observed for geothermal heat pumps since 1997 (The European Commission 2007a).

9.3.2 Electricity

Sweden's RES-E target was 60% of the gross electricity consumption in 2010. They then raised the target of RES-E by 17Twh[7] from 2002 to 2016 (The European Commission 2007b).

Swedish RES-E policy is composed of the following mechanisms:

- Tradable Green Certificates were introduced in 2003. The Renewable Energy with green certificates bill that came into force on 1 January 2007 shifts the quota obligation from electricity users to electricity suppliers.
- The environmental premium tariff for wind power is a transitory measure and was progressively phased out by 2009 for onshore wind.

(The European Commission 2007a).

The goal of the Swedish policy is to increase the production of the renewable energy with 25TWh between 2003 and 2020 (European Renewable Energy Council 2011). This production will be divided between bioelectricity and wind-power and is assumed to fulfill the targets.

The green certificates will function as support schemes, having a very positive influence on some technologies, but not the same influence on others. The EREC points to the green certificates having a positive effect on bioenergy, less positive effect for wind power and an actual negative effect on the remaining RES (European Renewable Energy Council 2011). Sweden has no plans for shortsighted investment subsidies before 2012. There are no plans for a specific support mechanism for offshore-wind, and it is not explained how the small part of offshore-wind calculated in the NREAP would be financed. Also, there are no targets for geothermal electricity in the NREAP. The electricity industry actually predicts that Sweden should be able to reach 53.6%, compared to 40.2% in the NREAP.

9.3.3 Transport

Sweden has put forward measures to increase the RES share in the transport sector, but as in many other Member States this is not the sector receiving most attention. The probability of reaching the targets is reported to rely on the quota

[7] The kilowatt-hour is a unit of energy equal to 1000-watt hours or 3.6 megajoules.
One terrawatthour equals one trillion watt-hours.

legislation. While other countries have added taxes up to 10%, Sweden only allows for 5% on ethanol gasoline. According to the European Renewable Energy Council (2011) the 10% target for this sector could be reached *"far ahead"* of 2020. The industry demands an increase in the tax-exemption for the low blend, instead of an upper-limit of 6.5% for ethanol in petrol and 5% for biodiesel in diesel, they demand 10% and 7%. The industries' scenario is lower than the NREAPs scenario; in the transport sector they predict 8000ktoe[8] while the NREAP predicts 8111. The gap is larger in other sectors.

9.4 Sweden's forecast compared to the trajectory

The Swedish Energy Agency (SEA) has made a forecast called the *Long-term-forecast 2008.*

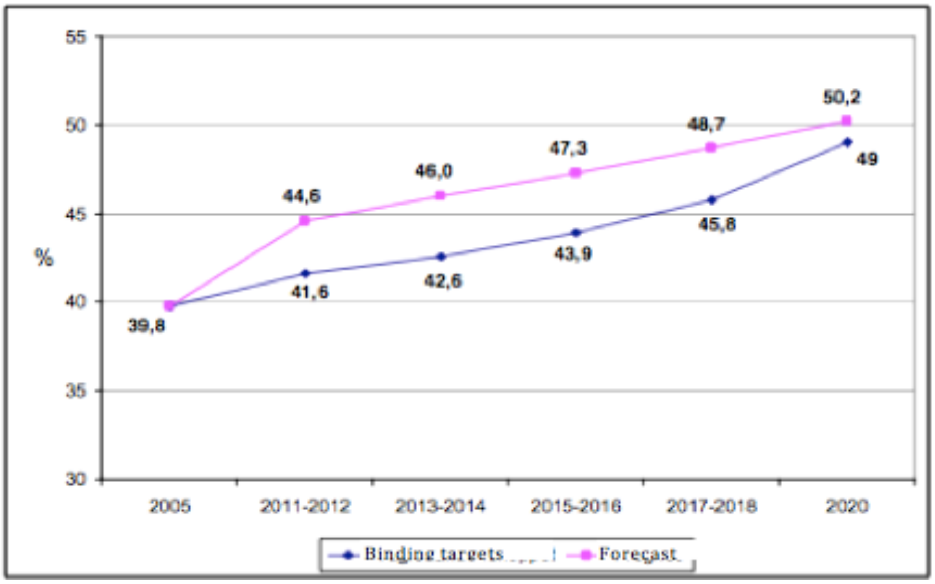


Figure 9.4 Swedens binding targets and forecast (Regeringskansliet 2010, 10)

As we see from the figure, Sweden's point of departure was 39.8% and their estimated reached target will be 50.2%, 1.2% points higher than the initial target. This forecast is made before the NREAP was published, but in contrary to some of the other Member States it is in accordance with the NREAP.

9.4.1 Future Visions

Sweden expects that the country will exceed the expectations of 49% RES with around 1.2% by 2020 (EurActiv 2011). According to the Swedish Association for Renewable Energies, the county Dalarna in Sweden (one of the three counties

[8] That is, 1 ktoe is the amount of energy equivalent to that which is contained in 1000 tons of oil.

which is in the frontline when it comes to RES), and several other renewable organisations (Swedish Bioenergy Association, The Federation of Swedish Farmers, The Swedish Society for Nature Conservation), the target of 50.2% could easily be raised to 70%, characterised as more rational and achievable (European Renewable Energy Council 2011).

10.0 Concluding remarks

There is no doubt that the European Union is at a threshold concerning their future energy policy. If the electricity grids are not upgraded, obsolete plant not replaced by competitive and cleaner alternatives and energy is used more efficiently throughout the whole energy chain; competitiveness, security of supply and climate objectives will be undermined (The Directorat-General for Energy 2011).

Leaning on the liberal intergovernmentalism indicates that it was the nation states, not the supranational institutions that pushed for the Climate Package, although achieved in agreement. This was done through a gradual process of preference convergence, especially the larger and more powerful Member States that bargained the deal. The new institutionalism, historic institutionalism tells us that it is a path-dependency developing over time and therefore constraining the actors who initially established the institutions. The development in the Union has led to centralization of several interest areas, earlier only to be controlled by each nation-state. The EU ETS, which was a utopia only a couple of decades ago, is now a reality.

10.1 20% renewable energy sources

The 20% target is set by a common effort throughout the union, with a reference to the year 1990, and a target measured from 2005-levels. This means that the Union has calculated an actual reduction of around 14% considering that there was already an achieved reduction in 2005. Renewable energy sources (RES) include wind power, solar power (thermal, photovoltaic and concentrated), hydroelectric power, tidal power, geothermal energy and biomass, are by the EU defined as essential alternatives to fossil fuels.

10.2 Different targets for each Member State

Each Member States had a different point of departure concerning renewable energy; therefore it would be unfair to demand the same from each nation. In addition, the Member States also have various means and resources to handle the challenges. The Member States have decided upon their own mix of renewables to reach their individual goal. Their goal is calculated starting with their exit level in 2005, adding a flat increase to all the Member States of 5.5%, and then adding an additional increase based on the country's GDP decided upon the individual

targets. The allocation of the reduction targets has been made on the basis of pure cost efficiency. This causes high compliance costs compared to GDP for poorer Member States (The European Commission 2011d). Some of the countries that had a high point of departure also got an "early starter bonus", meaning that their additional figures adjusted by the GDP was scaled down, because of the bonus.

10.3 Sectoral technological solutions

Together the Member States expect to more than double their total renewable energy consumption from 103Mtoe in 2005 to 217Mtoe in 2020, where the electricity sector will account for 45% of the increase, heating 37% and transport 18% (The European Commission 2011c). The share of RES in electricity consumption is predicted to increase to 34.3% in 2020, wind energy and hydropower being the largest contributors (EREC 2011a). Renewable heating and cooling should reach 22.2% in 2020, with biomass being by far the largest contributor. The share of renewables in transport is forecast to reach 11.27% of diesel and petrol consumption.

10.4 Level of achievement thus far and future prospects

The first reference year was 2010, when several of the Member States failed to reach their targets. This has been pointed out by several sources to prove a failed policy. The key here is that these goals were not binding, but leading, of the directive 2001 (2001/77/EC). Can they be seen as unsuccessful when the targets were only leading and not regulating? Not necessarily, as the final exam will not take place before 2020. There are only two countries in which have reported the need of the cooperation mechanisms, in order to reach their goal in 2020 (Italy and Luxembourg). Half of the countries say they foresee surpassing their binding targets in the renewable energy sector, and the rest claim they will at least reach the target. In 2014 there will be an assessment of the effective functioning of support schemes and cooperation mechanisms in the light of the review.

10.5 The cases- The Netherlands and Sweden

The Netherlands has a goal of 14% reached by 2020, while Sweden's goal is 49%. The Dutch government does not predict to surpass their goal, although indications points to 15.5%, not yet confirmed. Sweden reports to probably reaching a level of 50,2%. The Netherlands' main sources of energy today are natural gas, oil and coal. The Dutch NREAPs splits the overall target in the following way: RES-E

37%, RES-H 8.7% and RES-T 10.3%. They have one of the lowest targets in RES-H with hardly any progress from 2010 to 2020. In the RES-E sector the Netherlands show a much higher ambition. In the RES-T sector they have a fairly average point of departure, this sector might be the sector with the most similar goals, ending around 10%.

Over a third of today's energy consumption in Sweden depends on imports, which are mainly made up of oil. Their energy consumption is made up of nuclear energy (37%), renewable sources (26%, 39% in 2008), solid fuels (6%) and gas (2%). The nuclear level is higher than the average in the EU, as is the level of renewable energy sources. The NREAP splits the overall renewable energy target into 62.9% RES-E, 62.2% RES-H and 13.8% RES-T. It is emphasized in numerous articles and documents how disappointing the ambitions in Sweden are. Since the country already holds such a high level of RES, there is no real effort needed in order to reach their binding target of 49%, raised to 50.2.

10.6 Criticism

Looking back at the process and my work there are several parts I would like to comment on. First of all I would like to emphasize that if I had more time and resources I would like to continue my research, looking deeper into each of the industries, their investment schemes and developments. In the end this is where the groundwork is done, the technological innovation and development the society is dependant upon to reach the targets.

There are always parts of the work that in the final end turns out to be unnecessary, and I see now how I could have been more to the point earlier in the process. In addition, the theoretical basis would be interesting to work further with.

Many of the sources for my research operate with fairly different numbers, and therefore comparing these numbers in the analysis have created challenges. As I mentioned in PART III, this topic is dependant on new numbers, and articles or reports only a year old can already be out of date. This has been time consuming, and some of the reports used were not even published when I started my work.

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12.0 Appendix

12.0 Appendix

Appendix I

PRELIMINARY THESISREPORT

- THE EUROPEAN UNION, CLIMATE CHALLENGES AND PROGRESS -

FOR THE TIMES THEY ARE A-CHANGIN'…

BOB DYLAN

HAND-IN DATE:
17.01.2011

CAMPUS:
BI OSLO

VEILEDER:
KJELL A. ELIASSEN

EXAMINATION CODE AND NAME:
GRA 1902 PRELIMINARY THESIS REPORT

PROGRAMME:
MASTER OF SCIENCE IN POLITICAL ECONOMY

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Abbreviations

CCS	→	Carbon Capture and Storage
COP	→	Conference of the Parties (in the UNFCCC)
CDM	→	Clean Development Mechanism (Kyoto)
CITL	→	Community Independant Transaction Log
ECCP	→	European Climate Change Program (2000-2004)
ECCP II	→	European Climate Change Program II (2005-)
EJ	→	Exajoule: 1 EJ = 10^{18} J
EU	→	European Union
EU ETS	→	European Unions Emissions Trading Scheme
GHG	→	Greenhouse gas
IET	→	International Emission Trading
IPCC	→	Intergovernmental Panel on Climate Change
JI	→	Joint Implementation (Kyoto)
RED	→	Renewable Energy Directive
MS	→	Member States (Of the European Union)
NAP	→	National Allocation Plan
NREAP	→	National Renewable Energy Action Plan
UN	→	United Nations
UNCED	→	United Nations Convention on Environment and Development
UNFCCC	→	United Nations Framework Convention on Climate Change
WWF	→	World Wildlife Fund

1.0 Introduction

This preliminary thesis report will provide a plan for the work I will be conducting concerning my final thesis. I will discuss the topic of interest, how my research question can be related to the current literature on the subject, how I intend to continue with my research and what kinds of methods I plan to use. Since the project has strict limitations concerning time, resources and pages, there will naturally also be limitations to the research and work I will do. Despite this I will of course, do my very best to proceed beyond these limitations.

To structure my preliminary report I have used Bruce Bergs *"Qualitative Research Methods"* as a point of departure. The report is structured as a first draft of the final thesis, allthough it does not contain any findings or dicussions, or a literature review, but contains an overview over the subject, useful information for further research, and a discussion of methodological use. This report is of course meant as indications and early work as for what will be the final thesis report.

1.1 Climate as a challenge

The Intergovernmental Panel on Climate Change (IPCC) has produced three reports concerning the climate change since established in 1988, explaining to world leaders amongst other the connection between pollution, the world's biosystem and atmosphere (Yamin 2005). The IPCC warns drastic consequences if the development seen during the recent years continues. Their latest report was published in 2001.

"Melting glaciers and ice sheets on land will raise sea levels. According to analyses published since the IPCC's Fourth Assessment, we can expect more than a 1-metre sea-level rise by 2100, enough to displace at least 100 million people in Asia, mostly in eastern China, Bangladesh and Vietnam; 14 million people in Europe; and 8 million each in Africa and South America. However, sea-level rise will not stop in 2100" (WWF 2009).

Manmade climatechange is on the tip of everyones tongue, and has been for the last decade and beyond. And by all estimations this will continue to be the hit topic also for the next decade to come. 2009 was the coldest year in Norway since

1941 (Yr 2010), despite global warming, or because of it? The clock is ticking in order to solve what is likely to one of the biggest, if not the biggest challenge the world has ever faced. Is this something that should be addressed at a global level, e.g., that the G20 should take responsibility in a larger degree, or is this a question for regional and perhaps more effective solutions?

The European Union (EU)[1] stands with both feet in this discussion, both in a regional and global disucussion. How does such a large supra-national organisation hold the power and characteristics proven to be more efficient than even the United Nations (UN)? Both organisations are interested in reaching international agreements on emission cuts, their path and effectiveness to get there on the other hand, does not seem to be agreed upon. However, the EU has taken important steps and is working committed for that the European and international community to set, and most importantly to reach the targets ratified by the union. Using the recent financial crisis as an example on how effective the EU can be if it cooperates on issues that are global and require coordinated responses. The EU countries stand stronger together, and are better suited to face the challenges the world now faces (European Commission 2010 D).

The European Climate Change Programme was introduced in 2000, a program set out to make sure the EU reaches its Kyoto targets, and the second European Climate Change Programme (ECCP II) was set out in 2005 (European Commission 2010 C). To reduce the EU's vulnerability to the impact of climate change, the European Commission[2] presented a policy paper, a White Paper, presenting the framework for adaptation measures and policies (European Commission 2010 D).

2.0 Topic of Interest and Research Question

Going through the process of deciding a research question does not only entail setting the question, but also succeeding in explaining why this is a good question

[1] The EU will be used to denote the organization from its origination.

[2] The European Commission will be noted to as The Commission, and referenced to as the European Commission.

for a master thesis, why the topic is not self explaining and of course why exactly this question is of interest to answer. Furtmermore, how does this question relates to literature must be shown. The key is to understand that the research question has both substance and form (Yin 2003, 7). These are all things I would want to answer in my final thesis, in the preliminary report on the other hand, I will concentrate on background, developments and methods.

2.1 Motivation for the Thesis

In March 2007 The European Council by the presidency states that the EU "*is committed to transforming Europe into a highly energy-efficient and low greenhouse-gas-emitting economy and decides that, until a global and comprehensive post-2012 agreement is concluded, and without prejudice to its position in international negotiations, the EU makes a firm independent commitment to achieve at least a 20 % reduction of greenhouse gas emissions by 2020 compared to 1990"* (Council 2007, 12). In the same document they also endorsed keeping the rise of global average temperatures to less than 2 degrees Celsius above pre-industrial levels. The world's economies are linked through trade and capital flow, and it is essential that international agreements make out the basis for the solution of the biggest challenge the world has ever faced (Mullins 2005). The 1992 United Nations framework for such cooperation is provided by the 1992 United Nations Framework Convention on Climate Change (UNFCCC), this works as a supplementary to the 1997 Kyoto Protocol (ibid p.xxix). The core of this treaty is that the developed countries are legally binded to reduce greenhouse gas emissions (GHG). To execute these cuts in the respectable country towards the year 2020, there are set up action plans for each country, called national action plans (NAP). We will take a closer look at these NAPs later in this report, and especially considering the case studies in the final thesis report. *"The European Council reaffirms that absolute emission reduction commitments are the backbone of a global carbon market"* (Council 2007, 12).

2.2 Preliminary Research questions

How has the implementation of the EU Climate Change Package from 2008 been executed? The thesis will concentrate around the observations concerning

renewable energy. To look into this in-depth, I will take a closer look at two case studies: Bulgaria and the Netherlands.

3.0 Agreements, Treaties and Schemes – an Overview

3.1 The Kyoto Protocoll

The Kyoto Protocol is an international agreement, adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. The agreement is linked to the United Nations Framework Convention on Climate Change (UNFCCC) (UN 2010). *"The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012*" (ibid).

To reach their targets, the Kyoto Protocol sets forward three market-based mechanisms. These are known as emission trading, clean development mechanism (CDM) and joint implementation (JI) (ibid). According to the UN itself, this will stimulate the countries in investing green and reach targets in a cost-effective way (UN 2010).

3.2 The United Nations Framework Convention on Climate Change (UNFCCC)

"*This is the moral challenge of our generation. Not only are the eyes of the world upon us. More important, succeeding generations depend on us. We cannot rob our children of their future.*" Ban Ki-Moon, UNs General Secretary.

Article 2 of the convention sets clear what is known to be the final and most important target of the convention, and maybe even concerning working with the climate change challenge overall: namely to stabilize the GHG concentration in the atmosphere, at a level that will stabilize the increase of the world average temperature, as we are experiencing today. The agreement was negotiated between 1990 and 1992, and leans strongly on the north/south dynamics of the United Nations Conference on Environment and Development (UNCED). Both developed and developing countries agreed on the principle known as 'common but differentiated commitments' and this makes up a crucial part of the agreement (Yamin 2005). Furthermore, the convention establishes institutional machinery that ensures the implementation of the conventions decisions and also ensures that

Parties responds to the latest scientific information by taking action (Yamin 2005). The Conference of the Parties (COP) is the main policy-making body and provides' chief forum for international discussions about climate change' (ibid).

3.3 The EU Climate Change Package

In 2007 EU endorsed and ratified an agreement on a common approach concerning actions to be taken concerning global climate change, called the EU Climate Change Package[3]. The agreement was agreed by the European Parliament and Council in December 2008 and became law in June 2009 (European Commission 2010). An important aspect of this agreement is that this will commit the EU to further reduce its emissions also after the Kyoto agreement expires in 2012 (The European Union 2007). In the core of the Climate Package was four pieces of complementary legislation (European Commission 2010). First, the Emission Trading System (EU ETS) is in the center as EU's perhaps key tool for effectively cutting emissions. This is also characterised as one of the most important contributions of the European Climate Change Program (ECCP), which was launched in 2000. This program had as objective to set out strategies to how the EU could reach its Kyoto goals. The EU ETS is also the largest transmission scheme in the world. Second, since transport, housing, agriculture and waste are not covered in the EU ETS an 'Effort Sharing Decision' governs these sectors not covered. The national emission limitations have been estimated according to the countries relative wealth, ranging from 20 % decrease to 20% increase. Non-ETS sectors will cut emissions by 10% by 2020 compared to 2005 levels. Third, decreasing EU's dependence on imported energy and reducing greenhouse emissions. This will be reached by national targets for renewable energy setting the average renewable share across the EU to 2+% by 2020, the level in 2006 was 9,2%. Finally, the use of carbon capture and storage (CSS) is introduced. This is a *'promising family of technologies that capture the carbon dioxide emitted by industrial emitted by industrial processes and store it in underground geological formations where it cannot contribute to global warming'* (European Commission 2010). CCS's viability needs to be tested and demonstration plants will be set up by 2015, the legislative proposal enables governments to provide financial support for CCS pilot plants.

[3] From now to be denoted as the Climate Package.

3.3.1 The 20-20-20 goals

The main targets for the climate package can be summarized in three points (European Commission 2010):

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels.
- 20% of EU energy consumption to come from renewable resources.
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

Mullins points out that as the flexibility mechanisms has evolved, so has the evolution of commitments under the climate change regime (2005). Long term (2050) the Climate Package sets out to reduce the emissions with 60-80% compared to levels in 1990 (The European Union 2007). The EU is by this package setting out an example for other states and cooperation parties to follow:

> *The Council's position is an affirmation of the EU's leadership and determination to prevent climate change from reaching dangerous levels. But we can only succeed if the international community moves urgently to strike a comprehensive agreement to reduce global emissions after 2012. The EU has demonstrated its seriousness by committing to an emissions cut of at least 20% even before negotiations start. We now look to other developed countries to show responsibility and follow our example.*
>
> Commissioner Dimas, The European Union 2007
> (In relation to the announcement of the agreement)

Another aspect of the 20-20-20 goals, is that for the EU to be able to meet its target of 20 % renewable energy in 2020, this will create almost 700 000 new jobs within this fairly new sector. Commissioner Dimas (The European Union 2008) advocates that this will be a part of the solution for the financial crisis the EU is going through, as a part of a 'green new deal'.

3.3.2 The European Trading System

The EU ETS is a system meant to be an advocate for cost-efficiency and is seen as the best way to minimize the price of reaching the emission target. The system is now a cornerstone in the EU battle against climate change, being the largest scheme in the world, including 11 000 power stations and industrial plants in 30

countries (European Commission 2010 F). It works on the ”cap and trade” principle, meaning that companies receive emission allowances available to buy or sell from each other, as needed (ibid). Not having enough allowances according to the emissions for that year will lead to heavy fines (ibid). “*The number of allowances is reduced over time so that total emissions fall. In 2020 emissions will be 21% lower than in 2005”* (European Commission 2010 F). The EU ETS covers emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board.

The first period for the EU ETS was from 2005-2007 and the second from 2008-2012. The second period was corresponding to the Kyoto engagement period. The Climate Package, adopted in 2008, confirmed and set even more ambitious objectives for the EU (Delbosc and Perthuis 2009, 12). As the EU ETS reaches its third trading period in 2013, a series of important changes will be applied to strengthen the system. But the EU has shown that it is possible to trade in GHG emissions, and that the changes that will be made in 2013 will make it even more effective (European Commission 2020 F). *“The EU hopes to link up the ETS with compatible systems around the world to form the backbone of a global carbon market”* (ibid).

3.3.3 The Financial Crisis in relation to the Climate Package

Commissioner Dimas was in his speech (The European Union 2007) outlining the impact of the financial crisis that the world, and most certainly the EU have faced the last couple of years. He emphasized the fact that it is in these kinds of times that we need to focus on finding new solutions, search for new ways to be efficient at both consumption and production (ibid). A shift in the economy, towards a low carbon economy will not only be from a climate point of view. This will also secure energy security as our dependency on oil and gas will decrease.

> *Not only is a shift to a low carbon economy essential if we are to combat climate change but it also makes good economic sense to improve our energy efficiency and increase our energy security by reducing oil and gas imports. This is why our climate goals are not only supported by ministers of the environment but also by finance and economics ministers and by many business organisations.*
>
> Commissioner Dimas, The European Union 2008 A

The broad support for this step taken by the EU, towards a shift in the way we think about production, shows that this is not only a question or challenge for the DG Climate or DG Environment, but includes several of the DGs within the Commission. These questions about the future options of work, about the danger and fears we will face if we do not make a comprehensive effort towards a more climate-friendly way of conduction business, this relates to health, to tax competition, to quotas, financial support, and the list goes on. As President Baroso underlines in his speech to the 2nd Strategic Energy Review (The European Union 2008 B) energy and climate are two sides of the same thing. And reducing the impacts of our living on the planet, and climate change is a part of the energy security agenda (The European Union 2008 B).

3.3.4 The European Commissions Role

The Commission is EU's largest administration and main policy manager, not to leave out a source of political and policy direction (Peterson 2006, 81). Its members are not democratically elected, although they are appointed by the European council and approved by the Parliament, which are both directly elected. Given thus, the Commission is indirectly democratically elected.

In adopting the Climate Package in 2008 the Commission played a very important and significant part. The achievement of getting 27 MS to agree on the Climate Package is not less than impressive, leading to the EU becoming one of the leading actors globally, both in developing and implementing climate change policies (Eliassen et al. 2010). *"Climate policy in the EU involves a complex distribution of powers and responsibilities between the EU and the member states. The EU institutions can act only to the extent that they have been given the competence to do so by the member states in their treaties establishing them"* (Eliassen et al. 2010). This distribution of powers, not to forget the follow-up and approving of the NAPs are all responsibilities of the Commission, which hold an especially important role of the development of the EU climate strategies.

3.3.4 Renewable Energy

One of the 20-20-20 goals is the target of 20% of energy consumption coming from renewable sources. To reach these targets there is set out binding national

targets which take into account each country's starting position, ensuring that everyone is taking their fair share (European Commission 2010 B). On top of EU demanding that 10% transport of fuels needs should be from renewable energy sources, they also want to ensure that they are sustainably produced, *"do not undermine food production or lead to deforestation or biodiversity loss"* (European Commission 2010 B). To reach these targets it is important to find alternative solutions for todays consumption of energy in the EU. Sources can be wind power, solar power, hydroelectric power, tidal power, geothermal energy and biomass (European Commission 2010 E).

As a subtarget, the EU decided to work for a target of 12% share of renewable energy in gross inland consumption by 2010. This target was not met. The progress that was made has been achieved largely due to efforts of a few Member States, and this can be considered a policy failure (European Commission 2007).

3.4 National Action Plans

As mentioned it is the national action plans (NAPs) that will ensure that the EU in the end will reach their 20-20-20 targets. The NAPs are planned by the country it self, but the Commission has to approve the plans. The national governments set the cap on permits to be allocated where and to what industries and companies. If a country needs more emission allowances, or is in position to sell some of its allowances it is the Community Indeoemdent Transaction Log (CITL) that gathers and keeps all the information from the trading between the countries in the national registries.

By 30 June 2010, the article 4 of the renewable energy directive required Member States to submit national renewable energy action plans (NREAP). These were developed in cooperation with the Commission and functions as *"detailed roadmaps of how each member state expects to reach its legally binding 2020 target for the share of renewable energy in their final consumation"* (European Commission 2010 E). These plans all include technology mix, trajectory to follow, barriers and how to overcome them and the Commission evaluates and assess them (European Commission 2010 E).

3.4.1 Bulgaria

Bulgarias NREAP emphasizes on the fact that the countrys economic development was at lower level than most of the other Member States (MS) of the EU. Therefore the legal framework supporting the processes needed to reach the goals were started as late as in 2007, much later than several of the other MS. Bulgaria faced tremendous changes in the years following 1989, concerning both social structure, political and economic structure. *"The crisis in the 1990s led to a considerable slow-down of reforms, which resulted in the delayed introduction of cost-oriented tariffs and market mechanisms in the energy sector*" (Bulgaria NREAP 2010). As advocated by the Bulgarian NREAP, the setting of binding national targets for the use of energy from renewable sources depends on the economic conditions and the country's ability to implement financial instruments. Considering Bulgarias history, this has played a major role in the development of Bulgarias work with the action plan.

3.4.2 The Netherlands

The Netherlands main sources of energy today are natural gas, oil and coal. The energy consumption is measure in total to 3,3 EJ and the renewabel energy sources is estimated to be around 0,1 EJ, representing around 0,03 % of the total energy consumption (Netherlands NREAP 2010). The Netherlands has created a strategy to reach their targets in 2020, of 14,5 %, and with the substitution method, they estimate to reach 15,5%. They have pointed out 3 main elements to reach their targets:

- Making the supply of energy cleaner and more efficinet through the encourgagement of energy savings, the production of renewable energy and the capture and storage of CO_2.
- The promotion of smoothly running energy markets in which the consumers of energy occuoy a central position and in which there is total freedom of energy innovations at central and local level
- Creation of healthy and stable investment climate for all energy options by defining a clear framework and procedures, with additional incentives where necessary.

(Netherlands NREAP 2010, 10)

The report is written in a positive manner, stating good reasons for investing in renewable energy and also setting forth several strategies and sub-targets to reach

their goals. They expect to reach their targets and explain in a detailed manner how. This document, and other documents from the Dutch state will be important in my research process.

4.0 Methods and objective

If there were no time- or resource limitations, one could also read endless amount of theory and empirical information that is available, all working-documents, and not at least conduct an extensive amount of interviews on the field of interest. Unfortunately this is not the case, and limits have to be respected. Therefore a selection of methods and direction of the projects direction must be taken. In this section I will first give an overview over how I intend to carry out my research on the subject, and further I will say something about how I will structure and how I forsee the progress of my future work with this thesis project.

4.1 Methodology and Sources

To be able to conduct my analysis and studies I will rely on a variety of sources, both in terms of books, research papers, scientific journals, communication from the Commission, Council and Parliament, legal documents, and also interviews if these can be justified as to help solve the puzzle of the research question. This means that both primary and secondary sources will be used, allthough the research will rely mostly on the latter. Additional sources as to the ones mentioned above may also be included if needed. As my material will be tested on multiple types of sources, this will hopefulle lead to a more diversified testing of the hypothesis.

4.1.1 Qualitative research

In large terms, writing a thesis you have two options; qualitative or quantitative studies. I will not give a presentation of the different kinds of methods, but explain why I believe qualitative research will give the best explanation to my research question. A rather remarkable quote, perhaps more so to a beginner in the academic field is a quote by Dabbs (1982), in Berg (2009), *"Qualitative and quantitative are not distinct"*. Science is not all about quantitative research, numbers and analysis of these; qualitative research is by all means often the basis of deep understanding. Since qualitative research takes more time and requires

greater clarity of goals, it has normally been the quantitative research that has occupied the social sciences arena (Berg 2009). No matter what direction one might choose, it is the quality of the product that is important in the end (Dabbs 1982).

What is included in the term qualitative research is either observations, but also includes interviews (Berg 2009, 4). As noted by Berg (2009), *"students and graduates of social science programs increasingly use the research of others and conduct research themselves".* Therefore, both understanding previous research, on top of doing your own research must be conducted. It is by combining several lines of sight, several sources and methods, that you obtain a more substantial and complete picture of the symbols or trend you are conducting your research on. This is called triangulation; the use of multiple lines of sight (Berg 2009, 5).

The general goal of a research process is according to Berg (2009) *'to discover answers to questions through the application of systematic procedures'.* Therefore my further work with my thesis needs to be in a systematic manner, knowing what I want to find out, and having an opinion on how I want to get there, by which means. Since qualitative research does not provide quantitative measures, we must seek fact by observe and talk to people using not only academic texts, but also opinions, newspaper accounts and articles on the subject. Following a discussion between current actors might be very rewarding, and their opinion about the subject, even though it is not objective might lead to new perspectives on the issue.

Having this broad possible platform to build from, it is important for a qualitative researcher to remain rigorous in his work for answers, in the same way systematic work is important. Berg (2009) advocates that a good test for this is that other scientists can examine the same phenomenon through similar or different methods.

The approach used in Bergs book, from idea to finding develops as displayed below (2009, 5).

Idea → Theory → Design → Data Collection → Analysis → Findings

This includes doing one step, and then realizes that you will have to go back and redo the former one. Included in this sort of model is also a literature review which is *'examining how others have already thought about and researched your topic'* (Berg 2009, 27). Considering my progress the next months, this will be one of my first tasks, getting a thorough knowledge and familiarize with the sources of current interest to my thesis and research question. It is important here to be somewhat 'creative' in the search for literature, not only typing in one search word, but also seeing the issue from several sides. Also, being specific and know what to look for in the jungle of possible useful, and not so useful sources. The research question can be critical tools to get where I want.

To operationalization and conceptualization of the research project are important steps in the process, and might also be repeated as the study developes. Allthough, a more detailed research study does not neccessarily mean that the result will be better or of higher quality than a project conducted a bit more in the manner of less planning. Berg recommends a golden mean between the two approaches (2009, 41).

4.1.2 Possible problems and hinders

I presume that one of the possible problems of my research process, as not having enough data, which is also, according to my recollection from earlier thesis seminars, one of the most crucial parts of a research project. Therefore, I am prepared to spend much time searching for sources and data, as mentioned from several different sources.

4.2 Case studies

"How can you generalize from a single experiment?" asks Yin (2009, 15). His answers are logical, yet important. You don't particularize, you generalize, and the goal with a case study, or two case studies will be to expand and generalize theories, compare and analyze. Case studies can include multiple case studies (ibid) and can also include quantitative evidence. You can use a mix of the two methods, combining quantitative and qualitative evidence (Yin 2009, 19).

Concerning the research question I want to look deeper into, namely the implementation of the Climate Package from 2008, especially with regards to

renewable energy and the implementation of this. Therefore it would be interesting to compare two countries work with the Climate Package. According to Robert K. Yin (2009) the use of case studies in research projects is one of the most challenging methods. My goal will be to collect, present and analyze data fairly. Case studies do also have rigorous rules, and it is important to make a plan, design the project, collect data and analyze. Basically, the reason a cast study will be a good method for this project is because the answers I seek are answer to questions like how and why, how has the implementation process developed, what were the problems, why were there problems, how were these solved etc. Further on in this process of the thesis, I have to distinguish between exploratory, descriptive and explanatory case studies. At this stage I could argue how all three would be interesting paths to follow, although I assume to experience this changing during my work.

Before I can start my case studies I also have to be able to describe good questions and keep this inquiring mind during the collection of data (Yin 2009, 69). It is important to stay unbiased and keep the mind open for new input, not searching for answer that might fit the presumed or wanted result.

4.3 Progress of thesis

The period after handing in the preliminary thesis report, until the deadline for the thesis on the 1. September will be spent reading, analysing, structuring and form my thesis. Leaning on experience from earlier students doing their thesis I have the perception that if not the majority, at least a large part tend to change their perspective of their thesis during the process. Therefore I will not exclude that this might occur also in my situation during the next 7 months. Also, I expect to use the time I have at my disposition, not wanting to state that I will finish ahead of the deadline.

I will spend my time as smart as I can, aiming to be done with the fundemental research in the area within the next three-four months. This will mean that I have about 3 months to spend on writing the text and structuring my studies and findings.

THERE IS STILL TIME TO AVOID THE WORST IMPACTS OF CLIMATE CHANGE, IF WE TAKE STRONG ACTION NOW

CONCLUSIONS FROM THE STERN REPORT 2006

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