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FOSTERING THE DELIVERY OF WIND POWER: AN EVALUATION OF THE PERFORMANCE OF POLICY INSTRUMENTS IN THREE EUROPEAN UNION MEMBER STATES

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LIST OF ABBREVATIONS

$	Dollar
%	Percent
€	Euro
AEPUK	Association of Electricity Producers United Kingdom
AHP	Analytical Hierarchy Process
BBC	British Broadcasting Corporation
BDI	Federation of German Industries
BERR	United Kingdom Department for Business, Enterprise and Regulatory Reforms
BETA	British Electricity Trading Agreement
BMU	Ministry of Environment, Natural Safety and Conservation
BWE	German Wind Energy Association
BWEA	British Wind Energy Association
CAP	Common Agricultural Policy
CDM	Clean Development Mechanism
CDU	Conservative Democratic Party of Germany
CHP	Combined Heat and Power
CO_2	Carbon dioxide
DENA	German Energy Agency
DEWI	German Wind Institute
DNO	Distribution Network Operators
DTI	Department of Trade and Industry
EC	European Commission
ECCP	European Climate Change Programme
ECJ	European Court of Justice
EEA	European Environment Agency
EEG	Renewable Energy Sources Act
EIA	Environmental Impact Assessment
ENERGIENED	Netherlands Association of Electricity Producers
EREC	European Renewable Energy Council
EREF	European Renewable Energy Federation
ETS	Emissions Trading Scheme
EU	European Union
EUR	Eurostat
EWEA	European Wind Energy Association
FDP	Liberal Party of Germany
FIT	Feed-in Tariff
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GIS	Geographical Information System
GROWIAN	Big Wind Power System
GWEC	Global Wind Energy Council
GWh	Gigawatt hour
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KWh	Kilowatt hour
MAP	Environmental Action Plan

MEP	Environmental Quality of Electricity Production
MW	Megawatt
MWh	Megawatt hour
NETA	New Electricity Trading Agreement
NFFO	Non Fossil Fuel Obligation
NGO	Non-governmental Organisation
NIMBY	Not In My Back Yard
NWEA	Netherlands Wind Energy Association
OFGEM	Office of the Electricity and Gas Market
PPAM	Political Price/ Amount Market
PPM	Part Per Million
PPS22	Planning Policy Statements 22
PQPM	Political Quota/ Certificate Price Market
R&D	Research and Development
R&D&D	Research and Development and Demonstration
REA	Renewable Energy Association
REFIT	Renewable Energy Feed-in Tariff
RES	Renewable Energy Sources
RES-E	Renewable Energy Sources Electricity
RES-T	Renewable Energy Sources Technology
RO	Renewable Obligation
ROC	Renewable Obligation Certificate
RPS	Renewable Portfolio Standard
RUE	Rational Use of Energy
SNP	Scottish National Party
SPP6	Scottish Planning Policy 6
SRA	Scottish Renewable Association
SRO	Scottish Renewable Obligation
StrEG	Stromeinspeisegestz
TAN8	Technical Advice Note
TGC	Tradable Green Certificate
TSO	Transmission Systems Operators
TWh	Terawatt hour
U.S.A	United States of America
UK	United Kingdom
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
VDEW	German Association of Electricity Producers
WMEP	Scientific Measurement Evaluation Programme
WWEA	World Wind Energy Association

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Afolabi Otitoju
May 2010

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I DEDICATE THIS THESIS TO THE ONLY WISE GOD, AJIBOLA, OLUWAPELUMI, AND THE UNBORN ONES

ABSTRACT

Worldwide energy policies are built on three pillars: ‘cost competitiveness’, ‘security of energy supply’, and ‘environmental responsibility.’ This has brought about the integration of renewable energy sources into national systems with the deployment of policy instruments to make renewable energy sources electricity (RES-E) capable of nearly competing on a commercial basis with traditional forms of electricity generation**.** At the national level within the EU, there has been much experimentation with different policy instruments with varying levels of success. Nevertheless the EU as a whole will not meet its stipulated renewable energy target. This study challenges the theoretical and abstract evaluation presented in the literature about EU wind power delivery systems and has developed an integrative evaluation framework. This evaluation framework is used in this study to present the views of key stakeholders on their experiences with the performance of key policy instruments (feed-in tariff, and renewables obligation) implemented in three EU Member States namely: Germany, The Netherlands, and United Kingdom. It also challenges the EU-wide harmonised renewable energy policy agenda as proposed in Directive 2001/77/EC. The concept of path dependency of the historical institutional approach was adopted in order to explore the diversity of the wind power industry across the three country cases. An in-depth semi-structured interview with fifty-five senior wind power policy makers and experts was conducted to explore the historical emergence, the architect, and the outcome of the support and implementation of the policy instruments. Findings showed that the approach to wind power deployment in the three country cases differs significantly and this has affected the pattern of each country’s wind power policy instrument. Also, the role and contribution of the stakeholder groups to the success of the wind power policy instruments differ significantly in each of the country cases. This helps to explain the performance of the different policy instruments adopted. Concerning the harmonisation of EU renewable energy policy instruments which have received much attention in recent times, this study found that harmonisation based on a single policy instrument is not feasible and may ultimately inhibit the growth of the European wind power market. A harmonised system may cause uncertainties amongst willing investors, thereby causing a withdrawal of further investment in the wind power market. If this happens, Europe may also lose its position as the world leader in the wind power market. Furthermore, national histories demonstrates that Member States have different culture, stakeholder groups, political, and business practices that will influence policy instruments and the likelihood of any policy succeeding. Thus, rather than promoting harmonisation and political market for wind power, it is important that Member States adopt and implement, stable, flexible, and transparent policy instruments that enable wind power and other renewable energy sources to emerge, develop, and go through the R&D stage to a point of maturity where they can compete with other energy sources with limited financial support.

Key words: Renewable Energy, Wind Power, Feed-in Tariff, MEP, Renewables Obligation, Performance, Path Dependency, Harmonisation

CHAPTER ONE

1.1 INTRODUCTION

The aim of this Chapter is to set in context the scope and boundaries of this study. In order to understand and justify the need for renewable energy sources and hence policy instruments, it is essential to provide an overview of energy and its relevance to human activities. The Chapter will also define key themes and concepts that will recur throughout this study before providing an overview of the country cases and why they are selected. The Chapter will go on to discuss the theoretical lense, aim and objectives before discussing the structure of the Chapters of the study.

1.2 RESEARCH BACKGROUND

Energy is an important element for growth and development. It is vital in the production of goods and services, and virtually all economic activities depend on it for survival. Kolev and Riess (2007:11), while emphasizing the importance of energy argued that: *"for modern societies energy is vastly more valuable than what its share in gross domestic product suggests [energy sector in the European Union (EU) accounts for 3% of GDP], and although a secure supply of energy is the more vital the more 'modern' a society is, its [energy] importance does not rise and fall over time"*.

Energy is needed, for example, to generate electricity, run cars, charge batteries, and even cook. A short term unavailability of energy is likely to cause significant chaos, as all economic activities and human movement could be halted without it. Energy is available in two different forms renewable and non-renewable. Non-renewable energies are defined as natural resources that cannot be regenerated or reused, for example fossil fuels such as crude oil, coal, and natural gas. Records show that approximately 90% of world energy supplies are provided by fossil fuel (Elliot 2007). Eight countries[1] in the world have 81% of the world crude oil reserves; six[2] have 70% of all the natural gas reserves; and eight countries[3] have 89% of all coal reserves (Sayigh 1999).

From the above description, it is clear that crude oil reserves are concentrated in a few locations and countries around the world. This and other reasons explain why the interest in renewable energy sources have emerged and received much attention in recent years, some of which are mentioned below.

First, is the growing import dependence on fossil fuel by the EU on other locations or regions of the world. According to the European Commission Communication (EC 2008), it is expected that the EU import dependence may reach 70% by 2030. Kolev and Riess (2007) state that energy rich countries and neighbours of the EU are no longer reliable, because of political instability and politically motivated supply disruptions, as witnessed between Russia and Ukraine during the last week of 2005 and the beginning of 2006 (Spanjer 2007: 2889), and more recently during the peak of winter 2008 and January 2009 (BCC 2008a, 2009a, 2009b, 2009c).

In addition, due to growing global demand, energy (fossil fuel) prices have been on the increase. It has been forecast that oil prices could hit $200 per barrel within the

[1] Saudi Arabia, Iran, Iraq, Venezuela, Canada, Nigeria, Russia, and Libya
[2] Russia, Iran, Qatar, Saudi Arabia, United Arab Emirate (U.A.E), and United States of America (U.S.A)
[3] People Republic of China, U.S.A., India, Australia, South Africa, Russia, Indonesia, and Poland

next ten years (BBC 2008b). Kolev and Riess (2007) also noted that there has been a growing demand for energy, both from developed economies (the U.S.A, the United Kingdom, and Germany) and emerging ones (China and India), however the efforts of international companies and governments are not enough to secure production, hence a constant supply of energy at affordable prices can not be guaranteed.

Furthermore, the earth's climate is changing and as such, global warming is having an effect. The main source of global warming is from the production and consumption of energy, principally the burning of fossil fuel, which releases CO_2 and other dangerous chemicals (nitrogen oxide, sulphur oxide etc) into the atmosphere. According to the IPCC (2007) report, the average concentration of CO_2 in the atmosphere has risen from 280 parts per million (ppm) in 1750, to 370 ppm in recent times, while the average temperature has also risen by 0.6^{o}c during the 20^{th} century (Rowlands 2005). The consequence of these changes to the environment has resulted in rising sea levels, national disasters like flooding, heavy rainfall and other environmental effects.

For these reasons, the share of renewable energy sources, in terms of electricity generation in the world, has doubled[4] over the past decade as the use of renewable energy sources (e.g. wind power) is increasingly becoming an essential part of sustainable electricity generation worldwide (Neilson and Jeppensen 2003; Midttun and Koeford 2003; Helm 2002b; Martinot 2001; Jacobsson and Johnson 2000).

Renewable energy sources are becoming an integral part of electricity generation in the European Union (EU). The drive for promoting renewable energy came top on

[4] The Word Wind Energy Association (2008) reports that wind turbines now generate over 1% of the world electricity. Eurostat (2008) claimed that renewables meet 3.3% of global electricity demand

Europe's political agenda after the oil crisis of the 1970's (de Alegria Mancisidor *et al* 2009; Blok 2006; Johansson and Turkenburg 2004; Jansen and Uyterlinde 2004; IEA Wind 2001, 2000). Since then, there have been significant concerns in Europe over a range of issues including: cost competitiveness, security of energy supply and environmental protection (Strachan *et al* 2006; Nilson 2006; O'Gallachoir *et al* 2002)[5]. These and related issues demand that renewable energy sources make an ever increasing contribution to the energy mix (EWEA 2006a; Ferguson 2006; Madlener and Stagl 2005; Rowlands 2005a; Neilson 2003; Meyer 2003; EU 2002; EU 2000a).

Following Directive 2001/77/EC renewable energy sources are defined in this thesis as ***"****renewable non-fossil energy sources, i.e. wind, solar, geothermal, wave, tidal, hydro-power, biomass, landfill gas, sewage treatment plant gas and biogases.****"*** Wind power, in particular, has come to the forefront of global renewable energy debates. It is abundant in most regions of the world, most promising and is nearly capable of competing on a commercial basis with traditional forms of electricity generation (EWEA 2006c; Strachan *et al* 2006; Reeves and Beck 2003; Ackermann and Soder 2000; Andersen and Jensen 2000; Moore and Ihle 1999; Hemmelskamp 1998). Breukers (2006:15) said that:

> *"Wind power generation has some advantages over the use of fossil and nuclear energy sources. It does not depend on exhaustible resources, it contributes very little to climate change, it involves no oil spills, radioactive waste, nuclear risks, its environmental impacts are not of the kind associated with lignite mining or large hydro power, and the decommissioning of a wind turbine is relatively unproblematic compared to the decommissioning of a large power plant."*

[5] See further discussion in Chapter 2 titled: The European Union and International Policy Context: Literature Review

As a result, many EU Member States have focused on the deployment of wind power as the favoured renewables option. Szarka (2004) outlines three main reasons why the EU policy tends to favour renewables. These include: the growing awareness of the threat of climate change as a result of the use and burning of fossil fuels; pollution and risks caused by fossil fuel and nuclear energy; and concerns over security of supply. It is perhaps not surprising then, that Europe is now the leading player in the international wind power market, accounting for 54% of total global installed capacity, and employing some 108,600 people (EWEA 2009a). Germany and Spain are still among the top few countries in the world that have a high wind installed capacity, alongside the U.S.A and India. Table 1.1 highlights the global ranking and breakdown of total wind installed capacity for years 2007 and 2008. Europe recorded an 18% growth rate over 2007 records (EWEA 2009b). According to EWEA (2009c) the EU now generates approximately 142 Twh of electricity from wind. This represents 4.2% of the total EU electricity consumption.

Table 1.1: Ranking and breakdown of global wind installed capacity (2007-2008)

Ranking Total 2008	**Country**	**Additional capacity 2008 [MW]**	**Growth rate 2008 (%)**	**Total capacity end 2008 [MW]**	**Total capacity end 2007 [MW]**	**Ranking Total 2007**
2	Germany	1655.4	7.4	23,902.0	22,247.4	1
3	Spain	1595.2	10.5	16,740.3	15,145.1	3
1	USA	8351.2	49.7	25,170.0	16,818.8	2
5	India	1737	22.1	9587.0	7,850.0	4
9	Denmark	35.0	1.1		3,125.0	6
4	China	6298.0	106.5	12,210.0	5,912.0	5
6	Italy	1009.9	37.0	3,736	2,726.0	7
8	United Kingdom	898.9	37.6	3,287.0	2,389.0	9
10	Portugal	732.0	34.4	2,862.0	2,130.0	10
7	France	949	38.7	3,404.0	2,455.0	8
12	Netherlands	478.0	27.4	2,225.0	1,747.0	12
11	Canada	523.0	28.3	2,369	1,846.0	11
13	Japan	352.0	23.0	1,880.0	1,538.0	13
17	Austria	13.4	1.4	994.9	981.5	14
14	Australia	676.7	82.8	1,494.0	817.3	16
18	Greece	116.5	13.3	989.7	873.3	15
15	Ireland	439.7	54.6	1,244.7	805.0	17
16	Sweden	235.9	28.4	1,066.9	788.7	18
20	Norway	95.1	28.5	428.0	333.0	19
19	Poland	196	71.0	472.0	276.0	24
	Rest	**963.1**	**3.53**	**7,125.5**	**3,044.9**	**-**
TOTAL		**27261.0**	**100**	**121,188**	**93,849.1**	**-**

Source: World Wind Energy Association [Online] 16th July 2009

With the expansion of wind power and other renewable sources, there has been an increasing interest in the performance of the numerous policy instruments that EU Member States have adopted (Rathmann 2007; Toke 2006; Perrels 2003; Enzensberger *et al* 2002). Harmelink *et al* (2006:344) defined policy instruments broadly, *"as any concrete activity initiated by the government in order to enlarge the market implementation of renewable energy sources"*. Hewlett (1991:2) states that: "*policy instrument is the generic term provided to encompass the myriad techniques at the disposal of governments to implement their public policy objectives"*.

The aim of deploying renewable energy policy instruments is to further encourage investment and penetration of renewable generated electricity into the market. However, different types of policy instruments implemented in Europe in recent times have received attention from various authors of renewable energy literature. See for example: Szarka (2007, 2006), Strachan *et al* (2006), Breukers (2006), Connelly and Smith (2003), Morthorst (2003a), (2003b), Enzensberger *et al* (2002), Cassidy (2002) and Loiter and Noberg-bohm (1999).

Broadly speaking, policy instruments include: voluntary or technology-push instruments; regulatory instruments; and economic instruments. Connolly and Smith (2003) indicate that voluntary instruments are put in place by government authorities to change the attitudes and behaviours of market players. While Strachan *et al* (2006) view technology-push instruments as initiatives directed towards research and development. These include: the provision of information and education, certification of standards and schemes, etc (Connolly and Smith 2003). Breukers (2006:25) adds that voluntary instruments involve the provision of grants, loans, and other financial incentives that enable investment into renewable energy.

Regulatory policy instruments tend to mandate market players to conform to certain patterns of law set by the state authority (Connolly and Smith 2003). Economic instruments can be further divided into two, namely supply-pull and demand-pull instruments. Strachan *et al* (2006) state that demand-pull policies are made up of market and government regulations that are meant to stimulate a renewable energy market, e.g. renewable portfolio systems, certificate trading, tax reductions etc. Whereas, supply-pull instruments are government regulations that set prices for renewable energy generated capacity brought to the market e.g. direct subsidies, tax deductions, fixed tariffs, tender etc (Enzensberger *et al* 2002).

Two main policy instruments, in particular, tend to dominate the EU wind power market. One guarantees prices, while the other ensures market share, through mandated targets/quota (Sawin 2004). These are commonly referred to as: (i) the feed-in tariff; and (ii) the renewables obligation or the quota system.

The feed-in-tariff can be described as a policy instrument that obliges regional or national transmission system operators to feed the full production of green electricity into the grid at a politically fixed price (Ringel 2006; Toke 2006; Sawin 2004; Sijm 2002; Wiser *et al* 2002). The feed-in tariff has been used in Germany to support the renewable energy market and by the end of 2005, 4.3% of electricity generation was from wind power (IEA Wind 2006). Germany is the world's leader in terms of installed capacity for wind power. The Electricity Generation Environmental Quality (MEP) is also a form of feed-in tariff that gives additional premium to renewable generated electricity. The quota system is a relatively new policy instrument for renewable energy sources. It is quantity driven and also referred to as the Renewable Portfolio Standard (RPS). The quota system is aimed at increasing demand for renewable electricity and has recently been implemented in the UK (Ringel 2006;

Toke 2006; van der Linden *et al* 2005; Wiser *et al* 2002). It is a procedure, whereby supplier companies are obliged to purchase and sell a certain percentage of electricity from renewable energy sources. To ensure proper implementation, a penalty is charged for non-compliance by the obligated parties (Ringel 2006; van der Linden *et al* 2005; van Dijk *et al* 2003). A detailed analysis of both schemes is presented in Chapter Nine "*A Cross National Comparison: Discussion and Comparison of the Feed-in tariffs, the MEP, and the Renewables Obligation*".

This research is concerned with evaluating the performance of wind power policy instruments, especially in the context of Directive 2001/77/EC (Szarka 2007; Elliot 2007, 2005; Harmelink *et al* 2006; Ringel 2006; Rowlands 2005a, 2005b; Lauber 2005, 2004; van Dijk *et al* 2003). The directive called for a harmonised policy instrument for the EU. Harmonisation will lead the convergence of all EU Member States policy wind power policy instrument into a single form. According to Holzinger and Knill (2005:781-782) harmonisation "*refers to a specific outcome of international co-operation, namely to constellations in which national governments are legally required to adopt similar policies and programmes as part of their obligations as members of international organisations*". Hence, harmonisation of the EU wind power policy instruments implies that the Member States would have to sacrifice their renewable power systems for that of the European Union.

However, based on the report from the European Commission in December 2005, it was decided to suspend the plans to harmonise wind power policy instrument until later in the future. The European Commission, in a communication on "*The support for electricity from renewable energy sources,*" concluded that:

- *"It is impossible to isolate the discussions of support schemes from the issue of administrative barriers;*
- *While gaining significant experience in the EU with renewable support schemes competing national schemes could be seen as healthy at least over a transitional period. Competition among schemes should lead to a greater variety of solutions and also benefits;*
- *It is too early to compare the advantages and disadvantages of well-established support mechanisms with systems with a rather short history. Therefore, and considering all the analyses in this communication, the commission does not regard it appropriate to present at this stage a harmonised European system;*
- *The Commission will closely monitor the state of play in the EU renewable energy policy and, not later than December 2007, make a report of the level of Member States systems for promoting renewable electricity in the context of the on-going assessment related to 2020 targets and a policy framework for renewable energy beyond 2010."*

Before the release of this communication, an EU-wide harmonised policy instrument was proposed by the Commission. Albeit, from the Communication it was clear that there is a still no evidence of one best policy instrument able to fit into all the different Member States political[6] and market structures[7]. Responding to the report the EWEA Policy Director said that:

> *"...the Commission's intention to have another review of the policy framework in 2007 is pointless: it contradicts its own stated objectives to ensure short and medium term regulatory stability in the Member States and allow countries time to fine tune the frameworks they have developed in the last few years.......effective competition in the conventional power market is a precondition for creating an undistorted European market for renewable electricity...." (EWEA 2005:4)*

At present, harmonisation is difficult to achieve; Member States have very different policy instruments in place (Reiche 2002c). Furthermore, when evaluating such policy instruments, it is initially very difficult to determine how one policy option

[6] Political structure refers to government and wind power institutions and their relationship with each other.
[7] Market structure refers to the nature of the Member States' energy and renewables market with regards to competition, especially the free interplay of supply and demand in determining energy prices.

can be preferred to another (del Rio 2005, 2004). The feed-in tariff, for example, is often heralded as being an effective instrument at delivering political fixed targets, but is often criticised as not being the most cost-efficient instrument (Toke 2006; Jacobsson and Lauber 2006; Szarka and Blühdorn 2006; Elliot 2005b; Farinelli *et al* 2005; Hvelplund 2005; Lauber 2005, 2004; Rowlands 2005a, 2005b). Further discussion on policy instruments is provided in Chapter Three: *"European Union Policy Instruments and Evaluation Typologies."*

In comparing and contrasting different policy instruments, three EU Member States have been chosen for detailed investigation: Germany, The Netherlands, and the United Kingdom. The rationale for the country selection is that they have adopted different approaches and policy instruments to the deployment of renewable energy, with varying levels of success (do Valle Costa *et al* 2008; Toke 2007a, 2007b; Agnolucci 2007a, 2007b, 2007c; del Rio and Hernandez 2007; Ringel 2006; Mitchell *et al* 2006; Jacobsson and Lauber 2006; Fusaro 2005; Sawin 2004; Grotz 2002; Reiche 2002a, 2002b, 2002c; Dinica 2002). As outlined, the UK has employed a market based procurement mechanism, i.e. a quota system (Foxon *et al* 2007; Connor and Mitchell 2004; Stenzel *et al* 2003), the German Government a feed-in-tariff mechanism, while The Netherlands has not adopted a stable policy instrument (Toke *et al* 2008; Breukers and Wolsink 2007; Agterbosch *et al* 2009, 2007; van Schenk *et al* 2007; Klevas *et al* 2007; Wustenhagen and Bilharz 2006; Rooijen and van Wees, 2006; Szarka and Blühdorn 2006; Sawin 2004).

It is against this backdrop that this thesis aims to critically appraise the performance of wind power policy instruments outlined in each of the selected countries, using an integrative framework developed from an in-depth review of the literature. However, this research also recognises that the choice of policy instrument alone does not bring success, factors such as political and regulatory environments, industry structures and nature of stakeholder groups are also important in shaping the business environment of the Member States under investigation (Szarka 2007).

This thesis defines political and regulatory environments as the willingness of the government and politicians to bring forward renewables, the rate of public acceptance and the legal systems which allow the policy instrument to work in the wind or renewables market of each Member State. Industry structure is defined as the style of ownership and control in the Member States investigated. The German and the Dutch wind power industry are commonly based on community and local ownerships; it is the opposite case for the UK. In the UK, wind power ownership favours big company (e.g. utilities) ownership, rather than community ownership (Elliot 2007; Szarka and Blühdorn 2006; Toke 2005). A stakeholder in this study is defined as actors who have positive and negative perceptions of the wind power industry. Szarka (2007, 2004) grouped stakeholder groups into three clusters: (i) the pro-wind coalition; (ii) the conservationists' organisation; and (iii) the anti-wind movements. The author described the last group as an organised association at local and national levels, with the aim of breaking wind power development (2007: 323). They have a very strong influence in the UK but less of an impact in Germany and The Netherlands (Elliot 2007; Toke 2005). However, the analysis and findings of this research are based on the views of the first group; the pro-wind coalition/actors. This is made up of industry actors and associations (VDEW[8], Energiened, AEP[9], BWE[10],

[8] German Association of Electricity Producers

NWEA[11], BWEA[12], EWEA[13], EREC[14], Eurelectric, REA[15], Ecofys etc.), international NGOs (International Energy Agency, Greenpeace, Friends of the Earth etc) and Government institutional actors (Ministry of Environment Germany (BMU), Ministry of Economic Affairs, Netherlands, the Department of Business, Enterprises, and Regulatory Reform (BERR), Office of Gas and Electricity Markets (OFGEM), SenterNovem, Germany Energy Agency (DENA) etc) (Szarka 2007). These actors are actively involved in the design and implementation of policy instruments adopted by each of the Member States investigated.

Secondly, the harmonisation plans of the EU wind power policy instruments have received much attention in recent times (Soderholm 2008a; Elliot 2007; Lise *et al* 2007; Held and Ragwitz 2006; Toke 2006; del Rio 2005; de Vos 2005; del Rio and Gual 2004; Lauber 2004; Eurelectric 2004). The European Commission, in its directive in March 2009, left the issue open for the foreseeable future. However, it is unlikely that the harmonisation plans will take place in the EU. Germany, The Netherlands, and the UK represent different perspectives of the wind power industry (Toke *et al* 2008; Fouquet *et al* 2005; Lauber 2005), local and corporate ownership (Breukers and Wolsink 2007a, 2007b; Toke 2006; Szarka and Blühdorn 2006), different market, socio-political structures and conditions. Harmonisation at this stage may be at the expense of the performance of existing policy instruments and the end may jeopardise/inhibit further progress in European wind power market growth, as different Member States may be caught between harmonisation and the

[9] UK Association of Electricity Producers
[10] German Wind Energy Association
[11] Netherlands Wind Energy Association
[12] British Wind Energy Association
[13] European Wind Energy Association
[14] European Renewable Energy Council
[15] Renewable Energy Association

promotion of wind power. Chapter Nine, "*A Cross National Comparison: Discussion and Critical Analysis of the Feed-in Tariff, the MEP, and the Renewables Obligation*" provides a comprehensive analysis of the comparison of policy instruments and also examines the impact an EU-wide harmonised instrument has on the national and European wind power market.

Furthermore, when reviewing the renewable energy policy literature, there seems to be rather disorganised cross-national comparisons made about wind power delivery systems. There have been limited attempts to provide a detailed integrative framework that can be used to present the interaction of the stakeholder groups, or actors mentioned earlier, in the EU wind power industry. Most of the criteria and analysis presented in the literature are based on theory and lack empirical evidence (del Rio and Gual 2007; van der Linden *et al* 2005). This is an important gap that this thesis seeks to address. Thus, the framework developed in this thesis is utilised to gather evidence from various stakeholder groups and at the same time is used as an analytical tool for evaluating the performance of wind power policy instruments implemented in Germany, The Netherlands, and UK. This will add further value to the current cross national comparisons that are made about wind power delivery, differentiating this thesis from other research in this area. Chapter Four "*Evaluation Framework*" presents a detailed framework utilised by this study to analyse the policy instruments implemented in the three EU Member States investigated. Having outlined and discussed the importance of renewable energy sources viz-a-viz wind power to the current energy debate, the Chapter now goes on to introduce the country cases before discussing the theoretical lense of the study.

1.3 OVERVIEW OF COUNTRIES

1.3.1 European Union

During the last two decades, wind power technology has advanced to become a near market energy source. In recent years it has become Europe's fastest growing renewable energy source (GWEC 2006; EWEA 2009b; EWEA 2009d). About 8,877 MW of installed wind capacity was added in 2008, thus Europe's total installed capacity at the end of the same year reached 65,935 MW, representing over 50% of the global installed capacity (121,188 MW). Hence, Europe has now exceeded its projected target of 40,000 MW by more than 20%, three years earlier than the 2010 due date (EWEA 2009c, 2007a; GWEC 2007; WWEA 2007). It is also estimated that investment in the industry exceeded €25 billion in 2008 (EWEA 2009b, 2008a). Furthermore, the world wind power sector employed 350,000 people worldwide in 2007 (GWEC 2008; and WWEA 2008). At the end of 2008, records show that over 400,000 jobs were created by the sector (WWEA 2009).

1.3.2 Germany

Germany is recognised internationally as being one of the pioneering countries in the development and application of renewable energy sources (Bechberger and Reiche 2004; IEA Wind 2002). Although deficient in wind, Germany is the world leader in terms of market and installed capacity of wind power (EWEA 2006b; WWEA 2006; IEA Wind 2006). The major instruments used to encourage market growth are: the feed-in tariff, tax incentives and low interest loans (Ackermann *et al* 2001). At the end of 2007, the country's total installed capacity was 22,247MW, or about 24% of world installed capacity, while records at the end of 2008 show that Germany's wind installed capacity increased and reached 23,903MW (EWEA 2009b; WWEA 2009).

To date, the German feed-in tariff is described as one of the most effective policy instruments in Europe and worldwide (Toke 2006; Mitchell *et al* 2006; EU 2005a; Ranci 2005; Lauber 2004; Sawin 2004; Bechberger and Reiche 2004; Johansson and Turkenburg 2004).

1.3.3 The Netherlands

The Netherlands, once a pioneer of wind power in Europe, is now lagging somewhat behind Germany and Spain because of the lack of public acceptance, institutional constraints and general instability of government policy for wind power. Despite having a very good tax structure for wind power, investors are not willing to finance wind projects, due to a high risk of uncertainty and insecurity as government policies are complex and unstable (Agterbosch *et al* 2009, 2007, 2004; van Rooijen and van Wees 2006; IEA Wind 2004; Kwant 2003). Meanwhile the total installed capacity at the end of 2007 was 1,746MW and at the end of 2008, installed capacity reached 2,389MW. The Netherlands ranks among the fifteen top world leaders, in terms of installed capacity, with an annual market growth rate of 27.4% (WWEA 2009).

1.3.4 United Kingdom

In the UK, the Electricity Act of 1989 marked the beginning of support for wind power and the introduction of the Non Fossil Fuel Obligation (NFFO). The NFFO was abandoned in 2002 in favour of the renewables obligation (RO), which still operates today as the main policy instrument used to promote the development of wind power in the UK. This is very different to the mechanism being employed in Germany and The Netherlands. However, the RO is described as not being as effective as the German feed-in tariff due to its complexities and volatility.

Nevertheless, the UK's total installed capacity at the end of 2007 was 2,389MW, representing a 38% growth rate compared to that in 2006. In 2008, installed capacity reached 3,241MW (EWEA 2009b).

1.4 THE THEORETICAL LENS: NEW INSTITUTIONAL THEORY

New Institutional theory has been used by many researchers (for example: Toke *et al* 2008; Heiskala 2007; Breukers and Wolsink 2007a; Ma 2007; Breukers 2006; March and Oslen 2005, 1996, 1989, 1984; Paulsson and Malmborg 2004; Diermeir and Krihbiel 2003; Ingram and Silverman 2002; Thelen 2002, 1999; Lowndes 2002; 1996; Hasselbladh and Kallinikos 2000; Bulmer 1998, 1994; Hirsch and Lounsbury 1997; Peterson 1995; Dowding 1994; DiMaggio 1988) to explain the relationship between organisations, government institutions, and industries. Paulsson and Malmborg (2004) used new institutional theory approach to explain the interactions which exist between organisations and institutions in Sweden in relation to CO_2 emissions trading. Furthermore, Toke *et al* (2008), Breukers and Wolsink (2007a), and Breukers (2006) adopted the historical (path dependence) approach of new institutional theory to explain wind power policy planning and outcomes in six EU countries - Denmark, Spain, Germany, Netherlands, Scotland, and England/Wales.

Bulmer (1998) therefore contends that new institutional theory is one of the principal methodological approaches to have emerged in recent comparative social science literature. This is also consistent with Diermeir and Krehbiel (2003), who stated that new institutional theory is particularly well suited to comparative research, whether the institutional comparisons are cross-sectional or inter-temporal, or whether they are between committees or constitutions. Notwithstanding, new institutionalism differs from other approaches as it does not constitute a unified body of thought (see for example: March and Oslen 2005, 1989, 1984; Hall and Taylor 1996; Jeppesson 1991; Powell and DiMaggio 1991). Hall and Taylor (1996) identified three schools of thought or strands of new institutional theory: the historical approach, the rational approach, and the sociological approach.

1.4.1 Historical Institutional Approach

The historical institutional approach defines institutions as formal and informal procedures, routines, norms, and conventions embedded in the organisational structure of polity or political economy (Alexander 2005; Hall and Taylor 1996). They view institutions as being associated with organisations. Hall and Taylor (1996) also observed that historical institutional approach has built a strong tradition in political institutions, which they argue matter in any organisation. Thus, they tend to provide a detailed explanation of how institutions affect decision making from a group theory perspective. Alexander (2005) also observed that historical institutionalism approach focuses on path dependency and a heightened awareness of unintended consequences.

1.4.2 Rational Choice Institutional Approach

Rational choice institutionalism approach is based on analysis of the economics of organisations and from the influential work of North and Williamson (Alexander 2005). According to Breukers (2006: 51) rational choice institutionalism defines institution as *"rules and game'; structures of incentives that make up the opportunities and constraints for rational actors"*. Thus, rational choice institutional theory places great importance on property rights, rents, transaction costs and institutional development (Immergut 1998; Hall and Taylor 1996).

Hall and Taylor (1996) also identified four features of rational choice institutional approach: first, as observed by Alexander (2005), is that rational actors have sets of fixed preferences, tastes and values which tend to drive their behaviour to satisfy these tastes and values. Secondly, rational actors also view politics as being collective action dilemmas and rational actors would always operate in a way that satisfies their preferences in a Pareto optima[16] manner. They also viewed rational actors as being driven strategically, following the behaviour of other actors. Thus, institutions exist because of the need to solve problems and are designed to suit the functions they perform (Breukers 2006; Alexander 2005; Hall and Taylor 1996).

1.4.3 Sociological Institutional Approach

The sociological institutionalism approach began as a subfield of an organisation theory (Alexander 2005). Hall and Taylor (1996:946-947) also observed that sociological institutionalism argues that: *"many of the institutional forms and procedures used by modern organisations were not adopted simply because they were most efficient for the tasks at hand, in line with some transcendent 'rationality', instead, they argued that many of these forms and procedures should be seen as culturally-specific practices, akin to the myths and ceremonies devised by many societies, and assimilated into organisations, not necessarily to enhance their formal means-ends efficiency, but as a result of the kind of processes associated with the transmission of cultural practices more generally."*

[16] Making their own self better off, without making others worse off

However, they define institution more broadly than other schools of thought. They view an institution as a frame of meaning, guiding human actions and culture (Breukers 2006; Thelen 2002; Hall and Taylor 1996). Thus, they associate an institution with roles attached to norms of behaviour and belief. Institutions influence behaviours by specifying what an individual should do, and what one can imagine oneself doing in a given context.

In managing the complexities of the three institutional theories, Table 1.2 summarises the focus of each school of thought.

Table 1.2: Institution Definition and Focus

School of Thought	Definition of Institution	Focus and Interest
Historical institutional approach	Formal and informal procedures, routine, norms, and conventions embedded in the organisational structure of polity or political economy	The role and impact of political institutions in decision making
Rational choice institutional approach	Rules and games, structures of incentive that make up the opportunity and constraints for rational actors	Property rights, rents, transaction costs and institutional development
Sociological institutional approach	A frame of meaning guiding human actions and culture	Norms and behaviour

Source: Author Generated

1.4.4 New Institutional Theory and Country Cases

According to Breukers and Wolsink (2007: 2738) the "*New Institutionalism captures a cross-disciplinary tendency towards a renewed interest in how the role of institutions can contribute to the understanding of social and political outcomes*". Thus, new institutional theory helps explore the three country cases considered in this study. As mentioned earlier, the three countries have achieved varying successes in wind power deployment over the past decades, especially in the experimentation of different types of policy instruments.

Historical institutional approach has been adopted for this study. Historical institutional approach was employed because it enables this study to trace the historical emergence of different kinds of institutional and industry arrangements that have either helped to promote, or distort, wind power industry development in the Member States examined. Historical institutionalism defines institution as the rules governing organisation or behaviour, which are generally accepted by members of a social group. These can be formal and informal procedures, routines, norms, and conventions embedded in the organisational structure of polity or political economy (Laird and Stefes 2009; Alexander 2005; Hall and Taylor 1996). Breukers and Wolsink (2007: 2738) further argued that institutions in some cases are biased, in that they "*partly reflect and maintain the status quo since they empower some actors and enhance some perspectives at the expense of others*".

Thus, a key component of an institution is the presence of actors or stakeholder groups that interact with each other to bring about intended and unintended outcomes. As such, policy instruments implemented by the Member States are the results of the outcome of interactions between wind power industry stakeholders. Steinmo (2001:1) states that: "*historical institutionalists are primarily interested in understanding and explaining specific real world political outcomes*". Historical institutionalists start with institutions and ask how they affect the individual's behaviour and focus more on historical views of institution (Pierson 1991). The notion of path dependency helps to explain how the set of decisions one faces for any given circumstance is limited by the decision one has made in the past, even though past circumstances may no longer be relevant. Thelen (1999: 387) also states that the path dependency approach "*suggests that institutions continue to evolve in response to changing environmental conditions and ongoing political manoeuvring but in ways that are constrained by past trajectories*".

This study has adopted the concept of path dependency in order to explore the diversity of the wind power industry across the EU, especially within the three country cases under study. This will be done within three boundaries or parameters. Firstly, is the exploration of the historical emergence of policy instruments and goals they are set to achieve. This is in line with the Directive 2001/77/EC, which mandates Member States to deploy policy instruments in support of wind power and other renewables. The Directive contains and sets targets which each Member State is expected to achieve over a given period of time. Secondly, is the examination of the policy making process that is the architect of each policy instrument. Breukers and Wolsink (2007:2739) state that: "*the process of policy making involves the interaction, cooperation and conflicts among actors and stakeholder groups*". Thus, this study utilises new institutional theory (historical institutional approach) to explain the relationships and interactions that exist between the actors in the wind power industry. This helps to unveil the role of the national government in establishing rules, regulations, and policy instruments, in relation to environmental non-governmental organisations and the wind power industry.

Thirdly, this thesis investigates the outcome of the support and implementation of the policy instrument deployed to promote wind power in the three country cases, in terms of their performances over time. This is achieved by utilising the integrative framework, presented in Chapter Four of this thesis, to critically analyse the policy instruments implemented in each Member State and also to make comparisons, in order to put the argument for the EU-wide harmonisation plans into context, which has recently been very controversial.

Performance is a theme that will recur in this thesis. This thesis will analyse the performance of the feed-in tariff, the MEP, and the renewables obligation as implemented in Germany, The Netherlands, and United Kingdom. Performance in this thesis is defined as how well a policy instrument has contributed to the growth and development of wind power over time. In order to understand the performance of policy instruments, an evaluation framework has been developed and broken down into eight components as presented in Chapter Four of this thesis.

1.5 THE AIMS AND OBJECTIVES OF THIS STUDY

The purpose of this study is to contribute in addressing the challenges of the expansion of the wind power market by offering a practical and impartial critique of the current policy instruments (i.e. the feed-in tariff, MEP, and renewables obligation) adopted in the three EU Member States investigated. It aims to develop an integrative framework for evaluating the performance of wind power policy instruments, especially in light of the EU proposed harmonisation plans. More specific objectives include: (i) to critically examine the international and EU renewable energy policy drivers, and the role of wind power especially in the EU energy and climate change debate; (ii) to critically appraise the wind power industry structures and the role of stakeholder groups (e.g. NGOs and renewable energy consortiums) in the business environment in each Member State under investigation; and (iii) to utilise the framework developed to critically compare and contrast the performance of the feed-in tariff and quota system.

The development and application of this framework to this research stems from the call to harmonise the EU wind power policy instruments by the Directive 2001/77/EC and most importantly from the question emerging from the academic literature, whether the feed-in tariff system is the most effective instrument in promoting the deployment of wind power in Europe and encouraging a market take-off of wind power at national level. This thesis does not seek to credit nor discredit policy instruments rather it considers the performance of policy instruments in order to set in context the EU harmonisation agenda which has been a subject of much conjecture. It draws from historical institutional theory approach, especially the notion of path dependency to explore the diversity of the wind power industry across the Member States investigated. The concept of path dependency assumes that technological choices made in the past influences subsequent choices. Scheinstock (2007:93) argued that: *"nation-states tend to retain patterns of institutional continuity and national distinctiveness, even under conditions of external shocks to their political and economic environment"*. Thus, the idea and notion of path dependency help inform the core objective of this thesis which is to compare and contrast the performance of the feed-in tariff, the MEP, and renewables obligation. Furthermore, Scheinstock (2007:93) contends that: *"path dependency is a characteristic of institutional development, because actors involved in technological development processes also exploit institutional resources"*. Therefore the outcome of the comparison of the policy instruments implemented in the three country cases would be useful to comment on the current EU-wide harmonisation plans which in recent times have been a subject of much conjecture.

1.6 OVERVIEW OF CHAPTERS

This study consists of Ten Chapters covering the introduction to the research, the literature review, methodology and analysis. Chapter Two sets out the international and European Union policy context. It begins by outlining the three pillars on which energy policies are built worldwide before reviewing key EU renewable energy policy landmarks. The Chapter also highlights the importance of Directive 2001/77/EC and Directive 2009/28/EC to the EU renewable energy policy instruments design and implementation. The directives provide that Member States implement the choice of policy instruments that suits their political and market conditions. Recently, the EU agreed to reach a renewable energy target of 20% by 2020. Wind power is expected to play an important role in reaching this target by 2020; hence the Chapter also considers the relevance of wind power to the current debate. The Chapter concludes by pointing out that wind power will continue to grow and make significant strides towards the EU energy objectives. This is because it is a near market technology and available in most locations of Europe; it is clean and has limited climate change impact.

Chapter Three reviews the existing literature on renewable energy policy instrument evaluation typologies. The aim of the Chapter is to attempt to highlight some of the key weaknesses of the typologies found in the literature. First the Chapter provides an overview of policy instruments typologies and will highlight three common policy instruments widely implemented by EU Member States. Furthermore, in reviewing the literature, it will be demonstrated that most of the evaluation criteria presented are limited to effectiveness and efficiency criteria. This approach alone does not provide a complete understanding of the performance of policy instruments. It is therefore important to develop an evaluation framework which goes beyond effectiveness and efficiency.

The Chapter will also point out that most of the evaluation criteria presented in the literature are limited to policy makers' views on policy instruments; it does not include other stakeholder groups (e.g. renewable energy associations; NGOs and consortiums, industrialists etc). For a holistic and impartial analysis, the views of key wind power and renewable energy stakeholders on the performance of policy instruments are important in reaching a laudable conclusion. Analyses presented on the performance of policy instruments are based on theoretical and abstract views. This Chapter three therefore concludes that there is a need for a holistic analysis based on empirical evidence from wind power industry stakeholders. This forms an important part of thesis, and to achieve this aim the thesis will attempt to develop an integrative framework for evaluating the performance of policy instruments. This will allow this study to make a significant contribution to the current literature on the experiences of implementing policy instruments in the Member States investigated.

Arising from the conclusion above and from the first hand knowledge gained in the literature, Chapter Four sets out and defines the policy instrument evaluation framework through which this research will evaluate the performance of the feed-in tariff, the MEP, and renewables obligations. The Chapter highlights policy design conditions drawn from Directive 2001/77/EC. This is very useful in understanding the basis of the choice of policy instrument implemented by Member States investigated. Furthermore, the Chapter then discusses the evaluation framework by first justifying the reason for the selection before introducing each component part of the framework. The evaluation framework is made up of eight different components and these are grouped into four clusters, thus differentiating this thesis from others. A key contribution of this thesis to the renewable energy policy literature is the attempt to use the evaluation criteria to present the views of policy makers, practitioners, and other stakeholders regarding the performance of policy instruments mentioned above. Thus, Chapter Five outlines the method used.

In order to allow this thesis to provide impartial and holistic analyses of the performance of policy instruments implemented in the three country cases investigated, a qualitative research approach was adopted. Semi-structured interviews were used to collect the views of senior government policy makers, practitioners, and academics in each country case, hence very detailed and rich data was gathered and without doubt helped to strengthen the findings and analyses presented in subsequent Chapters of this thesis. Secondary data sources (e.g. EU and Member States policy documents) were used to complement and strengthen data gathered through interviews.

Chapters Six to Eight *"Country Analyses"*, present the findings and analyses of the three EU Member States (Germany, Netherlands, and the UK) investigated by this study. Chapters Five to Seven critically outline the principal market drivers shaping the wind power industry in each country. An overview of wind power policies since the 1970s to present (2008) of each Member States is also reviewed. Furthermore, detailed empirical analyses of the performance of the policy instruments (German feed-in tariff, the MEP, and the UK renewables obligation) based on the framework presented in Chapter Five *"Evaluation Framework"*, were presented. The findings and analyses of each Member State do differ significantly, and this helps to explain the outcome of the analyses of the performance of the different policy instruments adopted.

Chapter Nine *"A Cross National Comparison: Discussion and Critical Analysis of the Feed-in tariff, the MEP, and the Renewables Obligation"*, presents a qualitative analysis and comparison of the policy instruments adopted by the three Member States investigated. Arising from the critical analysis of the three Member States in Chapters Five, Six, and Seven, the aim of this Chapter is to attempt to add value to the current cross-national comparisons made about wind power delivery and to present a more rigorous comparative framework, which teases out different dimensions of policy instrument evaluation. The discussion proceeds to a detailed examination of the impacts of the current policy instrument harmonisation debate on the EU wind power industry. The harmonisation agenda has been a subject of much ongoing debate and conjecture throughout Europe. Considering the different environment, culture and market structure of each Member State, there is no one best policy option for the EU harmonisation agenda.

Chapter Ten *"The Research Conclusion and Recommendation"* concludes the study by presenting the research findings and the contribution of this study to wind power policy and management literature. This Chapter identifies areas for future research and provides contributions to the current cross national debate and comparisons made to the EU wind power delivery systems. The research also offers a number of policy recommendations for the EU wind power policy instruments harmonisation agenda. These recommendations focus how to move the Member States wind power market forward, rather than concentrating on the current harmonisation debates.

CHAPTER TWO

INTERNATIONAL AND EUROPEAN UNION RENEWABLE ENERGY POLICY CONTEXT

2.1 INTRODUCTION

One of the key objectives of this thesis is to outline international energy policy drivers of change, and to critically appraise the principal market drivers which are shaping the EU energy industry. This Chapter sets out key international and EU policies relating to renewable energy sources, and it begins by introducing the international policy drivers on which energy policies - worldwide - are built. It is the desire to address key energy policy drivers that bring about the deployment and integration of renewable energy sources into national systems, thus the deployment of policy instruments, to make renewable energy electricity competitive with other forms of energy, comes into play.

On this note, the Chapter will move to further discuss the international and EU renewable energy policies before setting out the relevance of wind power to the current renewable energy debate. As mentioned in Chapter One, wind power has come to the forefront of global renewable energy debates, whereby it is seen to be abundant in most regions of the world, most promising and has competitive advantage, and additionally, it is capable of nearly competing on a commercial basis with traditional forms of electricity generation.

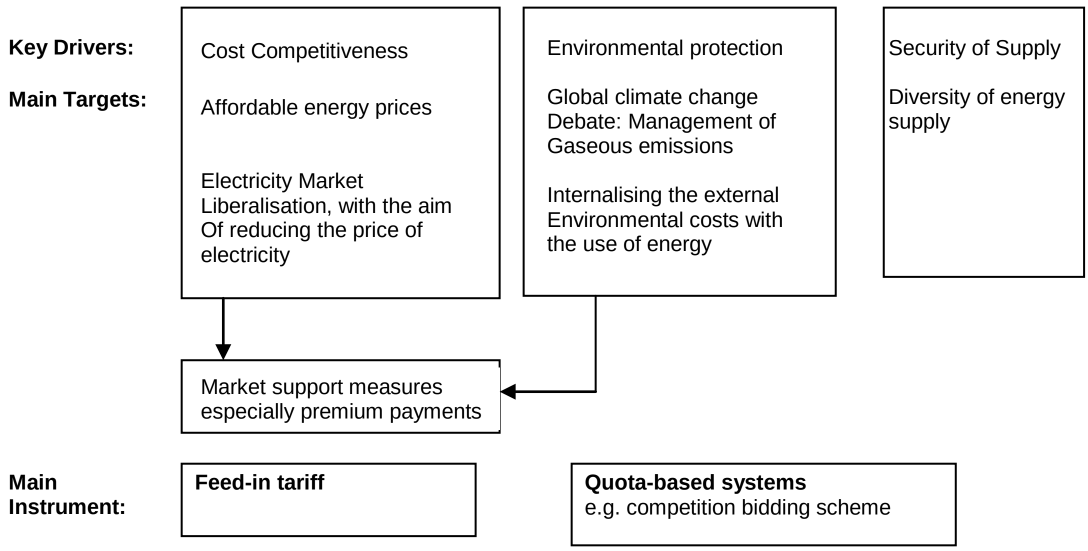
2.2 INTERNATIONAL ENERGY POLICY PILLARS

Energy policies worldwide appear to be built on three pillars;

1. *Cost competitiveness* - the need to make energy relatively cheap and affordable for households and industry;
2. *Environmental responsibility* - rising to the challenge of the global climate change, as a result of the effect of using fossil fuels as a major source of energy to humanity; and
3. *Security of supply* - owing to the threat of over dependence on a single resource, such as fossil fuel.

Oil reserves are concentrated in relatively few locations, but coal reserves are extensive and found in most parts of the world (O'Gallachoir *et al* 2002; Kellet 2002). Kellet (2002) provided a diagrammatical framework (Figure 2.1) that shows the relationship between these three key world energy policy drivers and argued that policy instruments, such as the feed-in tariff and the quota system, are designed on the drivers of energy policy. However, for sustainable energy development to be achieved, these key energy policy drivers must be balanced (O'Gallachoir *et al* 2002).

Figure 2.1: Energy Policy



Source: Kellet 2002

These three key pillars will now be discussed to determine their relevance to the current renewable energy policy debate.

2.2.1 Security of Energy Supply

Over the past four decades, security of energy supply has been one of the main energy policy goals, starting with the two global oil crises of the 1970s (Hedenus *et al* 2010; Bielecki 2002). However, the concept has recently been revived (Kruyt *et al* 2009; Costantini *et al* 2007; IEA 2007a, 2007b, 2007c; Mulder *et al* 2007; Correlje and van der Linde 2006; EU 2006a), due to:

- the recent increase in the dependence of developed and industrialised economies on energy imports;
- the increased shortages in most cases caused as a results of disruptions in supply; and
- the current high oil prices in the period 2007 and beyond.

Indeed, the concept has been defined and approached differently by many authors, e.g. Hedenus *et al* (2010) found that the concept is vague and hard to define; whereas Alhajji (2007) argued that the exact definition of the concept makes different meanings to different people at different moments in time (Kruyt *et al* 2009). Nevertheless, the most cited definition is that which is set out by IEA (2001:76), where it defines security of energy supply as: *"Reliable and adequate supply of energy at reasonable prices"*.

The IEA (2001) definition tends to imply that the uninterrupted supply of energy that meets the need of the global economy - at a cost based price – which is determined by the market, and is based on demand and supply balances (Bielecki 2002). Therefore, central to the concept of security of energy supply is that: *"energy is inevitable for human life and a secure and accessible supply of energy is crucial for sustainability of modern societies"* (Muneer 2007:1388).

Furthermore, the second point to highlight is that, any attempt which disrupts the availability of energy supplies may cause economic and social consequences (Constantini *et al* 2007). However, the EU is not left out of the discussion, Constantini *et al* (2007:211) contends that: *"The current European domestic energy system is not sufficiently reliable or affordable to support sustained economic growth. OECD European countries are consuming more and more energy and importing more and more energy products. As a result, external energy dependence for all sectors of the economy is constantly increasing, especially, for oil and gas."*

This view is consistent with Jansen and Uyterlinde's (2004) observation. On this note, the authors pointed out that the blue print for the EU policy on security of energy supply is given in the Green Paper "Towards a European strategy for the security of energy supply" (EU 2000b). Here, the three main points emphasised in the Green Paper, as outlined by Jansen and Uyterlinde (2004:95) were:

(i) "The EU will become increasingly dependent on external energy sources. Enlargement will not change the situation;

(ii) The EU has very limited scope to influence energy supply conditions but the EU can intervene on the demand side: mainly by promoting energy saving in buildings and the transport sector;

(iii) At present, the European Union is not in a position to respond to the challenge of climate change and to meet its Kyoto Protocol commitments".

In continuing, the Green Paper (EU 2000b), revealed that EU dependence is increasing and stressed that the EU meets 50% of its energy needs through imports, although this may rise to 70% by around 2030 if no action is taken by the EU. Furthermore, EU (2007) also reports that the reliance on gas importation is expected to soar from 57% to 84%, and in addition to this, and from 82% to 93% for oil by 2030. Such increases cannot go unnoticed and national and regional governmental policies require significant rethinks, in order to address these shortfalls. Hence, two of the key factors influencing the EU energy import dependence, are:

(i) the EU energy crunch; and

(ii) the forecasted depletion of the finite North Sea oil resources (Eur 2007).

Notably, Spanjer (2007) divided security of supply into two broad parts: (i) System security - the extent to which consumers can be guaranteed gas supplies, within foreseeable circumstance; (ii) Quantity of supply - guaranteeing an adequate supply of gas now, as well as in the future (p2890). Spanjer's analyses dwells more on the quantity of supply aspect and this is linked to the EU's dependency on the Russian gas supply. Spanjer (2007) and Weisser (2007) further claimed that the EU import dependence creates the three important risks of:

- Source dependence;
- Transit dependence; and
- Facility dependence.

Source dependence is described as the increase in Europe's energy demand in recent times - which is expected to rise from 36% in 2002 towards 69% by 2030. The bulk of the energy supply according to Weisser 2007, is expected to come from Russia (33%), North Africa (27%), and the Middle East (17%).

Describing transit dependence, Weisser (2007) indicates that most of the gas supplies across Europe are pipeline bound and they are concentrated in a few trunk lines[17] (p2). Here, Europe is seen to be dependent on a relatively small number of pipelines and can affected by disruption, whether political or otherwise, and Europe is therefore vulnerable to shortages, which may affect economic activities.

Similarly, any breakdown of the existing pipelines will put a strain on the other transit systems, and this may also cause facility dependence (Weisser 2007; Spanjer 2007). Overall, in terms of the consequences of security of energy supplies, there would appear to be a likelihood of the EU becoming more exposed and vulnerable to price fluctuations, which may have a negative impact on economic development (Spanjer 2007; Weisser 2007; Corredje and van der Linden 2005; Jager-Waldau *et al* 2004).

Being aware of the problems of security in energy supply, Jager-Waldau *et al* (2004) suggested that measures need to be taken to reduce the EU's dependency on energy and gas demand from other regions of the world. Such measures should be designed to look after the citizens' welfare, environmental protection and sustainable development[18]. As a preferred solution, the Green Paper (2000b) states that:

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[17] Few Gas pipelines from main source of supply to European Union Member States

[18] This argument is linked to Article 2 and 6 of the Treaty of Amsterdam 1997. For further details see Jager-waldau *et al* (2004: 12)

"Renewable sources of energy have a considerable potential for increasing security of supply in Europe. Developing their use, however, will depend on extremely substantial political and economic efforts. In the medium term, renewables are the only source of energy in which the European Union has a certain amount of room for manoeuvre aimed at increasing supply in the current circumstances. We cannot afford to ignore this form of energy" (Jager-waldau *et al* 2004:13).

Against this backdrop, this suggestion identified serious concerns over conventional methods of energy production and additionally, points towards the need for a greater focus on renewable energy for Europe as a whole.

2.2.2 Environmental Responsibility/ Protection

This thesis defines environmental responsibility as: *"the need to rise to the challenge of the global climate change, as a result of the effect of using fossil fuel as a major source of energy to humanity (O'Gallachoir et al 2002:2).*

In recent times, the concept of climate change and its impact on the environment has received significant attention internationally (Hirschl 2009; Nordhaus 2007; Stern 2006a, 2006b; UNEP and IEA 2002). Indeed, Stern (2006b:1) summarises that: *"There is now an overwhelming body of scientific evidence that human activity is causing global warming, with the main sources of green house gases....the fastest growing sources are transport and electricity".*

Whist, the damages being caused by climate change are vast, there is a suggestion that demands that international and national governments should respond promptly (Stern

2006a). As such, in understanding the nature of the evolution of climate change, it is noted that the beginning of international climate policy can be traced to the development of international environmental policy through international conferences, aimed at protecting the climate (Sahin 2004). The first of such conferences which is recognised as having initiated the international environmental policy, was the Stockholm Conference in 1972, which led to the emergence of the United Nations Environment Program (UNEP). The Brundtland Commission 1987 also initiated the publication of the international environmental framework *'Our Common Future'*, which called for the protection of the atmosphere and the reduction of greenhouse gas emissions. Later, the Toronto Conference 1998 was also agreeable to this and set a target for reducing CO_2 emission by 20% of the 1988 levels, by 2005. Meanwhile, the United Nations Conference on the Environment and Development (UNCED), held in 1992 in Rio de Janeiro, expanded these international policy goals even further by including sustainable environmental development policies and the Framework Convention on Climate Change (FCCC). Furthermore, in December 1997, the most prominent and effective international policy was developed in Kyoto, with policies relating to quantified emissions limitations and associated reductions being recommended and subsequently adopted by a number of developed countries. The second approach is primarily based on the international technological policy towards protecting the climate. Internationally, renewable sources are considered an important measure in protecting the environment and mitigating the threat of global climate change, but Hirschl (2009) contends that renewable energy was scarcely mentioned in the main documents of international climate policy convention and the Kyoto Protocol. A key reason for this is pointed out by Hirschl (2009: 4410) in that: *"The international climate policy begins solely on the output side i.e. with the emission of greenhouse* *gases that are to be reduced and/or regulated, and leaves out the question of how these are to be produced or should be produced".*

However, Lund (2009); Sahin (2004); and Sims (2004) contend that renewable energy and other energy efficient technologies[19] are the best means to reduce greenhouse gas emissions. Consequently, Sahin (2004) stressed that wind power has the greatest capacity to promote the use of renewable resources technology internationally and can help save nearly 50 million tonnes of CO_2 per year.

2.2.2.1 Kyoto protocol and the EU

The Kyoto Protocol is an international agreement on the abatement of greenhouse gas emissions (GHG), with the overall aim, to attain a 5% reduction of the GHG emission, below the 1990 levels during the period 2008 to 2012. Signatories to the protocol are to achieve this objective by introducing national policies to reduce emission. The Kyoto protocol primarily allows three flexible mechanisms: International Emission Trading System (ETS), Joint Implementation (JI), and Clean Development Mechanism (CDM) (Anger 2008; van Asselt and Biermann 2007; Streimikiene and Mikalauskiene 2007; Egenhofer 2007; Jager-waldau *et al* 2004). With this in mind, according to Pan and Regemorter (2004), these three flexible mechanisms were recommended by the Kyoto Protocol to alleviate emission reduction loads of the committed countries that may have difficulty in meeting their respective obligations.

[19] Low energy using light bulbs, fuel efficient cars, and improved carbon capture facilities

The EU is a strong proponent of the Kyoto Protocol and has committed itself to achieving an 8% reduction of the 1990's level of the greenhouse gases emission between the period 2008 to 2012. Jager-waldau *et al* (2004) described the Gothenburg meeting of the European Council in June 2001 as a good starting point, where heads of government met to discuss ways to combat climate change. The outcome was the stimulation of negotiations of burden sharing of the greenhouse gases emission reduction by each Member State[20]. This was accompanied by the European Climate Change Programme (ECCP) which provided for the integration of the European policy, science and technology efforts, with respect to environmental protection. The ECCP also witnessed the development of a series of implementation processes and awareness campaigns, aimed at exposing the EU authorities to the formulation of relevant energy policies. However, the second report of the ECCP (2003) stated that the EU would not meet the set Kyoto target with the current policy measures in place (Jager-waldau *et al* 2004. Nevertheless, the 8% target affects all the Member States starting with the EU-15 and subsequent enlargement. Table 2.3 outlines the set targets.

[20] The outcome was in response to the achievement of the overall EU 8% commitment to GHG emissions reduction by 2008 to 2012, compared to the 1990 levels.

Table 2.3: Increase in the share of renewable energy sources in electricity market from 1997 to 2010; and the reduction of greenhouse gas emissions from 1990 levels by the 2008-2012 compliance period.

Country	EU directive	Kyoto target
Austria	+8.1%	-13.0%
Belgium	+4.9%	-7.5%
Denmark	+20.3%	-21.0%
Finland	+6.8%	0.0%
France	+6.0%	0.0%
Germany	+8.0%	-21.0%
Greece	+11.5%	+25.0%
Ireland	+9.6%	+13.0%
Italy	+9.0%	-6.5%
Luxembourg	+3.6%	-28.0%
Netherlands	+5.5%	-6.0%
Portugal	+0.5%	+27.0%
Spain	+9.5%	+15.0%
Sweden	+10.9%	+4.0%
United Kingdom	+8.3%	-12.5%
EU Total	+8.1%	-8.0%

Source: European Energy Agency (2001)

Based on the above figures, it is noted that according to the Report on the Demonstrable Progress under the Kyoto Protocol (EU 2005c), the EU has made significant progress in achieving the 2012 target and even has plans and strategies[21] in place to meet the post 2012 target (EEA 2008; EU 2008a; EUR 2008b).

2.2.2.2 EU Emission Trading Scheme (EU ETS)

The EU ETS came into force in January 2005, based on the Directive 2003/87/EC (Egenhofer 2007). The ETS is the biggest international environmental trading scheme and a key pillar of the fast growing global carbon trading market (EC 2007). The ETS was put in place by the EU Commission in order to create a market for emission

[21] Extending the EU ETS to other greenhouse gases and other industrial emitters; a harmonised ETS suitable for EU internal market with common rules to ensure a level playing field; and a proposed EU framework to cover other areas where the EU ETS does not apply e.g. building, transport, agriculture, and waste (EU 2008a)

reductions, and to allow Member States to reach their respective Kyoto targets. According to the European Communication (EC 2005:6) the: *"EU ETS is based on the recognition that creating a price for carbon through the establishment of a liquid market for emission reductions offers the EU the most cost-effective way for the Member States to meet their Kyoto obligation and move towards the low carbon economy of the future…..the ETS should allow the EU to achieve its Kyoto target at a cost between EUR 2.9 Billion and EUR 3.7 Billion annually….."*

As a consequence, the Communication further outlines six principles upon which the EU ETS is based, and these include:

- 'Cap' and 'Trade' system
- A focus initially on big CO_2 emitters
- Phase implementation with periodic reviews
- Allocation plans for emission allowance decided periodically
- Strong compliance framework
- Tapping emissions reduction opportunities from the rest of the world, through the use of Clean Development Mechanism (CDM) and Joint Implementation (JI), and providing links with compatible schemes in the third world countries.

The first phase of the EU ETS, or the mandatory warm-up phase (2005-2007), covers CO_2 emissions from large industrial and energy installations and provides a number of limits, as the allowance, companies can emit (Asselt and Bietmann 2007; EC 2005; van Egenhofer *et al* 2002). Most of the allowances are allocated to installations free of charge, at 95% for the first phase and at least 90% for the second phase 2008-2012 (EC 2005).

To ensure compliance, a market based instrument, which makes it possible to put a price on carbon emissions, is incorporated into the ETS. EC (2005) also states that installations must surrender a number of allowances, equivalent to verified CO_2 emissions each year. The allowances are then cancelled to avoid them being recounted or resold, and any allowance left can be used the following year. A fine of 40 Euro per tonne is levied on those that go over their emission limits, and this penalty was risen to 100 Euros from 2008-2012.

With respect to the performance of the EU ETS during the first phase (2005-2007), the European Communication (EC 2008) claimed that the EU ETS successfully established free trade of emission allowance across the EU. The first phase also saw the introduction of monitoring and verification infrastructures, including a comprehensive register of verified emissions. The EU ETS has also successfully concluded two compliance cycles. Furthermore, it has developed into the world's largest single carbon market, accounting for 67% in volume and 81% in terms of value in the global carbon market. Moreover, it has worked as a driver of the global credit market and has triggered worldwide investments in emission reduction projects, as well as linking 147 countries through the CDM[22] and JI[23] projects (EU 2008b:2). During the same period, EU (2008a) reports that the EU absolute emissions were reduced by 6.5% compared to 2005 verified emissions. However, some of the shortfalls experienced were due to an excessive allocation of allowance in some Member States and a lack of complete verified data. Hence, the European Communication (EC 2008) proposed an amendment to the EU ETS directive 2003/87/EC and further affirmed the EU's commitment to a 20% reduction in

[22] Clean Development Mechanism
[23] Joint Implementation

greenhouse gases by 2020. The EU ETS directive 2003/87/EC amendment is aimed at achieving three objectives of:

- Fully exploiting the potential of the EU ETS to contribute to the EU's overall greenhouse gases reduction commitments, in an economically efficient manner;
- Refining and improving the EU ETS in the light of experience gathered;
- Contributing to transforming Europe into a low greenhouse gases emitting economy and creating the right incentive for forward looking low carbon investment decisions, by reinforcing a clear, undistorted and long-term carbon price signal (EU 2008b).

With these objectives, the scope of the current EU ETS would expand to include new sector and gases[24] not currently covered by the EU ETS. Furthermore, going beyond the ETS, the European Commission in EC (2008) indicated that renewable energy deployment in the EU would also help reduce greenhouse gases emissions and improve energy security. Currently, renewables account for 8.5% of the EU energy consumption, which falls far short of the 20% target which is to be achieved by 2020, (EU 2008a). To encourage Member States, EU (2008a:7) claimed that the EU council agreed to: *"a fair target that takes account of the different national starting points and potentials, including the existing level of renewable energies and the energy mix, notably low carbon technologies"*.

With these plans and strategies in place, the EU ETS's second phase is in operation (2008-2012) and it is rather early to analyse the final success of the EU ETS from the

[24] CO_2 emissions from petrochemical, ammonia, aluminium, N_2O etc

period 2005-2012. A further point to note is that, the EU ETS has been criticised for not applying to all emissions generated in the EU, rather it is limited to only CO_2 emissions in four sectors (Oberbdorfer and Rennings 2007). The EU ETS is also unfair and inadequate as it favours firms that qualify for free emissions permits, over others that do not have this advantage. Thus, Oberbdorfer and Rennings (2007) claimed that the EU ETS lacks environmental effectiveness and economic efficiency.

2.2.2.3 The EU and energy efficiency

The Action Plan for energy efficiency (2000-2006) defined energy efficiency as reducing energy consumption without reducing the use of energy-consuming plant and equipment. In this case, there is a focus towards promoting behaviour, working methods and manufacturing techniques which are less energy-intensive. The EU energy efficiency is aimed at reducing energy consumption and wastage. This is very important in order for the EU to attain the three energy objectives of security of energy supply, competitiveness, and environmental protection. To demonstrate the EU's commitment in promoting energy efficiency, the strategy towards the rational use of energy (RUE) was adopted in 1998 by the European Commission (EU 1998) and it proposed an 18% reduction of energy use by 2010. While in 2000, an EU Action Plan for Energy Efficiency (2000-2006) was released as a follow-up to the Commission Communication 1998. The Action Plan outlined the barriers to EU energy efficiency[25]. The objective of the Action Plan was to attain a 1% decrease, per annum until 2010, over and above the 18% envisaged in the 1998 European Commission Communication. It proposed action plans which are divided into three categories:

[25] Inefficient use of energy in the industry sector; practice of selling energy by kWh rather than a service (http:www.europa.eu)

- Measures to integrate energy efficiency into other community policies - this is to be carried out in the six main areas: transport; enterprise policy; regional carbon policy; R&D; taxation and tariff policy; international cooperation and pre-accession activities.
- Initiatives to strengthen and extend existing policies in household appliances; commercial and other equipment; buildings etc.
- New policies and measures - through the promotion of energy efficiencies in public procurement; cooperative technology procurement; energy audits in industry and the tertiary sector; and best practice.

In order to strengthen the action plan 2000-2006, the Green Paper ‘Energy Efficiency or Doing more with less’ EU (2005c), states that the EU must intensify its efforts in the transport, energy production, and building sectors to be able to achieve the energy efficiency targets. The Green Paper (EU 2005c; Eur 2008a) further stressed that the EU dependence on energy imports may rise to 70% by 2030 and outlined four key areas where the EU could strengthen its energy efficiency plans. These include:

- Intensive effort is needed by the EU Commission to reverse the trend of increasing energy consumption, by combating energy waste.
- Reducing the dependency on petrol usage in the transport sector.
- Improved technology in energy production process, as 40-60% of energy necessary for electricity production is lost in the production process.
- Increase energy efficiency in buildings. Heating and lighting in buildings accounts for 40% of all energy used in the EU.

Following the Green Paper (2005c), saw the evolution of the EU Action Plan for energy efficiency (2007-2012), released in 2006 by the European Commission. The action plan highlighted measures to improve the energy performance of products, buildings and services, improving energy transformation, limiting the costs linked to transport, changing behaviour, adapting and developing international partnerships (EU 2006c). Putting these actions and legislation to work in the EU will translate into a 20% reduction in energy consumption by 2020 through energy efficiency (EU 2008b).

2.2.3 Cost Competitiveness

Cost competitiveness is defined in this thesis as the need to make energy cheap and affordable for households and industries. Jansen and Uyterlinde (2004) refer to the cost competitiveness objective of relaxing the EU's internal electricity market, and they argued that competitiveness is promoted through liberalisation of the EU electricity and gas market, separation of energy production, transport and distribution activities. This is also consistent with the findings of Newberry (2006, 2005, 2004, 2003, 2002a, 2002b), Neuhoff and Newberry (2005), Brunekreeft *et al* (2005). On this, Newberry (2002b) indicated that EU electricity and gas directives 96/92/EC and 98/30/EC were adopted in 1996 and 1998 to further strengthen the liberalisation programme of the EU and required all Member States to open up their markets for competition by 2000, with the aim of replacing the monopolistic structures of the electricity market and energy sector with a competitive market. While Meyer (2003) argued that the European Schemes, deployed in recent times to promote renewable energy sources for electricity, they are related to the liberalisation of the energy market. Meyer (2003) also indicated that the relaxing of the electricity market in

Europe was first pursued by the UK in 1989 and Norway in 1991. This was before the European Council of Ministers adopted the Directive 96/92/EC in 1996. However, Ringel (2003) indicated that after accepting the directives, the EU energy sector witnessed an irregular change. This is primarily due to the directive 96/92/EC seeking to achieve low energy prices with high efficiency through competition, while pursuing security of energy supply, energy quality, price, and environmental protection (Meyer 2003).

Ringel (2003) and O'Gallachoir *et al* (2002) indicated that the liberalisation of the electricity market was aimed at delivering low consumer prices and competitive energy costs and prices. It tends to give the end users the opportunity to choose their supplier freely - as well as – to be able to negotiate contracts, while generators can sell their electricity mix to any other market players[26]. This is to allow the free interplay of supply and demand, with high hopes of increasing economic efficiency.

Ringel (2003) also argued that market liberalisation does not pose any threat to the European Union objective of maintaining a balanced security of energy supply, neither does it affect the drive of meeting the EU's environmental responsibilities rather, they complement one another. This is also true with Newbery's (2002b) findings. Here, Ringel (2003) and Newbery (2002b) used the British experience as a case study to analyse the relationship and conflicts between energy policy and the desire for liberalised electricity markets. Ringel (2003) concluded that Britain has an advantage, since the inception of market liberalisation in 1990, and that Britain was also well placed in terms of security of supply. However, Newbery (2002b) indicated

[26] The consumers represents the demand side while the generators represents the supply side respectively

that the main problem of liberalising the energy market is the tension between the desire of efficient, competitive and unregulated wholesale and retail markets against long-term investment and security of supply.

In summary, in collating these drivers of change, it is noted that these energy policy pillars are integrated to form the basis for building a sustainable economy for the EU, in terms of job creation, an increase in productivity, consumer protection and the overall protection of the environment through the reduction of climate change impact. Renewable energies such as wind power are expected to play a major role in strengthening the EU's effort in achieving these objectives. The next section outlines key EU renewable energy policy milestones before providing an overview of the relevance of wind power to the current debate.

2.3 THE EU RENEWABLE ENERGY POLICY LANDMARKS

The White Paper (EU 1995) on energy policy for the EU is a good landmark and starting point for promoting the development of renewable energy sources and energy policy design. The White Paper (EU 1995) sets the general principle that governs the energy policy design of the EU. According to the White Paper, EU energy policy is based on the integration of the market, public interest and welfare, with sustainable economic and social development. Indeed, Jager-waldau *et al* (2004:15) pointed out that the establishment of a stable and common policy framework for renewable energy deployment in the EU is driven by four main factors: "*the growing EU energy import dependence*; *security of supply; man-made climate change and Kyoto Accord Obligation*; and *the threat of missing the future of a new global renewable energy technology market*".

Two of the key documents published to promote renewable energy sources and also to address factors outlined above, include the Green Paper ‘Energy for the future: renewable sources of energy’ (EU 1996) and the White Paper ‘A community strategy and action plan’ (EU 1997).

The Green Paper (EU 1996:3) outlined the advantages and barriers of the increased use of renewables, vis-à-vis community objectives and sets out the basic elements of a policy strategy to be implemented at both Community and Member State levels. The Green Paper (EU 1996) reinforces the strategic aim of promoting renewable energy sources as an integral part of energy policy and a number of other policies, and sets the objective of doubling the contribution made by renewable energy sources to the European Union’s balance by 2010. Similarly, the White Paper EU (1997) presents the goals and drive for the development and promotion of renewable energy sources. The document revealed that renewable energy can help reduce EU dependence on imports of fossil fuel, reduce the emission of CO_2 and open up the entire economy with job opportunities for citizens. Furthermore, the strategy and action plan are directed towards the goal of achieving 12% penetration of renewable energy sources by 2010 (p10). Thus, the White Paper (EU 1997) is an important document that allowed Member States to shape and formulate indicative targets of renewable energy sources consumption.

In evaluating the initial progress of the White Paper (EU 1997), the Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of Regions on the implementation of the community strategy and action plan on renewable energy sources (1998-2000) (EU

2001) reports that the share of renewable energy sources in the community increased from 5.8% in 1997 to 5.9% in 1998. The report reveals that Member States had little experience in collecting renewable energy statistics in the early 1990s. Albeit, evidence from EU (2001) shows that the total renewable primary energy production rose by 32%, while renewable energy electricity generation increased by 29%. Wind power in particular soared from 4541MW in 1997 to 7660MW in 1999, signifying a 70% rate of growth.

In addition to the evaluation of the implementation of the community's strategy and action plan of renewable energy sources, Jager-waldau *et al* (2004) noted that some legislative instruments had been used at EU level recently to promote the deployment of renewable energy sources and to increase the energy efficiency of the EU. The most important of these legislative instruments, as far as this thesis is concerned, is the *"Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market"* (Directive 2001/77/EC) and the *"Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources"* (COM (2008) 19 final. Here, these directives set indicative targets for the share of renewable energy electricity for Member States, with each being given the freedom to choose the kind of policy instrument that would enable it to reach the set target. Values for Member States' indicative targets for the contribution of electricity produced from renewable energy sources to gross electricity consumption by 2020 and the choice of policy instruments implemented by EU Member States are shown in Tables 2.1 and 2.2

Table 2.1: National Renewables Target

Country	Share of energy from renewable sources in final consumption of energy 2005 (%)	Target for share of energy from renewable sources in final consumption of energy 2020 (%)
Belgium	2.2	13
Bulgaria	9.4	16
The Czech Republic	6.1	13
Denmark	17	30
Germany	5.8	18
Estonia	18	25
Ireland	3.1	16
Greece	6.9	18
Spain	8.7	20
France	10.3	23
Italy	5.2	17
Cyprus	2.9	13
Latvia	34.9	42
Lithuania	15	23
Luxembourg	0.9	11
Hungary	4.3	13
Malta	0.0	10
The Netherlands	2.4	14
Austria	23.3	34
Poland	7.2	15
Portugal	20.5	31
Romania	17.8	24
Slovenia	16	25
The Slovak Republic	6.7	14
Finland	28.5	38
Sweden	39.8	49
United Kingdom	1.3	15

Source: EU (2008) 19 Final; Directive 2009/28/EC

Table 2.2: Choice of Policy Instruments for Member States (•Present promoting system * Policy instrument in one region °Introduction is planned)

Country	Feed-in tariff	Quota obligation	Tender	Exemption from energy taxes	Parts of the revenue of energy taxes finance RES
Austria	•	•	• *		•
Belgium	•	•			
Denmark	•	o			
Finland	•				
France	•			•	
Germany	•				•
Greece	•				
Ireland			•		
Italy		•			
Luxembourg	•				
Netherlands				•	•
Portugal	•				
Spain	•				
Sweden	•	o		•	
United Kingdom		•			•

Source: Reiche 2002

The directive 2001 also proposes a harmonised framework for the promotion of electricity produced from renewable energy sources for the EU, and regulations for grid access in Member States in order to remove the possibility of discrimination against electricity generated from renewable energy sources. However, the directive is not without its weaknesses. Although it recognises the importance of a harmonised policy instrument for the development of renewable energy sources of electricity for the EU, it fails to present a model of such an instrument, rather it allows individual Member States the choice to implement the policy instrument that suits their market system.

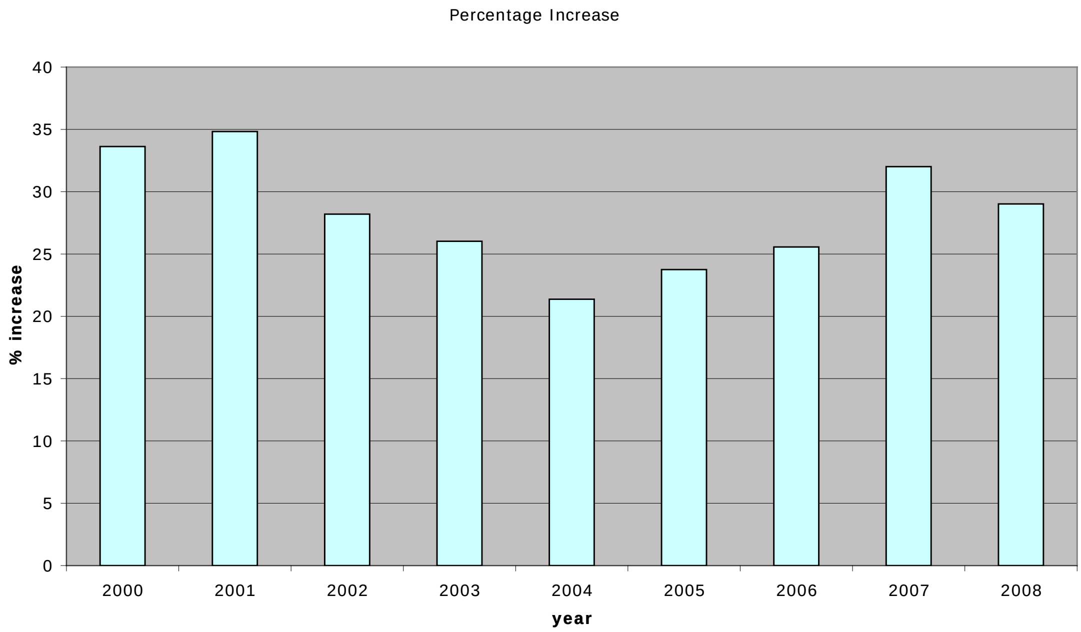
In January 2007, the European Commission endorsed and published a Renewable Energy Roadmap which called for a mandatory target of 20% share of renewable energy sources of the EU Member States energy mix by 2020. To enable Member States to meet the set target, a new renewable energy directive (Directive 2009/28/EC) was finally adopted in April 2009. The directive set individual targets for each Member State and as a consequence, it requires each to increase its respective share of renewable energy from the current level to an overall share of 20% by 2020. To this end, the European Commission issued a template for National Renewable Energy Action Plans (NREAPs) in June 2009. Member States are mandated to present in June 2010, plans that sets out targets for share of energy from renewable sources consumed in transport, electricity, heating and cooling by 2020 (EU 2009).

In homologating the aforementioned issues, it is now important to focus on the role of wind power as a major source of renewable energy, particularly as wind power is expected to play a major role in the delivery of the Member States National Action Plan. Hence, this Chapter will now provide an overview of the relevance of wind power to the current EU renewable energy debate.

2.4 RELEVANCE OF WIND POWER TO THE CURRENT DEBATE

Over the past two decades, wind power capacity for electricity generation has grown significantly, such that wind power is expected to play a key role in the delivery of the EU renewable targets by 2020. Kjaer (2008) claims that more wind capacity was installed in the EU than any other power generating technology apart from natural gas, between 2000 and 2008. Similarly at the global level, wind capacity installed reached 121,188 MW at the end of 2008[27]. Figure 2.2 shows the percentage increase of wind capacity installed globally between 2000 and 2008.

Figure 2.2: Percentage Increase in World Wind Capacity (2000-2008)



Source: World Wind Energy Association [Online] 16th July 2009

From the above graph, global wind capacity installed annually has increased every year. Records in 2008 also show an increase of 29% compared to 2007 figures (WWEA 2009), and Europe retained its place as the global wind power market leader. At the end of 2008, installed wind capacity reached 65,933MW, with Germany and Spain retaining their leading places among the world national wind power markets alongside the U.S.A, China and India (WWEA 2009; EWEA 2009b). Table 2.4 shows the percentage share of the five world leaders in installed wind capacity in 2008.

[27] See Appendix 4 for further explanation

Table 2.4: Percentage share of global wind capacity installed

Country	Total capacity installed	Global percentage share
U.S.A	25,170 MW	20.77%
Germany	23902.8 MW	19.72%
Spain	16740 MW	13.81%
China	12210 MW	10.08%
India	9587 MW	7.9%
Others	33577.9 MW	27.71%
TOTAL	121,188 MW	100%

Source: World Wind Energy Association [Online] 16th July 2009

The subsequent sections of this Chapter examine the relevance of wind power to the current debate on the relevance of wind power as an alternative to conventional electricity generation and in terms of renewable energy provision.

2.4.1 Wind Power and Electricity Generation

According to the WWEA (2009), the world wind capacity installed by the end of 2008 is generating 200 terawatt hours per annum. This represents over 1.5% of the global electricity consumption. At the EU level, EWEA (2009b:7) states that wind power in 2007 "*produced 119 terawatt hours in an average wind year, equal to 3.7% EU power demand, up from 0.9% of EU electricity demand in 2000*". These figures increased further in 2008, and records show that installed wind power capacity produced 142 terawatt hours, equal to 4.2% of total EU electricity demand (EWEA 2009b). At Member States level, Denmark generates 21% of its total electricity demand from wind power, while Germany and Spain generates 7 and 12% of electricity respectively, from wind power (EWEA 2009a). It has also been predicted that the EU will reach 80,000MW wind capacity installed by 2010, which suggests that the EU will generate 5% of its overall electricity consumption from wind power. Further, with the release of the draft of the EU directive for renewables target by 2020, it has been predicted that by 2020, between 12-14% of the EU electricity consumption will be generated from wind power (EWEA 2009b). These figures imply that Europe's dependence on the import of fossil fuels to meet electricity consumption and demand for its populace can be reduced with the deployment of more wind power. Against this backdrop, Kjaer (2008:2) importantly points out that: *"renewable energies are indigenous and Europe is a world leader in wind power. By developing this source further it can turn the energy tables around, [with the EU] becoming an exporter and remaining in control of its energy costs with an unlimited supply of power on its door step"*.

2.4.2 Wind Power and Climate Change

Wind power, when compared with conventional energy sources, has less environmental impact, and rather than adding to the quantity of carbon dioxide emission to the atmosphere, it reduces it (Kjaer 2008). Wind power does not require fuel to operate, thus the price fluctuations of crude oil, coal, and gas does not affect its operation and generation in any way. EWEA (2009c) states that the total cost of producing wind power throughout the 20 -25 years life span of the wind turbine can be predicted with great certainty. With the current installed wind power capacity, the EU will have exceeded its 72 million tonnes of CO_2 reduction plans by 2010. In 2007 Kjaer (2008) pointed out that with 56,535 MW capacities installed, about 91 million tonnes of CO_2 was avoided. The 180 GW of installed wind capacity, predicted by 2020, would help avoid over 300 million tonnes of CO_2 being emitted into the atmosphere and would save €8.2 billion in CO_2 abatement (EWEA 2009b; Kjaer 2008). However it is important to note that, the impact of wind power on the reduction of GHG emissions has been contested in recent times (Pryor and Barthelmie 2010; Milborrow 2009; Szarka 2007; Yang 2007; Holhinen and Tuhkanen

2004; Jean-Baptiste and Ducroux 2003). Furthermore, Milborrow (2009) argues that wind power could potentially replace other high GHG emitting energy sources, such as coal fired plants, while Szarka (2007) accepted the fact that wind power technology produces no emission, but argued that it only reduces emissions indirectly. In the author's opinion this is primarily due to there being a lack of established standard measurement on how this can be both calculated and justified[28].

2.5 CONCLUSION

This Chapter has highlighted the three energy pillars (security of energy supply, environmental protection, and cost competitiveness) on which energy policies worldwide are built. The desire to address these key issues bring about the deployment and integration of renewable energy sources into national systems, thus the deployment of policy instruments to make renewable energy electricity effective and competitive with other forms of energy, all come into play.

Whist the Framework Convention on Climate Change, and the Kyoto Protocol has failed to explicitly or strongly mention renewable energy as a possible option to be put into practice Hirschl (2009), this Chapter highlights the importance of renewable energy sources such as wind power as a viable and sustainable option to address environmental pollution caused by conventional electricity generation. This is consistent with Hirschl's (2009: 4407) observation that: "*the reason behind national renewable energies –whose relevance continue to increase [is that] renewable energy reduces our dependence on the import of ever scarcer and more expensive fossil fuels and at the same time provides an effective contribution to climate*

[28] For Further reading please see Szarka (2007: 128-137)

protection…..[renewables] also creates lead markets through early development of green industries and sustainable jobs that also brings high export potentials in growing international markets."

The growth of renewable energies in the EU is closely linked to the endorsement and adoption of legislative instruments which enable Member States implement policy instruments for renewable energies. However, these legislative instruments have not been without limitations, and in the past, EU directives tend to lack enough evidence as to how Member States are mandated to meet set targets. However, with the recent move of the EU, through the introduction of mandatory targets (EU 2007), and the National Action Plans (EU 2009) it is too early to conclude on the EU's performance towards the 2020 targets.

Nevertheless, wind power is expected to continue to grow and make a significant impact towards EU energy objectives and this is primarily due to it's availability in most locations of Europe; it's clean and has limited climate change impact. Albeit, the use of policy instruments in Member States being necessary and would further help the resource to grow. Against this backdrop, this thesis therefore examines the performance of policy instruments implemented in Germany, The Netherlands, and the UK, in order to promote wind power. The next Chapter defines the nature of the feed-in tariff and the quota system and includes a detailed discussion of the typologies of evaluation criteria which permeates renewable energy literature. The Chapter is important because it helps put the evaluation framework presented in Chapter Four into context, and this will be used in order to better understand the nature of complexities surrounding the introduction and expansion of wind power within the renewable energy debate.

CHAPTER THREE
EUROPEAN UNION POLICY INSTRUMENTS AND EVALUATION CRITERIA: LITERATURE REVIEW

3.1 INTRODUCTION

This Chapter will provide an overview of typologies of policy instruments evaluation criteria that permeate renewable energy policy literature. Performance of policy instruments is defined in Chapter One as how well policy instruments have been successful in the delivery of wind power over time. The Chapter will suggest that most of the criteria presented in the literature are theoretical, and in most cases biased (Enzensberger *et al* 2002). This is considered a weakness since findings and analyses presented are not based on empirical evidence but on theory (Held *et al* 2006).

The Chapter will begin by outlining key EU renewable energy policy instruments implemented in recent times and provide a summary definition of the feed-in tariff, quota, and tender systems as adopted in Germany, The Netherlands, and United Kingdom. However, this thesis will not attempt to examine the structure of these policy instruments rather it will evaluate their performance in relation to the evaluation framework that will be presented in Chapter Four. This is to enable this thesis to set in context the EU harmonisation agenda which has been subject to much debate in recent times.

Next, the Chapter will go on to present some common policy instruments evaluation typologies found in the literature. Some of these criteria have been limited to effectiveness and efficiency (del Rio and Gual 2007; Blok 2006). Therefore this Chapter aim to conclude with the limitations of current typologies and point towards an integrative evaluation framework that can be used to present the views of stakeholders on the performance of policy instruments implemented in three country cases under study.

3.2 TYPOLOGY OF EUROPEAN POLICY INSTRUMENTS

In an attempt to understand the effectiveness of renewable energy supporting policies Harmelink *et al* (2006: 344) defined policy instruments as: *"as any concrete activity initiated by the government in order to enlarge the market implementation of renewable energy sources"*. Policy instruments are essential and implemented due to the need to accelerate the development of renewable energy sources. Renewables are still expensive and cannot compete on commercial basis with other non-renewables without government support (Ciocirlan 2009; Johansson and Turkenburgh 2004). Finon (2007) in analysing the pros and cons of alternative policies aimed at promoting renewables adds that policy instruments are needed to support renewables because of the market failures in the creation and innovation of products especially in the case of renewable energy replacing fossil fuels. Finon (2007) contends that without support, renewable energies will face entry barriers. First, is that renewables are expensive now because they are still in their developmental stages however, their costs will fall as they gain commercial maturity. Secondly, *"an entry barrier stems from constraints and costs on integrating decentralised, renewable technologies into existing centralised infrastructure. The cost of integrating renewable electricity into the network (comprising network investment cost, balancing for intermittent production, the cost of regulating voltage and frequency, and so on) are indeed among the most important obstacles for developers and producers of renewable electricity"* (Finon 2009:112).

Whist, policy instruments are needed to help limit potential risks as a result of the barriers pointed out by Finon (2007), they are adopted by national governments in order to make renewable energy electricity effective and competitive with other forms of energy. Hence, EU Member States implement a wide range of policy instruments to promote the development and application of renewable energy sources (Vehmas and Luukkanen 2003; Reiche 2002a).

Vehmas and Luukkanen (2003) identified green certificates, investment aid, tax exemptions or reductions, tax refunds and direct price support as key policy instruments contained in the Directive 2001/77/ EC. Reiche (2002a, 2002b) also included the feed-in tariff, quota obligation, tender, exemption from energy tax and earmarking in the list. The author claimed that these policy instruments are the most widely implemented by EU Member States.

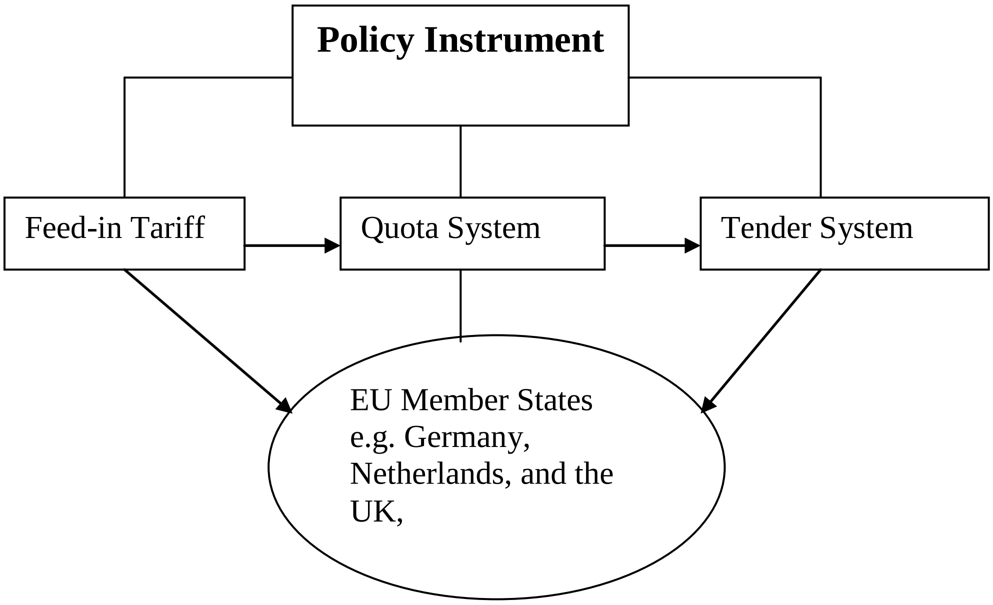
Lauber (2002a, 2002b) has also identified some other forms of policy instruments implemented within the EU. Lauber (2002b) classified them into three, namely: financial support for R&D and financial aid invested in renewable energies; Directive 2001/77/EC; and the EU framework on environmental state aid. In his analysis, Lauber (2002b) noted that the Directive 2001/77/EC is rather a simple principle that enables the EU to assess the cost effectiveness and overall performance of various policy instruments within the community, with the aim of providing a framework for promoting renewable energy sources later in the future.

Enzensberger *et al* (2002), in presenting their evaluation criteria, divided the policy instruments into two broad areas: the *'legislative'* and *'non legislative'* instruments respectively. Enzensberger *et al* (2002) defined the former as those implemented by the government authorities. The authors further classified the legislative instruments into demand and control (regulatory) instruments and the market based (economic) instruments. The regulatory instruments make the market players conform to acceptable state laws, while the economic instrument ensures a favourable interplay of the market players. This is made possible by the free interaction of the supply-push and demand-pull approach, where the market price and quantity for sale in the market come into play, in the form of the feed-in tariff and the quota/certificate systems. Enzensberger *et al* (2002) advocated further that the non legislative instruments are basically implemented by stakeholders interested in promoting renewable energy technology. These instruments are initiated through pricing, informative (educative) and administrative measures.

Moreover, based on analysis, the authors identified the feed-in tariff, tender system and the renewable portfolio standard (RPS) as the most important policy instruments commonly employed by Member States. Held *et al* (2006:3) further divided the European policy instruments into direct and indirect policy instruments. Direct policy instruments "*aim at the immediate stimulation of RES-E, whereas indirect instruments focus on improving long-term framework conditions.*" See Appendix 6 for Held *et al* (2006) classification of policy instruments.

However, Ackerman *et al* (2001) argued that these policy instruments do not necessarily bring about cost reductions, while some of the instruments, like the combination of the green certificate and the quota system may attempt to provide the desired cost reduction, but its implementation to date has not been successful in this regard. Figure 3.1 shows the typology of the common policy instruments utilised by the EU Member States.

Figure 3.1: Key policy instrument implemented by EU Member States



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3.2.1 The Feed-in Tariff System

This refers to the price per KWh payable by the local distribution company for local renewable energy generation fed into the local distribution grid. The concept feed-in tariff also applies to the total amount per KWh received by an independent producer of renewable electricity, including production subsidies and tax refunds (Haas *et al* 2004; Sijm 2002; Ackerman *et al* 2001). The feed-in tariff system is the most implemented and successful policy instrument used in promoting renewable energy sources in the EU. The system is used mostly by the European wind power market leaders e.g. Germany, Spain, Portugal, and Denmark in the past. The Government usually fixes the price of electricity produced from renewable sources and mandates utilities to buy the electricity at the set price. The feed-in tariff is provided for a specified period of time and differs from one renewable energy source technology to another because of the difference in generation cost. It is price driven, as it tends to favour the producers, especially when the fixed price is high, at the expense of electricity consumers (Menanteau *et al* 2003; Jansen 2003).

3.2.2 The Quota System

The quota system is a relatively new policy instrument for promoting renewable energy sources. It is quantity driven and also referred to as the Renewable Portfolio Standard (RPS). The quota system is also aimed at increasing demand for renewable electricity and was recently implemented in Sweden and the UK. It is a system, whereby utilities or producers are obliged to provide and sell a certain amount/ percentage of energy mix from renewable energy sources. To ensure proper implementation, a penalty is charged for non-compliance by the obligated parties (van der Linden *et al* 2005).

3.2.3 The Tender System

The tender system is a system that brings together investors and developers to compete through a competitive bidding system. The investors in this case compete for an electricity premium purchase agreement and government administered fund. The electricity producers are obliged, by the government, to buy a considerable volume of electricity generated from renewable sources, at a premium price. The difference between the market price and the premium price is paid back to the utilities/electricity provider through a non-discriminating levy on all domestic electricity consumption.

The tender system has been used in the UK (under NFFO) and France (Menanteau *et al* 2003; van Dijk *et al* 2003).

3.3 TYPOLOGY OF EVALUATION CRITERIA

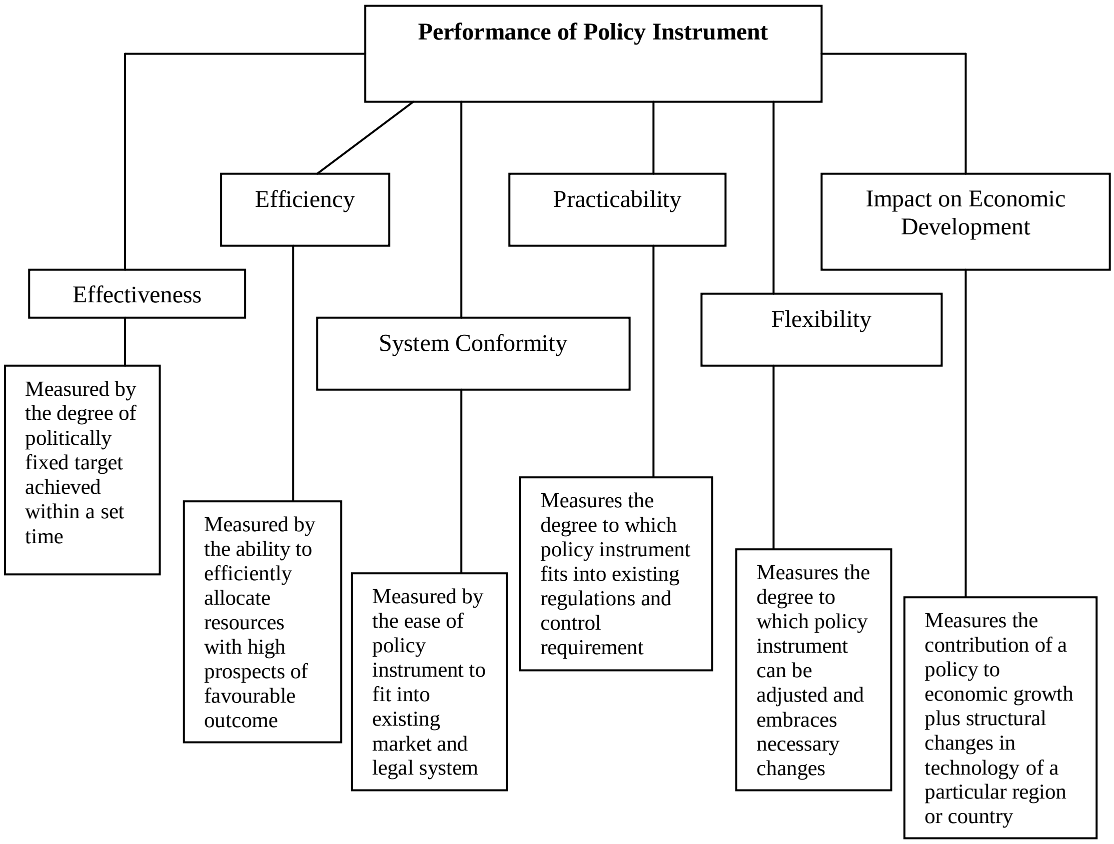
Renewable energy policy instruments have been evaluated using various criteria and approach. Majority of the criteria found in the literature relating to policy instruments evaluation are centred on effectiveness and Efficiency. Held *et al* (2006:2) pointed out that: "*the literature reviewing the effectiveness and efficiency of various promotion strategies for RES-E has attracted increasing attention in recent years.*" This connote that effectiveness and efficiency are main criteria of evaluation of policy instruments, other criteria are secondary (Verbruggen 2009). This brings the question; what is effectiveness and efficiency and how has it been defined in the literature?

van Dijk *et al* (2003) defined effectiveness of policy instrument from a quantitative view as the amount of capacity added through policy instruments. While Held *et al* (2006) contends that the definition offered by van Dijk *et al* (2003) does not represent appropriate indicator of effectiveness and therefore defined it in terms available potential for individual renewable energy technology in a specific country. van der Linden *et al* (2005) viewed the effectiveness criterion as the ability of policy instrument to deliver a large capacity over a period of time. Verbruggen (2009) adds further that effectiveness of a policy instrument should ask clarification on three aspects of (i) goal and target setting; (ii) quantification of RES-E sources and technologies; (iii) robustness of obtained levels of effectiveness. On the other hand, Verbruggen (2009), Held *et al* (2006), del Rio and Gual (2007), van der Linden *et al*

(2005), and van Dijk *et al* (2003) defined efficiency of policy instrument in relation to costs and benefits of renewable energy sources to the society.

Whist, the definition of the two main criteria is subject to much debate, Lewis and Wiser (2007), Mitchell *et al* (2006), Harmelink *et al* (2006), Sawin (2004), Meyer (2003), van Dijk *et al* (2003), and Enzensberger *et al* (2002) are the most cited academic commentators who recently presented policy instruments evaluation criteria and in some cases analysed the performance of key policy instruments implemented by the EU Member States. Evidence from the criteria described by these authors shows that policy instruments has been analysed in different ways and are mostly based on theoretical experience rather than empirical evidence (del Rio and Gual 2007; Enzensberger *et al* 2002). In some cases analyses are done in favour of policy makers and government actors involved in renewable energy policy making process (van der Linden *et al* 2005; Enzensberger *et al* 2002). In some cases these analyses have also been biased. For example Enzensberger *et al* (2002: 786) provide an evaluation criterion for measuring the effectiveness of policy instruments (e.g. feed-in tariffs, quota system, etc) implemented by EU Member States. The author argued that "*while these criteria are helpful and commonly used to assess and to compare policy instruments from the point of view of a policy maker, they neglect in many cases the interest of other important stakeholder groups*". Enzensberger *et al* (2002) evaluation criteria are summarised in Figure 3.2:

Figure 3.2: Typology of Evaluation Criteria (i)

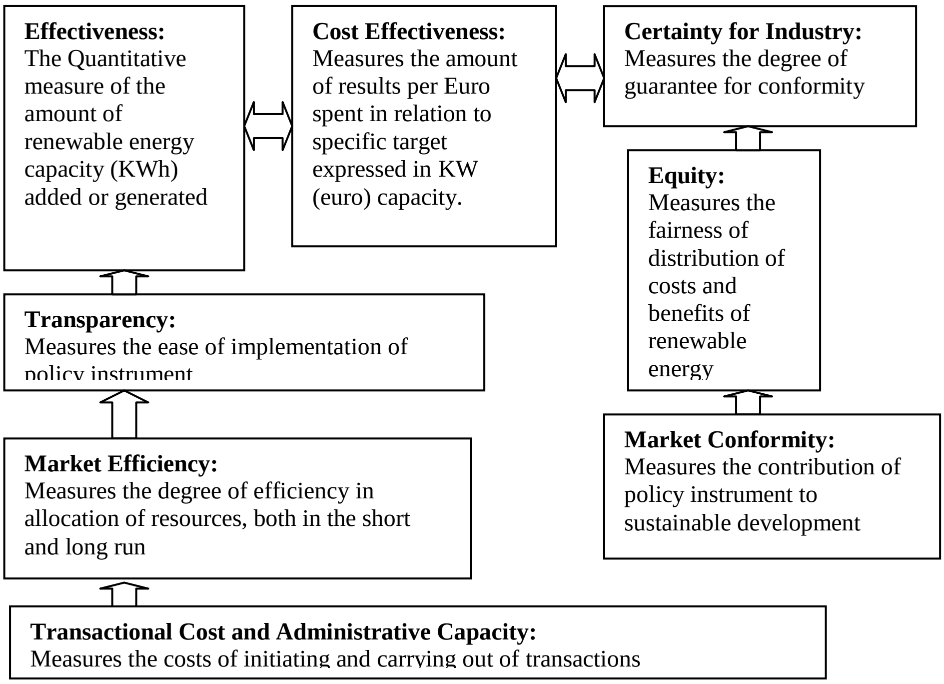


Source: Enzensberger *et al* (2002)

The authors identified different stakeholder groups as: non governmental organisations (NGOs) and politically active ecologists, national policy makers, international policy makers, investors, project developers and plant suppliers, and utility companies. Each of these stakeholders has an interest in the design and formulation of present and future policy instruments.

van Dijk *et al* (2003) also provides an interesting contribution to the literature on evaluation criteria. However, the criteria presented by these authors are theoretical in nature (del Rio and Gual 2007; van der Linden *et al* 2005). According to van Dijk *et al* (2003), the criteria used in measuring the performance of any policy instrument are defined by the contribution of such instrument to the sustainable growth of the renewable energy market. This definition is further broken down to a set of criteria which conforms to that presented by Enzensberger *et al* (2002). However, this thesis argues that the evaluation method presented by van Dijk *et al* (2003) is an advancement of the evaluation criteria discussed in Enzensberger *et al* (2002). van Dijk *et al* (2003) set of evaluation criteria included: the measure of effectiveness, cost effectiveness, certainty of industry, market efficiency (static and dynamic) transaction costs and administrative capacity, equity (fair distribution benefits) and market conformity of policy instruments. The policy instruments used for analysis also include: the feed-in tariff; quota; competitive bidding system; subsidies and fiscal measures; investment support; and labelling and green tariffs. Figure 3.3 depicts van Dijk *et al* (2003) evaluation criteria.

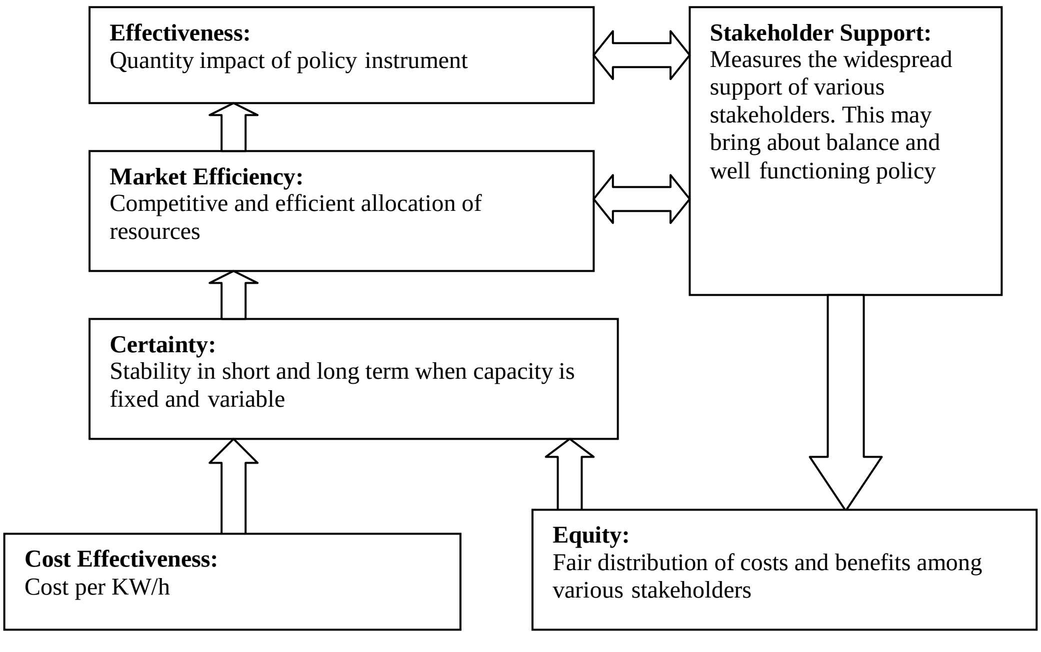
Figure 3.3: Typology of Evaluation Criteria (ii)



Source: van Dijk *et al* (2003)

The analysis provided by van der Linden *et al* (2005) also follows the same approach as that presented by van Dijk *et al* (2003). van der Linden *et al* (2005), while evaluating the international experience with the renewable energy obligation policy instrument, indicated that the renewables obligation systems in the USA, UK, and Sweden are assessed based on the criteria presented in van Dijk *et al* (2003). However, the authors selected some features of the criteria (effectiveness, market efficiency, certainty of renewable energy system electricity industry, cost effectiveness, and equity), and introduced the stakeholders support for the system as being last in the list of their criteria. van der Linden *et al* (2005) modified the criteria presented by van Dijk *et al* (2003) in order to explain in detail the efficiency and to ensure the effectiveness and benefits of adopting the quota system. Furthermore, they clearly explained the direct effect the quota system had on the EU and international renewable energy market. According to the authors, the report was commissioned by the Ministry of Economic Affairs to review the experiences gained by using the quota system and to enable the Dutch government to make the decision whether or not to implement a similar system in the near future. Figure 3.4 summarises the criteria presented by van der Linden *et al* (2005).

Figure 3.4: Typology of Evaluation Criteria (iii)



Source: van der Linden *et al* 2005

One main criticism directed towards van der Linden *et al* (2005) criteria is that it is theoretical and not based on empirical evidence (del Rio and Gual 2007). Therefore, in this study, the criteria is further modified in order to move the debate forward and to explain the empirical involvement of various stakeholder groups and their perception of the policy instruments implemented in the EU Member States. This is very important, as this thesis argues that the success of any policy instrument depends on its design and implementation. This is discussed in more detail in Chapter Four of this thesis.

Sawin (2004) also argued that the effectiveness of any policy instrument will depend on how it has been designed and enforced. Sawin (2004), however, claimed that using a particular policy instrument does not bring about success, what creates success is the recognition and understanding by the Government, of the type of technologies to be promoted. Based on these findings, Sawin (2004) argued that a good evaluation framework, that measures the performance of policy instruments should be predictable, long-term and consistent with clear government intent[29], it must be appropriate[30], flexible[31], credible and enforceable[32], simple and clear[33], and transparent[34].

Harmelink *et al* (2006) also advocate that additional policy instruments/incentives are needed to reach the national and indicative targets at EU level. To this effect,

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[29] Ability to provide certainty that can draw investors into the renewable energy industry market
[30] The ability of policy to match with renewable energy source government objectives
[31] Easily adjusted
[32] Convincing and effective
[33] Ability of policy to be easily implemented, understandable and easy to comply with
[34] Ability to be open and fair in all respects

Harmelink *et al* (2006), unlike Enzensberger *et al* (2002), presented a checklist to assess the performance of policy instruments and further describe the success and the risk factors of these instruments respectively. Harmelink *et al* (2006) split the policy instruments that were implemented and effective, before and after September 2001, into two: *Active* (policies passed by parliament in different EU Member States before September 2001, these include: budgets and tax exemptions). The *continued policies* (incentives continued)[35]. Based on this description, Harmelink *et al* (2006) drew up two checklists to demonstrate how the effectiveness of policy instruments can be determined[36]. They distinguished between the characteristics of the instruments by determining the 'theoretical[37]' and 'actual[38]' effectiveness of each policy instrument. Harmelink *et al* (2006), however, claimed that the methods presented above, allow a great variety of characterisations and help explain the factors influencing the implementation of renewable sources, inclusive of technical and market factors. Harmelink *et al* (2006) also demonstrated a practical approach in the development of the use of renewable energy. This was undertaken by using four criteria to make a country by country analysis of the development of renewable energy sources at EU level. The first step involves the collection and analysis of information on the development and use of renewable energy sources over the period 1990-1999; the national targets for renewable energy sources; the implementation potential; and policy instruments put in place to support the use of renewable sources. The second step is based on the active policies used for the development of renewable energy

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[35] These include: compensation schemes directed towards one technology and stated in government documents; the generic instruments; and policies in advanced phase of development (Harmelink *et al;* 2006).
[36] The effectiveness of different types of policy instruments, success and risk factors of supporting individual renewable energy sources.
[37] The basic elements for each instrument required to allow it have an effect on implementation of renewable energy sources.
[38] Factors that need to be put in place to achieve the theoretical effectiveness.

sources between 2003 and 2010. The third step examines the impact of continued policies for the period of 2003 to 2010. The fourth step examines the shortfall in national targets and finally, the deficit in the EU target.

In an attempt to evaluate the success of policy strategies for the promotion of electricity from renewable energy sources in the EU, Held *et al* (2006:2) present the following criteria;

- *"Effectiveness: there should be a substantial increase in RES-E capacity;*
- *Economic efficiency: electricity from RES-E capacities should be generated at competitive costs which should decrease over time (due to learning effects);*

Strategy targets derived from these criteria are:

- *ensure sustainable growth of the RES-E industry;*
- *enhance social acceptance and increase public awareness with respect to renewable energy;*
- *improve technical reliability, technical performance and standardisation;*
- *remove obstacles with respect to grid-connection; and*
- *strive for low administration costs, low transaction costs and minimise public financial support to reach a certain level of installed RES-E capacity."*

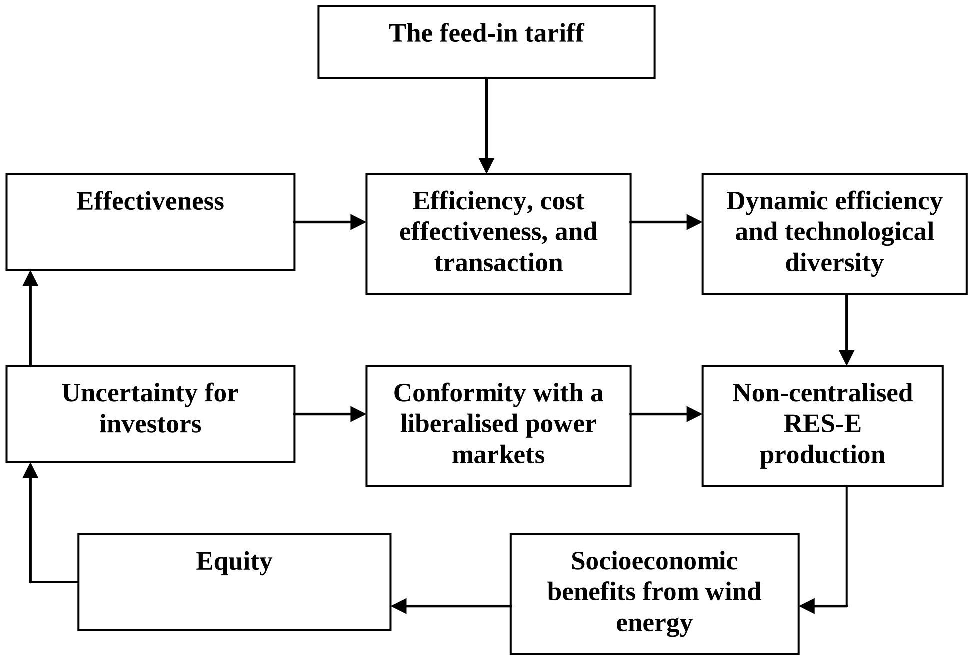
Held *et al* (2006) contends that the main objective of implementing policy instruments is to increase the capacity installed for generating renewable electricity. Therefore, the criteria presented by Held *et al* (2006) are limited to effectiveness and efficiency. This is a significant weakness. Verbruggen (2009) applied similar evaluation criteria for the Flanders' tradable certificates system. The Verbruggen

(2009: 1385) contends that: "*evaluation of RES-E support policies starts at clarifying the objectives adopted by policy makers, when designing support schemes and instrument*". Justifying his argument, Verbruggen (2009) focuses on three criteria: effectiveness, efficiency, and equity. Equity criterion is measured "*first, [by] the realisation of the widely accepted "polluters pay" principle; second, [by] the avoidance of excess (monopoly and swindle) profits by free-riders*" (Verbruggen 2009:1388).

Again, Verbruggen (2009) criteria and analysis is abstract as it is not based on empirical evidence. More broad description of renewable energy policy instrument evaluation criteria is provided by del Rio and Gual (2007).

del Rio and Gual (2007) contends that although the FIT is often regarded as most effective policy instrument, care must be taken on how the FIT is set. del Rio and Gual (2007) therefore provides the following criteria for evaluating the FIT.

Figure 3.5: Typology of Evaluation Criteria (iv)



Source: del Rio and Gual (2007)
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Although, del Rio and Gual (2007) criteria goes beyond '*effectiveness*' and '*efficiency*' criteria, it was designed and intended to analyse the FIT system. it is limited to Member States with FIT experience e.g. Spain, Germany, and Denmark[39]. This is a significant weakness.

Having outlined and discussed policy instruments evaluation criteria found in the literature, the Chapter now goes on to review renewable energy policy literature that applied various approaches to analyse and compare policy instruments.

3.4 EVALUATION AND COMPARISON LITERATURE

Finon (2007), Lipp (2007), Szarka (2007), Mitchell *et al* (2006), Toke (2006), Hvelplund (2005, 2001), Lauber (2004), Sawin (2004), and Menanteau *et al* (2003)

[39] Before the implementation of tradable green certificate

provide an important contribution to the comparison of common policy instruments implemented in most EU Member States. Mitchell *et al* (2006), for example, analysed and compared the effectiveness of the renewables obligation of England and Wales and the German feed-in tariff, with respect to risk reduction in terms of price, volume, and balancing risk. The authors argue that the success of the feed-in system is due to the lower risk and higher security the system tends to offer investors. Mitchell *et al* (2006) split the security provided by the feed-in system into *'price risk', 'volume risk,' and 'balancing risk'*. The authors advocate that the guaranteed feed-in tariff provides renewable energy generators with prices higher than the normal market price and, as such, provides the hedge against price volatility, saving the generator costs. Mitchell *et al* (2006) indicated that the feed-in system does not present volume risk, like other mechanisms. The feed-in system guarantees all renewable energy generated and bought from generators. The feed-in tariff also eliminates the risk of balancing, it allows generators to feed all generated output directly into the grid and does not penalise unreliable generation, thus, boosting investors' confidence.

In contrast, and using the same principle, Mitchell *et al* (2006) argued that the renewables obligation of England and Wales does not reduce price risk, as the value of the ROC and others largely relies on supply and demand. It is also difficult to predict what will become of the ROC once the UK's 10.4% target is met. Similarly, there is volume of risk, as analysed by Mitchell *et al* (2006,) as generators are not guaranteed security of output purchase after 2027. Generators, as well are mandated to make electricity market decisions; this affects smaller independent producers as it is not cost effective for them and they are fined for any discrepancies occurring, creating a balancing risk.

With these evaluations and comparisons, Mitchell *et al* (2006) concluded that the German feed-in system is more effective than the renewables obligation of England and Wales, because of its ability to reduce price, volume, and balancing risk more effectively than the renewables obligation. This is also true with the findings of Hvelplund (2005, 2001).

Moreover, Hvelplund (2005, 2001) put emphasis on two renewable energy policy instruments: the quota system and the renewable feed-in tariff system. He classified these systems into two broad models (a) political price/amount market[40] (PPAM) and (b) the political quota/certificate price market[41] (PQPM). In comparison, Hvelplund (2001) argued that the political quota/certificate price market does not foster competition. Hvelplund (2001) argued that the PQPM discourages competition between investors as it allows for a higher profit margin for wind turbine owners in regions with high wind capacity and a lower margin for turbine owners in regions with poor wind capacity. Hvelplund (2001), therefore, concluded that the PQPM is not a suitable model for the promotion of the renewable energy market, because it is politically influenced, while the PPAM is not, making the latter preferable to the former.

The comparison outlined by Menanteau *et al* (2003) follows a similar approach to that of Hvelplund (2001) and he presented the incentives used in most of the EU

[40] political prices for electricity from renewable sources are fixed with quality to be produced determined by the market forces
[41] the quantity is fixed as quota with prices determined by the market

Member States to support the development of wind power in two forms: the feed-in tariff, and the competitive bidding system. Menanteau *et al* (2003) analysed the performance of these policy incentives using four criteria. These are: ‘capacity to stimulate renewable electricity generation’, ‘net overall cost for the community’, ‘incentives to reduce costs and prices’, and ‘incentives to innovate’.

In terms of capacity to stimulate renewable electricity generation and incentives to enter the market, Menanteau *et al* (2003) analysed the two incentives in respect to future profitability, risks and transaction costs. Future profitability is guaranteed, as a result of the prospects of return on investment offered, by the high prices of the feed-in tariff. Menanteau *et al* (2003) found that this is the case for German, Danish, and Spanish led sustained wind power development, in relation to installed capacity and industrial development. The feed-in tariff also guarantees low transaction costs and low risk because continued subsidies are granted to new developers, allowing investors to control costs. In comparison, Menanteau *et al* (2003) advocated that the lower purchase price of bidding systems is open to risks and results in a small amount of installed capacity. The bidding system is also surrounded by uncertainty in the profitability of projects, which is accompanied by huge costs for procurement and preparation. The authors advocated that the granting of subsidies to successful bidders is uncertain, while the unsuccessful bidders are left to bear the costs incurred in the preparing and bidding processes, bringing about lower profits in comparison to the feed-in tariff system. The bidding system also places less importance on factors that tend to make projects materialise. Environmental impact studies, education, information, public interest and awareness etc, are not fully considered, as in the case of the feed-in tariff. The effect of this is translated in the wider spread of projects in

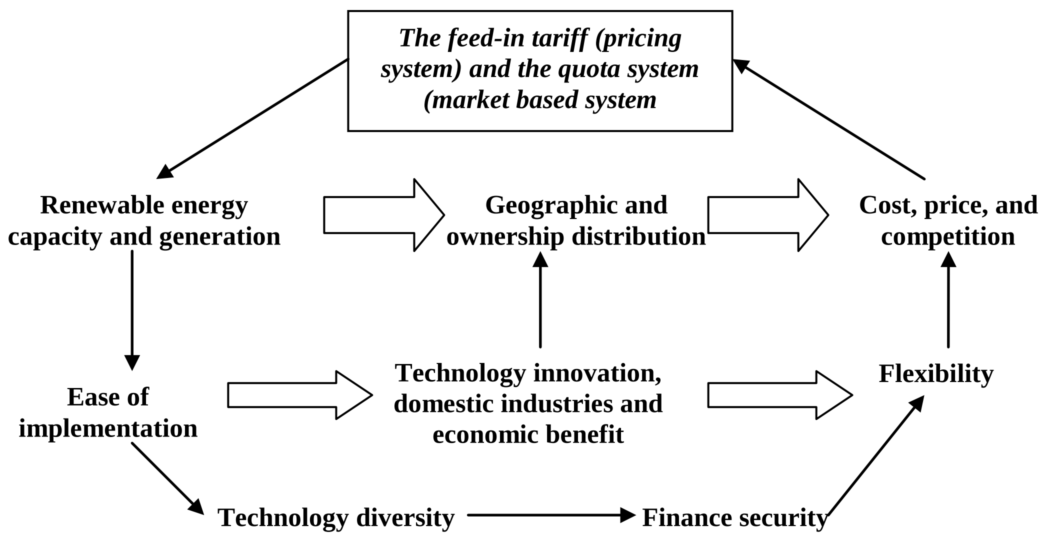
Member States implementing the feed-in tariff by high profits and an even distribution of projects, leading to a geographically balanced development, as is the case with Germany as opposed to England and Wales, where there is great public resistance.

Menanteau *et al* (2003), in relation to the net overall cost of supporting renewable energy sources, found that the feed-in tariff, although very simple to administer, is very costly in terms of subsidies compared to the bidding system, which allows for a controlled subsidy. The feed-in system does not have a controlled subsidy system because of its institutional rigidity. However, Menanteau *et al* (2003) argued that the two policy instruments in question are similar in certain respects because of the favourably large share of differential rent which the feed-in tariff tends to provide for producers, while the competitive bidding system allows indirect control of public expenses through successive quotas.

Menanteau *et al* (2003) also found that the bidding systems provide greater incentives at lower prices and costs when compared to the feed-in system, which is less flexible and reversible than the bidding system. The authors maintain that this is due to the use of the best available sites which the competitive bidding system tends to provide, and a combination of other factors. Menanteau *et al* (2003) also noted that the feed-in tariff brings about technical change and surpluses shared among investors and manufacturers, while in the competitive bidding system producers are mandated to pass on the surplus at lower costs to tax payers. This makes the technical and learning effects of the feed-in tariff implemented by Member States greater for manufacturers because it helps build and promote producers generating capacity. Similarly, the lower profit margin of the competitive bidding system brings with it a reduced R&D investment capacity for manufacturers and suppliers. The authors, therefore, concluded that the feed-in tariff system is more efficient than the competitive bidding system.

Moreover, Sawin (2004) provided a very good contribution to the comparison of the feed-in tariff system and the quota system discussions. Sawin's (2004) approach is presented in Figure 3.6:

Figure 3.6: Summary of Sawin (2004) approach for comparison of Policy Instrument



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Sawin (2004), however, concluded that for renewable energy to reach its full potential policies and framework conditions need to be established to allow for the development of sustained renewable energy technology markets and industries that are able to help deliver and promote a reduction in cost and increased renewable energy capacity. Sawin (2004) also pointed out that the feed-in tariff system has, so far, been the most successful policy instrument implemented in the EU. It has led to cost reductions and economies of scale and an increased installed capacity of renewable energy sources. However, Sawin (2004) recommends a combination of policies to deliver the required cost reductions and lower risks expected from renewable energy sources.

Toke (2006) provides an excellent comparison of the renewables obligation (UK) to other policy instruments (German feed-in tariff). Toke (2006) argued that the feed-in tariff is more expensive than the renewables obligation for three reasons (*i) the German feed-in tariff declines over 20 years of fixed payments (ii) base load of electricity prices is higher (iii) lower wind speed.* Equally, in terms of capacity factor, Toke (2006) found the German feed-in tariff produced lower subsidy per quantity of installed capacity, than was the case for the renewables obligation. The explanation put forward by Toke (2006) revolved around the fact that private investment in capital investment is tax deductible, with marginal tax rates for the highest income group, up to 50%, making investment in Germany more attractive than in the UK for instance.

Toke (2006) also argued that the renewables obligation is not as flexible as the feed-in tariff because the former tends to set a single level of payment for all renewable energy generators, both onshore and offshore. Similarly, while analysing the renewables obligation and the feed-in tariff, in terms of cooperative/local ownership, Toke (2006) argued that the feed-in tariffs are not necessarily better than the renewable energy obligation in supporting projects owned by cooperatives. The author concluded that cultural factors are responsible for the pattern of ownership of wind power schemes in the UK. In summary, it can be deduced that the financial returns per MW of installed capacity of the renewables obligation is much higher compared to the feed-in tariff system.

Lauber (2004) also put forward an important argument in comparing the two policy instruments analysed by other authors. Lauber (2004) in comparison, recognises that the REFIT system favours early and rapid growth of renewable sources while the RPS/TGC accommodates stable and predictable growth. Lauber (2004), like Menanteau *et al* (2003), argued that the REFIT favours the producers of renewable energy source equipment because of the support it provides to various technologies, from the early stage of development until market competitiveness. Whereas the RPS/TGC favours the time period when the technology is near market, because of the low prices it tends to provide at an early stage of development. In a concluding remark, Lauber (2004) suggested that the two incentives could be used to develop a harmonised framework for more efficient and effective policies implemented in favour of renewable energy sources, vis-à-vis wind power.

3.5 CONCLUSION

This Chapter has presented the evaluative criteria found in the literature to appraise the performance of various policy instruments that have been employed so far to promote the development of renewable energy electricity in Europe. However, policy instruments in this thesis has been defined as being the economic tools, put in place by the EU and national government/authorities, to help push renewable energy electricity to the energy market, thereby making them competitive alongside the non renewable energy sources. No doubt, literature that presents criteria for evaluating policy instruments are numerous but the problem with the literature as highlighted in this Chapter is that they are abstract, and provide a theoretical analyses of the performance of EU policy instruments. Majority of the analysis and comparison presented in the literature are biased as they do not represent the views of stakeholder in the wind power industry, they only represent the views of policy makers (Enzensberger *et al* 2002; del Rio and Gual 2007). Although, majority of the renewable energy policy evaluation literature aims to understand the justification for the choice of policy instruments by Member States, and in most cases attempt to evaluate the relevance of such to the growth of wind power and other renewable energy sources, the consequences of presenting *'one sided'* and *'theoretical'* views about policy instruments limits the understanding of the how well policy instruments has performed in moving the EU wind power industry forward and also limit the understanding of the experiences with the design, and operations of policy instruments. This thesis is therefore intended to develop policy evaluation framework from the first hand knowledge gained in the literature and then apply that as a tool or framework for evaluating the performance of policy the feed-in tariff, the MEP, and the renewables obligation. Thus, evidence gathered and analysis will be based on the views of policy makers, and other stakeholders that these policy instruments directly impact upon in the wind power industry.

Chapter Four presents the evaluation criteria used for analysis in Chapters Six to Eight of this thesis. Results obtained in these Chapters will be used in Chapter Nine to compare and contrast wind power policy instruments and set in context the harmonisation plans of the EU, which have been a subject of debate and conjecture in recent times.

CHAPTER FOUR

EVALUATION FRAMEWORK

4.1 INTRODUCTION

The aim of this thesis is to develop an integrative framework for evaluating the performance of wind power policy instruments in three EU Member States. More specifically, the study aims to critically compare and contrast the performance of the feed-in tariff and quota system in order to set in context the discussion on EU harmonisation agenda which is subject to current debate.

Chapter Three provided an overview of the literature on policy instrument evaluation criteria in the EU. Nevertheless, the Chapter concludes that, most evaluation criteria provided in the literature are limited in that they are based on abstract, and not on empirical evidence. They are biased as such limits the understanding of the performance of the EU policy instruments.

Based on the literature reviewed in Chapter Three, a new evaluation framework has been developed in this Chapter. This framework will allow the researcher to evaluate the performance of policy instruments used in the three country cases under investigation. Historical institutional theory provides a theoretical lens through which to explain the outcomes of the implementation of choice policy instruments by country cases under investigation. As pointed out in Chapter One, the notion of path dependency helps this thesis to explore the diversity of wind power industry across the EU. Thus, this Chapter will provide an overview of policy design conditions as required in Directive 2001/77/EC before discussing the framework conditions and a brief justification for the selection of evaluation criteria. Finally, the evaluation criteria are grouped further into four clusters.

4.2 POLICY INSTRUMENTS DESIGN CONDITIONS

As pointed out in previous Chapters, renewable energy sources are near marker technologies, and requires adequate support to enable them compete on commercial basis with non-renewable energy sources. However, when policy instruments are not designed properly, the aim of promoting renewables may not be achieved in the long-run. de Jager and Rathmann (2008:4) contends that: *"a good policy instrument design that reduce the cost of renewable electricity by 10 to 30%"*. Grotz and Fouquet (2005) also argue that; success in achieving politically fixed targets will not be feasible without a good and reliable policy instrument which secures investor confidence. Therefore, EU Directive 2001/77/EC states that any proposal for a policy instrument should address the following issues:

- Contribute to achievement of the national indicative targets.
- Be compatible with the principle of internal electricity market.
- Take into account the characteristics of different sources of renewable energy, together with the different technologies, and geographical differences.
- Promote the use of renewable energy sources in an effective way, and be simple and at the same time, as efficient as possible; particularly in terms of costs.
- Include sufficient transitional periods for national policy instruments of at least seven years and maintain investor confidence.

Morthorst *et al* (2005:8) also noted that policy instruments are not, by themselves, sufficient for an extensive deployment of renewable sources. Other issues need to be put in place to make a successful policy instrument. Instruments must be well designed with the electricity generators having good access to the grid. This implies that administrative barriers are removed and application processes are streamlined, while public participation and acceptance of renewables is widely encouraged. This research upholds this fact and argues that the success of any policy instrument depends on how it is designed and implemented. Therefore the criteria, applied for the evaluation of the policy instruments implemented in the EU Member States investigated, is based on the following conditions: (i) The implementation of policy instrument is important in delivering the huge potential of wind power in the EU; and, (ii) Policy instruments should therefore be capable of reaching a politically fixed target within the time frame stipulated, at minimum or least cost possible, with little or no risk of uncertainties.

The evaluation criteria discussed in this study focuses on how this is achieved over time. It is also assumed that policy instruments should receive wide support from stakeholders and interest groups with a vested interest in wind power. Policy instruments should provide incentives for both small and large investors, such that a level playing field of competition is created without discrimination in the market. Policy instruments also need to be designed to conform to the legal and market regulations, especially the internal electricity market or the electricity market liberalisation pursued by the EU and its Member States.

4.2.1 Evaluation Criteria

Various frameworks and approaches have been developed to evaluate the performance of policy instruments (see Chapter Three). Drawing on the international wind power literature, including, for example, de Jager and Rathmann (2008), del Rio and Gual (2007), Dinica (2006), Harmelink *et al* (2006), Mitchell *et al* (2006), Toke (2006), Connor (2005), Elliot (2005), van der Linden (2005), Lauber (2004), Sawin (2004), Haas *et al* (2004), van Dijk *et al* (2003), Menanteau *et al* (2003), Sijm (2002), Wiser *et al* (2002), Enzensberger *et al* (2002), and Hvelplund (2001). This study has identified the following criteria that seem to permeate existing debates. However, as mentioned in Chapter Three, the main criticism of these standards is that they are theoretical in nature. They are not based on empirical evidence. In most cases analyses based on these conditions are limited to a few stakeholder groups (Ezensberger *et al* 2002; del Rio and Gual 2007). This is the reason why this study has modified the criteria from the literature, to account for wide coverage of different stakeholder groups. Furthermore, rather than offering a theoretical analysis of the performance of the policy instruments deployed by Member States to promote wind power, this study applied the evaluation framework as a guide to the design of interview schedule and used it for gathering empirical data. These measures will subsequently be applied to assess the performance of the German feed-in tariff, the Dutch MEP, and the UK renewables obligation.

4.2.1.1 Administration

The policy instrument needs to reduce regulatory and non-regulatory barriers, streamline and expedite administrative procedures, ensure that guiding principles and rules are objective, transparent and non discriminatory, and fully take into account the peculiarities of the various renewable energy technologies. Policy instruments should also be cost effective and simple to implement. Transparency is defined here as the ease of access to information on investment and financial related data from governmental regulatory bodies. Under this criterion, the questions explored include:

- To what extent is the policy instrument transparent and easy to understand?
- Is the policy instrument flexible and practicable?
- Is the administrative and transactional cost low compared to other policy instrument?

4.2.1.2 Stakeholders support/ involvement

Stakeholders in this context are defined broadly to include parties or groups that are affected by policy choices and facilitate policy instruments. Stakeholders can react differently – they can facilitate or indeed inhibit the deployment of wind power. The extent to which the policy instrument encourages stakeholder groups to participate and be involved in wind power deployment is crucial to successful implementation. Under this criterion the questions explored include:

- Does the policy instrument involve stakeholder groups in its design and implementation?
- Do stakeholders largely favour the policy instrument?
- Ultimately, to what extent does the policy instrument encourage corporate ownership and/or community ownership of wind power?

4.2.1.3 Certainty for industry

The willingness of investors to enter the wind power market is crucial to the expansion of wind power capacity. A policy instrument must be capable of attracting a wide range of new investors to the market and it must be stable over the longer term, so that investor confidence can be guaranteed. Policy instruments are highly risky when they are not stable and are unpredictable, with investors usually being put off when this happens. Under this criterion, the questions explored include:

- Does the policy instrument possess characteristics that ensure investor confidence?
- To what extent is the policy instrument perceived by investors and stakeholders as stable or unstable, both in the short-to-medium term and in the long-term?
- To what extent does the policy instrument mitigate investment risks?

Next are the effectiveness and efficiency criteria. Most of the comparative analysis in the literature that focussed on these criteria has defined them in different ways, (for example see del Rio and Gual 2007; Szarka 2007; Elliot 2007, 2005; Toke 2007, 2006; EU 2005; van der Linden *et al* 2005; van Dijk *et al* 2003) however, Szarka (2007:94) noted that of all the contentions between the definition and conceptualization of both criteria, "*outcomes have turned out to be more complex*". For this study, subheadings 4 and 5's definition of both criteria offered by Szarka (2007) has been selected for it appropriateness, as it appears to capture the definition offered by a number of authors.

4.2.1.4 Effectiveness

Szarka (2007:93) states that: "*the criterion of effectiveness concerns the quantity of the new capacity coming on line and the timeliness of build in relation to targets*". Therefore, effectiveness can be simply measured by the extent to which the policy instrument has performed, in terms of how fast and in what quantity wind power has added to new installed capacity, in meeting politically fixed targets. Under this criterion questions explored include:

- To what extent has the policy instrument performed in achieving politically fixed targets?
- How much and in what quantity has the policy instrument delivered over time?
- How does this compare with other policy instruments?

4.2.1.5 Efficiency

According to Szarka (2007:93) "*the criterion of efficiency relates primarily to the price competitiveness of generation...it also concerns other dimensions of competition, notably equipment costs*". Therefore, one of the main means used to assess the performance of policy instruments has been to focus on the cost of their operation. Efficiency can be measured in terms of the costs of operating the policy instrument, to ensure a reasonable market and competitive price for investors when compared with other forms of energy. Efficiency also needs to take into consideration the risk factors over time. For investors, assessing risk is essential in terms of price, volume, and for system balancing. Under this criterion questions which are explored include:

- Is the policy instrument capable of delivering wind power at a low cost to consumers?
- Is the policy instrument efficient in reducing production risks, and investment costs?

- Does the policy instrument provide a reasonable market and competitive price for wind power?

4.2.1.6 Market Conformity

Policy instruments need to be designed in a way that they fit into the existing market and legal systems. Directive 2001/77/EC Article Four sub section 2(b), also states that policy instruments implemented by Member States should be compatible with the principles of the internal electricity market. Some Member States already have fully liberalised power markets including power exchanges, while others are still in transition. Thus it becomes increasingly important how well a policy instrument fits into a liberalised power market and eventually the development of competition in European power market. Market conformity aims to examine the extent of which policy instruments are compatible with the legal and market system of the internal electricity market, hence liberalisation of the electricity market, international and cross boundary trade (Wiser *et al* 2002; Sijm 2002). Under this criterion the questions which are explored include:

- Is the policy instrument compatible with the legal and market conditions of internal electricity market?
- Does the policy instrument encourage competition among suppliers and generators of electricity?

4.2.1.7 Finance

Financial security examines the extent to which a policy instrument is able to guarantee security and return on investment, with low or no risk, over a long period of time. Sawin (2004) argued that long term certainty results from guaranteed prices that facilitate the willingness of investors to invest in wind power projects. A further dimension is to assess the ease at which wind power projects are able to secure finance from banks and other lending institutions. Questions explored include:

- Does the policy instrument guarantee return on investment?
- Is it easy to obtain finance for investment in wind power with the policy instrument?
- Does the policy instrument possess a high or low risk of encouraging or discouraging support from financial institutions?

4.2.1.8 Impact on economic development

This aims to assess the impact of policy instrument in contributing to economic development (e.g. employment), and environmental responsibility (e.g. reductions of greenhouse gases). Morthorst *et al* (2005) have also identified that positive local effects need to be considered, including enhanced public support for renewable energies. Questions explored include:

- Does the policy instrument encourage local and economic development?
- Does the policy instrument contribute to environmental objectives including the reduction of greenhouse gas emissions?

Table 4.4: Evaluation Criteria and Questions Guiding the Research

Evaluation Criteria	Questions Guiding The Research
Administration	• To what extent is the policy instrument transparent and easy to understand? • Is the policy instrument flexible and practicable? • Is the administrative and transactional cost low compared to other policy instruments?
Stakeholder Support/ involvement	• Does the policy instrument involve stakeholder groups in its design and implementation? • Do stakeholders largely favour the policy instrument? • Ultimately, to what extent does the policy instrument encourage corporate ownership and/or community ownership of wind power?
Certainty for Industry	• Does the policy instrument possess characteristics that ensure investor confidence? • To what extent is the policy instrument perceived by investors and stakeholders as stable or unstable both in the short-to-medium term and in the long-term? • To what extent does the policy instrument mitigate investment risks?
Effectiveness	• To what extent has the policy instrument performed in achieving politically fixed targets? • How much and in what quantity has the policy instrument delivered over time? • How does this compare with other policy instruments?
Efficiency	• Is the policy instrument capable of delivering wind power at a low cost to consumers? • Is the policy instrument efficient in reducing production risks, and investment costs? • Does the policy instrument provide a reasonable market and competitive price for wind power?
Market Conformity	• Is the policy instrument compatible with the legal and market conditions of internal electricity market? • Does the policy instrument encourage competition among suppliers and generators of electricity?
Finance	• Does the policy instrument guarantee return on investment? • Is it easy to obtain finance for investment in wind power with the policy instrument? • Does the policy instrument possess a high or low risk to encourage or discourage support from financial institutions?
Impact on Economic Development	• Does the policy instrument encourage local and economic development? • Does the policy instrument contribute to environmental objectives, including the reduction of greenhouse gas emissions?

Source: Author Generated

4.2.2 Integrating the Evaluation Criteria

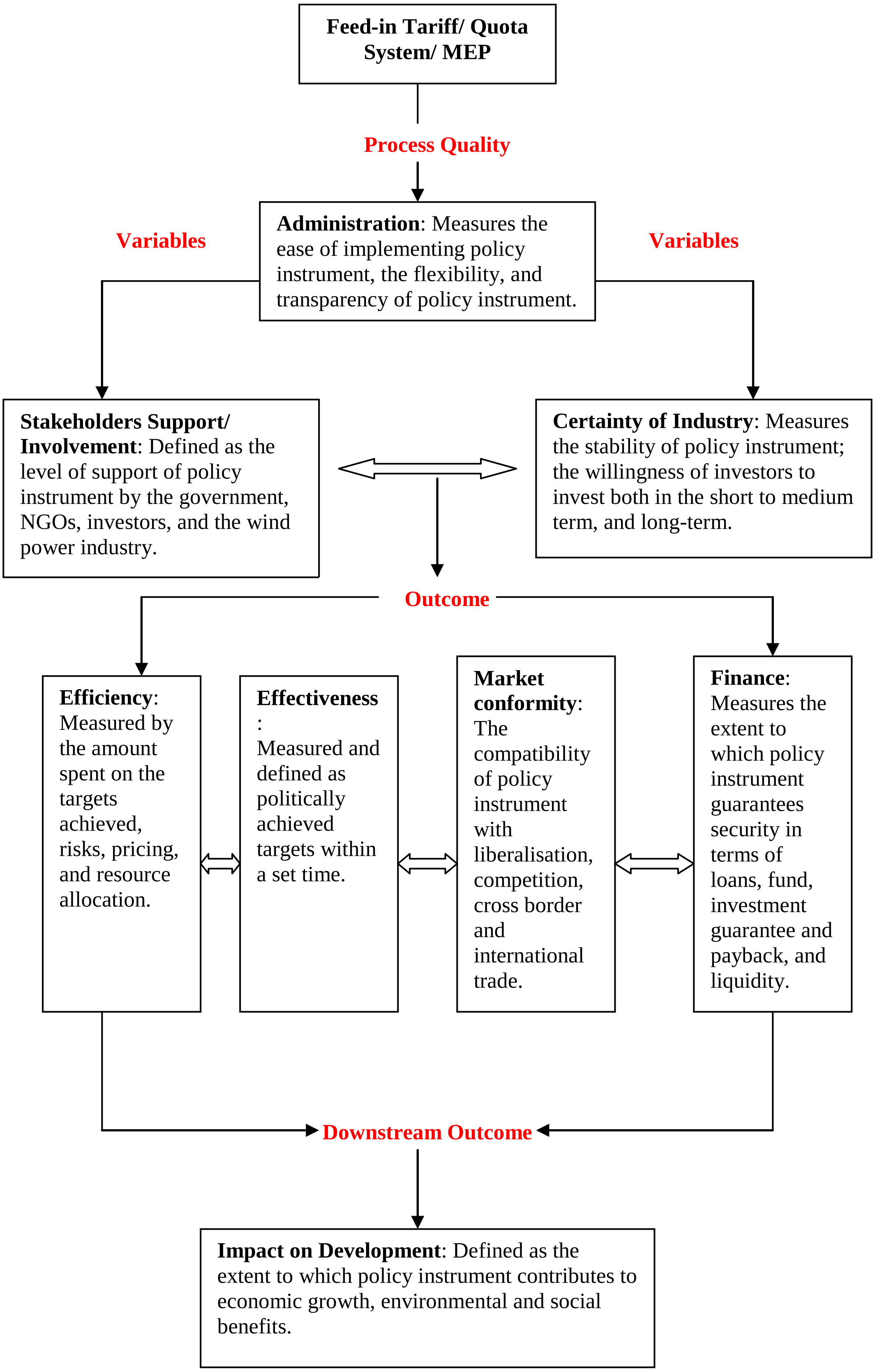
To enable this study to compare and contrast the performance of the feed-in tariff, the MEP, and the renewables obligation, the above criteria were integrated to produce a theoretical but pragmatic framework. Figure 4.1 outlines the framework and identifies four possible dimensions of policy instrument performance evaluation using the notion of path dependency of the historical institutional theory. Mayer (2008) contends that the concept of path dependence originates from the general premise that early events have a substantial effect on later ones. Therefore the performance of policy instruments may be affected by the way they are designed and implemented. Thus, the first dimension of the framework describes the process conditions where the administration of the policy instrument is examined. It is assumed that policy instruments need to be transparent and flexible enough to understand, and bring about a positive investment environment for investors. The exploration of the historical emergence of the policy instrument in the country cases will be very useful in providing an understanding the processes of policy instrument design.

Dimension Two describes the stakeholder interests and the certainty for industry. Renewable energy policy making process involves various actors and institutions thus, support from stakeholder groups and the perception of the policy instrument varies from one stakeholder to another. If conditions are favourable enough, stakeholders' support is likely to be higher than when conditions are not favourable or when the risk is great. This implies that a favourable policy instrument and conditions encourage investment in the wind power industry; as such risks and uncertainties are reduced and may be averted completely. The transparency and flexibility of the policy instrument will have a strong impact on the commitment of the stakeholders and their support. Hence a strong wind power industry should emerge.

Dimension Three describes the possible outcomes of the interaction that exist between actors in the wind power industry. Breukers (2006:65) contends that: *"policy making is a political process and the outcomes depend on how interests and values are represented in the political configuration of actors involved."* Held *et al* (2006) pointed out that renewable energy policy instruments are formulated and implemented in order to achieve national renewables target hence, it is important to understand how well targets has been achieved through the implementation of policy instruments. Four key parameters are utilised in this stage to access the policy instruments namely: effectiveness; efficiency; market conformity; and finance.

Dimension Four describes the down stream outcome of the implementation of the policy instrument. The impact of the policy instrument and its contribution to economic and environmental development is important. This might include the contribution of policy instrument to the economy, in terms of employment opportunities created, and the contribution to the overall reduction of greenhouse gas emissions.

Figure 4.1: An Integrative Framework for Evaluating Wind Power Policy Instruments



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4.3 CONCLUSION

The literature reviewed in Chapter Three presented an overview of the renewable energy policy instruments evaluation typologies. However, they are flawed because they are limited in most cases to effectiveness and efficiency criteria, and are biased towards stakeholders considered. This is a major weakness. The aim of this Chapter has been to develop an integrative framework for evaluating the performance of wind power policy instruments, with the objective being to utilise the framework to critically compare and contrast the performance of the feed-in tariff, the MEP, and the renewables obligation. Drawing on the international wind power literature, evaluation criteria were developed. Eight different perspectives of analysing the performance of policy instruments were identified and then grouped further into four clusters. These criteria will be applied in Chapters Six to Eight of this study to assess the performance of the German feed-in tariff, the Dutch MEP, and the UK renewables obligation. Results from the comparison of the policy instruments in Chapter Nine will be used to put into context the EU harmonisation debate which is currently subject much debates.

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1 INTRODUCTION

Having discussed the evaluation framework that will be used in this study to critically examine the performance of policy instruments of the country cases investigated, this Chapter will now provide an overview of the methodological approach adopted. The Chapter will first examine the positivist and the interpretive stance of research before reviewing both research methodologies. Next, an overview of selected method for data collection is presented before outlining the procedure for coding and data analysis.

5.2 METHODOLOGY

Over the past decades there have been issues and discussions over research methodology and approaches (see for example: Carter and Little 2007; Duranti 2006; Gunzenhanser 2006; Gysen *et al* 2006; Hamilton *et al* 2006; Mason 2006; Yanchar *et al* 2005; Ritchie and Lewis 2003; Robson 2002, 1993; Nigel 2001; Hollway and Jefferson 2000; Boswell and Brown 1999; Maffie 1999; Fischer 1998; Lin 1998; Hughes and Sharrock 1997). Therefore, this study is not unaware of the gap which exists in the literature between various philosophical research schools of thought (see for example: Saunders *et al* 2007; Neuman 2006; Silverman 2006a, Silverman 2006b; Denzin and Lincoln 2003a, 2003b, 2003c; Remenyi *et al* 1998; Denzin 1989). One of the most common is between the *'Positivist'* and the *'Interpretive'* philosophical stance.

Marsh and Furlong (2002:20) argued that the positivist adheres to a fundamentalist ontology and is concerned with establishing causal relationships between social phenomena, thus, developing explanatory and indeed, predictive models. The positivist approach is usually linked to natural science and stems from the influential work of Auguste Comte (1798-1857).

From a philosophical and epistemological point of view, positivists place more importance on objectivity and evidence in the search of truth (Saunders *et al* 2007; Ritchie and Lewis 2003; Easterby-Smith *et al* 2002). The key idea of the positivists is that the social world exists externally and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition (Easterby-Smith *et al* 2002: 28). The claims are based on two assumptions that: *(i) reality is external and objective; and (ii) knowledge is only significant if it is based on observations of external reality* (Easterby-Smith *et al* 2002). Thus, from the positivist point of view, knowledge is acquired through direct observation or by induction, and experiences derived through our senses (Ritchie and Lewis 2003), while, the interpretive school of thought arose from the criticism levied against the positivist approach to research.

The interpretivists, through direct observation and induction viewed the world differently (Ritchie and Lewis 2003). They believe that the world, people, and institutions are fundamentally different from actual science (Bryman and Bell 2004). The interpretive approach is built on two premises, which include: (i) people act on their beliefs and preferences; and (ii) we cannot presume objective facts, such as social class, race and institutional position by looking at people's beliefs and preferences (Bevir and Rhodes 2002: 133).

The interpretivists' school of thought can be traced back to the influential work of Wilhem Dilthey (1835-1911) and Max Weber (1864-1920). Wilhem Dilthey, in his contribution, concluded that social research should explore life experiences in order to reveal the connections between the social, cultural, and historical aspects of people's lives and to see the context in which particular actions take place. Weber, on the other hand, argued that researchers must understand the meaning of social actions within the context of material conditions in which people live (Ritchie and Lewis 2003: 7). Thus, Weber's argument tends to bridge the gap between the interpretivist and positivist approaches to research. Interpretivist approaches advocate the need for interpretation and observation in the social world (Saunders *et al* 2007; Ritchie and Lewis 2003).

Following the suggestion of Read and Marsh (2002) a researcher should decide upon and adopt the most appropriate methods that interest them in a particular research. This study followed the interpretivist school of thought. Due to the nature of the research inquiry, qualitative methodology was adopted for the study. The rationale behind this is because qualitative methodology approach availed the researcher the opportunity to deal extensively with all aspects of the research questions arising from the performance of the key policy instruments deployed to promote wind power in the Member States investigated.

Devine (2002: 197) viewed qualitative method as a *"generic term that refers to a range of techniques including…individual interviews and focus groups interviews which seek to understand the experiences and practice of key informants and to locate them firmly in context"*. Spencer *et al* (2003) also argued that qualitative research aims to provide an in-depth understanding of people's experiences, perspectives, and histories in the context of their personal circumstances or settings. It tends to explore phenomenon by using unstructured methods sensitive to the social context of the study. Data gathered in this sense is detailed, rich and complex.

Quantitative research emphasizes the measurement and analysis of casual relationships between variables and not processes (Denzin and Lincoln 2003). The purpose of quantitative research is to *"discover how many and what kind of people in the general or parent population have a particular characteristic which has been found to exist in the sample population"* Brannen (1992:5). Quantitative research is centred more on design issues, measurement, and sampling. Neuman (2006) noted that quantitative research is a deductive approach that requires detailed planning prior to data collection and analysis. It also seeks to utilise methods that include structured questionnaires.

A key difference between qualitative and quantitative methodology is flexibility (Berg 2007). Due to the nature of quantitative methodology, it is fairly not flexible as qualitative methodology. Mack *et al* (2010:4) contends that: *"qualitative methods are typically more flexible- that is, they allow greater spontaneity and adaptation of the interaction between the researcher and the study participant.....the relationship between researchers and the participant is often less formal than in quantitative* *research. Participants have the opportunity to respond more elaborately and in greater detail than is typically the case with quantitative methods”.* Hence, qualitative methodology encourages open ended questions and probing which gives opportunity to participants to express themselves and in turn allow the researcher the flexibility of asking how and why questions during the process of engaging participants (Mack *et al* 2010).

Due to the many different languages spoken in the Member States investigated, the utilisation of quantitative techniques would have demanded the translation of the questionnaire into German and Dutch before embarking on data collection, and back into English after the field work. This would have taken considerable time and effort, and the translation process may have even introduced bias and distortions to the information. Therefore, in order to avoid this strenuous and complex process, and to maintain high quality data that is reliable and valid, this researcher felt that administering a questionnaire was not appropriate in addressing key research questions arising from the literature.

5.2.1 Methods of Data Collection

Arising from an in-depth review of the renewable energy policy literature, three main research tools for gathering data were identified: secondary sources, interviews, and questionnaires (see for example: Butler and Neuhoff 2008; Lipp 2007, 2001a, 2001b, 2001c; Lise *et al* 2007; Lund 2007; Midttun and Gautesen 2007; Mitchell *et al* 2006; Strachan *et al* 2006; Toke 2006, 2005; Vachon and Menz 2006; Hvelplund 2005, 2001; Sawin 2004; Strachan and Lal 2004; Scharpf 2000). However, for the purpose of this research, two (i.e. secondary sources and interviews) of these research instruments or tools identified above have been utilised. Some of the advantages and disadvantages of using these research instruments are summarised in Table 5.1

Table 5.1: Advantages and Disadvantages of Research Tools

	Interviews	**Questionnaires**	**Secondary Sources**
Advantages	Most appropriate approach for studying complex and sensitive areas; a possible means of obtaining in-depth information; and can be used for any type of population.	Proves to be a relatively simple and straight forward approach to the study; it is helpful in the collection of generalisable information; it gives room for high amount of data standardisation.	Data is easily generated; to an extent reliable and concise.
Disadvantages	It is time consuming and sometimes expensive when potential respondents are scattered over a wide geographical location; quality of data obtained is affected by experience, skills and commitment of interviewer; researcher's bias in the framing of questions and the interpretation of responses is always possible.	It usually has a low response rate; ambiguities in and misunderstanding of the survey question may be detected; data are affected by the characteristics of the respondents; respondents may not treat the exercise seriously and the researcher may not be able to detect this.	Sometimes it is difficult to ascertain the validity and reliability of data.

Source: Robson (2003).

In order to enable the researcher explore the set of evaluation criteria presented in Chapter Four, semi-structured interviews were conducted in the country cases under investigation.

An interview, as defined by Parahoo (2006:307), is "*the verbal interaction between one or more researchers and one or more respondents for the purpose of collecting valid and reliable data to answer particular research questions.*" First the interview schedule was designed and drawn from the research framework discussed in Chapter Four, since each criterion is crucial to the outcome of this research. To allow the respondents leeway and flexibility, a semi-structured form of interview was designed. This is also consistent with Bryman and Bell's (2004:355) argument that: "*flexibility is important in varying the order of questions and also in clearing inconsistencies in answers*".

Similarly, a semi-structured interview schedule allowed this researcher the opportunity to ask questions, which were not originally in the schedule, but are relevant (Neuman 2006). Furthermore, it guides the respondents and brings them back on track whenever they seem to be distracted. This is also consistent with Parahoo (2006), and Bariball and While's (1994) argument that semi-structured interviews allow a researcher the opportunity to change words but not the meaning of the questions contained in the interview schedule. This is because certain words might evoke a different meaning to different respondents so, the semi-structured interview helps break down questions for respondents, without introducing any form of bias. Parahoo (2006:329) further noted that: "*validity is enhanced because respondents can be helped to understand the questions and interviewers can ask for clarification and probe for further responses if necessary.*"

Furthermore, due to the nature of this research and the audience (i.e. senior policy makers) considered for the data collection process, two sets of interview schedules were designed for each Member State (see Appendix 1 for full details). This was done to enable the researcher to balance the information from the respondents representing government and industry. It was also to ensure reliable and valid data. Key areas covered in the interview schedule included:

- The principal wind power market drivers. A key focus of this aspect of the interview was to capture issues surrounding the introduction of the study and the justification for promoting wind power, with the implementation of the choice policy instrument. It was also to enable the interviewee to respond to questions in a relaxed manner.

- The process of policy instrument design and implementation. The key focus of this aspect of the interview schedule was to understand why the particular policy instrument was chosen by the Member State and to explore the institutional roles and process of the design and implementation of the policy instrument.

- The performance of policy instruments and the impact of harmonisation of wind power. The key focus is to critically examine the performance of the choice of policy instrument. The questions explored here relate to the evaluation criteria developed from the literature and adopted in this study. These questions also seek to understand why there was much experimentation in each Member State with the deployment of the choice policy instrument.

- Significant issues impeding the development of wind power. The aim here is to understand the institutional barriers to the advancement of wind power in each Member State.

Linking the four sections together, is to set the argument in context for the harmonisation of the EU renewable energy policy instrument, which has been a subject of much debate in recent times. For geographical and financial reasons, the data collected through interview took place in two phases, first face-to-face interviews and then telephone interviews.

5.2.1.1 Face-to-face interview

The first stage of the data collected consists of key government bodies directly associated with either the design or the implementation of policy instruments. Major wind power associations and environmental NGOs were selected at this stage for a personal interview. This step involved significant travelling costs and planning but the data gathered was extremely rich. The researcher was also able to coordinate the interviews and of the fifty-five interviews twenty-nine were face-to-face.

5.2.1.2 Telephone interview

The second stage of the data collection process was mainly through telephone. To recap, this research focuses mainly on three EU Member States that are widely dispersed in different locations of Europe. With this in mind, it was not possible for the researcher to travel round the Member States for a second time due to the time and costs involved. Therefore a telephone interview was utilised for respondents who were not available for face-to-face interviews during the first stage of the research.

The interview schedule used was the same as that of the face-to-face interviews. The data collected at this stage was also very rich. The principal reason for this was that the researcher was already known to the respondents. Having attended seminars and conferences in the subject area afforded the researcher the privilege to network and familiarize himself with the target respondents. In fact, most of the contacts made were through attendance of major conferences and other large gatherings of senior policy makers. This is consistent with Berg (2007: 109) finding that initial contacts "*allow the subjects [respondents] to ask questions and raise any concerns they might have about the study or their participation. It will also provide an opportunity for the investigator to gain some sense of the individual and to begin developing a kind of relationship and rapport as well as an opportunity to convince the individual to participate in the study if the individual is resistant.*"

Furthermore, contrary to often cited criticisms against telephone interviews (see for example: Holt 2010; Stephens 2007; Sturges and Hanrahan 2004; Carr and Worth 2001) the process of data collection at this stage proved extremely productive and the data collected was very valuable. As with the face-to-face interview, the interview schedule used was also semi-structured, each lasting between forty-five minutes to one hour. Twenty telephone interviews were conducted during the research.

The secondary data utilised in this thesis is to complement data from the interview. The secondary data gathered were mainly from published documents from the EU and the national governments (Directives, Energy Papers, IEA Wind Report 2000-2008, etc) ministries and departments, international organisations and renewable energy associations' websites. The review of the secondary sources were particular helpful in understanding of renewable energy policy instruments of the country cases investigated. It also offered me the opportunity to understand how each policy instruments are viewed by various stakeholder groups operating in the wind power industry.

5.2.2 Sample Selection Method and Size

Before making decisions about sample selection, a considerable amount of time and effort was spent on understanding the political and regulatory environment, industry structures and the stakeholder groups in the business environment of the Member States under investigation. This enabled the researcher to identify the key stakeholders directly involved in renewable energy policy making.

Again, due to the nature of the research, a gradual strategy of sampling was adopted. According to Flick (2006), this is patterned after the theoretical sampling developed by Glaser and Strauss (1967). The selection of participants for the interview process was focused directly on personnel and employees involved in the wind power policy for their organisations. This, to an extent, helped the researcher to identify those knowledgeable in the subject area for interview. For various reasons (differences in the geographical locations of each Member State studied[42], cost, time, and the bureaucratic processes of interview appointments) the researcher opted to identify the personnel directly charged with the responsibility of handling renewable energy policies for their organisation thus, the questions were selected with experts, practitioners, and academics in mind. This was to avoid gathering unwanted data and wasting valuable resources and time. Table 5.2 shows a sample of respondents

[42] Member States investigated in this study are far apart and as such are located in different regions of Europe.

interviewed in each of the three Member States (see Appendix 2 for the details of organisations selected).

Table 5.2: Numbers of Interviews held

Country	Number of contacts made	Number of Face-to-Face Interviews	Number of Telephone Interviews	Number of Interviews
EU	4	-	4	4
Germany	17	7	10	17
Netherlands	18	13	3	16
United Kingdom	20	9	9	18
Total	59	29	26	55

Author Generated

In total, a high response rate was achieved with most of the organisations willing and happy to participate. However, organisations which refused to participate gave reasons which anchored on availability and time. Some just did not wish to divulge information and hence totally refused to participate.

5.2.3 Pilot study

Polit and Beck (2009:563) described a pilot study as a "*small-scale version, or trial run, done in preparation for a major study*". The importance of the pilot study in a social qualitative research cannot be overemphasized. A pilot study is necessary so as to avoid wasting time and money. Aitman *et al* (2006) observed that pilot studies can reveal deficiencies in the design of a proposed experiment or procedure and these can be addressed before time and resources are expensed on large scale studies. Following the generation of the interview schedule, a pilot interview was carried out with two academic experts in the field of study and later with some wind farm operators (Airtricity Ltd, Fred Olsen Ltd, and Natural Power). The primary reason for piloting was to seize the opportunity to test the questions on industry practitioners and academic experts. Data and responses received at this stage were very useful and instrumental to the development of the final interview schedule. It provided the researcher with ideas and clues that were not originally thought of when designing the initial interview schedule. Secondly, the pilot study also afforded the researcher the opportunity to understand and identify key stakeholders groups involved in wind power policy making processes, as such the selection of respondents for interview became easier and less stressful.

5.2.4 Reliability and Validity

Reliability and validity has been viewed differently by many qualitative researchers (Koro-Ljungberg 2008; Neuman 2006; Ritchie and Lewis 2003; Golafshani 2003; Cohen *et al* 2000; Lincoln and Guba 1985; Glaser and Strauss 1967). Although, its relevance in qualitative research has been highly contested (Stanbacka 2001), its importance cannot be overemphasized (Patton 2002). According to Golafshani (2003:601), "*validity and reliability are two factors which any qualitative researcher should be concerned about while designing a study, analysing results and judging the quality of the study*". Kirk and Miller (1989:19) contend that: "*reliability is the extent to which measurement procedure yields the same answer however and whenever it is carried out; validity is the extent to which it gives the correct answer. These concepts apply equally well to qualitative observations.*"

Newman (2006:196) and, Lincoln and Guber (1985:300) used the word "*dependability*" to refer to reliability in qualitative research. Clont (1992), and Seale (2002, 1999) referred reliability to consistency, truthfulness, and dependability. However, Collingridge and Gantt (2008:390) contend that: "*reliability in qualitative* *research typically refers to adopting research methods that are accepted by the research community as legitimate ways of collecting and analysing data. Specifically, reliable qualitative methods consistently produce rich and meaning descriptions of phenomena".*

Applying this to the study, the process of interview schedule design was carefully thought through and standardised as much as possible thus, minimising any form of bias. This is evident in the richness and extensiveness of the data gathered and presented in this study. The findings of the study are also presented as objectively as possible. The data obtained represents not only the views of policy makers, but also that of practitioners and academic experts. This provides the study with a complete data that is very rich, extensive and reliable.

According to Neuman (2006:196), validity means "*truthful' based on 'authenticity' of giving a fair, honest, and balanced account of social life from the view point of someone who lives it every day"*. Although the relevance of the concept of validity to qualitative research is contested by many social science researchers (see for example: Golafshani 2003; Stenbacka 2001; Cresswell and Miller 2000), there is need to put in place checks and balances in qualitative research. Validity in quantitative research means accurate measurement. In qualitative research, *"measuring what one purports to measure means selecting an appropriate method for a given question and applying that method in a coherent, justifiable, and rigorous manner"* (Collingridge and Gantt 2008:391).

However, for this study, the description of validity offered by Ritchie and Lewis (2003) seems appropriate. The authors referred to validity as ‘correctness’ or ‘precision’ of a research reading. The sample coverage for this study is a wide representation of actors involved in renewable energy policy design and implementation. Respondents were selected purposefully to avoid gathering unnecessary data or data outside the scope of this study. The data was collected and the findings were validated using academic practitioners in the field of study. To this end, three academic experts were interviewed, each representing the three Member States covered in the study. The interview process was also carried out systematically such that the quality of questions asked enabled respondents to fully express their views of policy instruments implemented by Member States. Thus, the findings of this study are categorized to reflect the meaning assigned by the respondents to the criteria for evaluating the performance of policy instruments. Therefore, in order to ensure reliability and validity of the data collected, the researcher maintained consistency throughout the organisations and institutions selected. Therefore, to a large extent, the authenticity of the data collected is guaranteed, valid, and reliable.

5.2.5 Handling of Data

According to Richards (2005:33) *“making qualitative data is ridiculously easy. The challenge is not so much making data but rather making useful, valuable data, relevant to the question being asked, and reflecting on the process of research”*. The data handling stage is one of the most important processes of this study. Prior to carrying out the data analysis, a very careful and flexible process of handling data from the field was thought through and clearly defined. This is broken down further into the following stages.

5.2.5.1 Recording and transcribing of data

Recording in qualitative research is undertaken because it is impossible to remember all the answers to the questions asked during the interview. Bryman (2008: 451) states that: "*the recording of conversations and interviews is to all intents and purposes mandatory*". The process of recording helped the researcher to concentrate and limit note taking during the interviews. It also afforded the researcher the opportunity to prompt and probe the respondents when it was necessary to do so. The recorded data was transcribed verbatim to retain the richness and content of the data. However, Green and Thorogood (2009:117) pointed out that: "*transcribing conversation is, of course, a translation process in itself. The choices of punctuation, spelling and detail of the transcript all affect how it is read by those analysing it*". Whilst it is difficult during transcription to capture body language, and other forms of expression by the interviewee, the researcher made a great deal of effort to capture as much gesture as possible. Although it's assumed by many authors (for example: Barbour 2008; Bryman 2008; Punch 2005; Richards 2005; Ritchie and Lewis 2003) that the process of transcribing is time consuming and rigorous, the researcher did all the transcribing. This was personally exiting and beneficial. The process brought the researcher closer to the data and helped in identifying categories and themes which were subsequently used for coding purposes.

5.2.5.2 Coding and method of data analysis

The interview schedule for this study was generated from the evaluation criteria developed from the first hand knowledge gained in the literature. The generation of the criteria made it clear that objectives needed to be develop to test the framework through the generation of a number of subjective questions. Therefore, qualitative statements in the nature of data were collected to address each of the questions.

In order to identify the key themes emerging from the data set, the information was first sorted out and grouped into individual Member States. Barbour (2008:196) described this stage as ‘the early stages of coding’. It enabled the researcher to develop a list of code names which was later applied to the data. Green and Thorogood (2009:201) described this stage as a ‘coding scheme’ developed by looking through the early data to identify the key themes and how they will be labelled. The aim of this process *is to "assemble, or reconstruct the data in a meaningful or comprehensive fashion"* (Jurgenson 1989:107). A total of fifty-five interviews were analysed. Codes were attached to each criterion that emerged from the literature.

Seale (1999:154) defined coding as *"an attempt to fix meaning, constructing a particular vision of the world that excludes other possible viewpoints"*. As such Richards (2005) notes that coding is not merely the act of labelling all the parts of a document, but rather the process of bringing them together so they can be reviewed and allowing thoughts on the topic to be developed.

Once the set of categories and codes had been attached, the responses from the transcript were rearranged sequentially to follow the order of categories created. Green and Thorogood (2009:201) notes that: *"these kinds of cut and paste techniques are ‘low technology’, but they work. They allow the researchers to compare, contrast,* *and start to build up categories and typologies and to discuss the meaning of their data"*.

A total of forty-five themes were identified and grouped into eight categories based on the evaluation criteria discussed later in this Chapter. Table 5.3 shows the list of codes and categories. A full list of the themes is shown in Appendix 5.

Table 5.3: Categories for Analysis

Code	**Categories**
01	Administration
02	Stakeholder support and involvement
03	Certainty for industry
04	Effectiveness
05	Efficiency
06	Market conformity
07	Finance
08	Impact on development

Source: Author Generated

The method adopted for analysing the data for this study is content analysis. Kaplan (1943:230) defined content analysis as "*a technique which attempts to characterise the meaning in a given body of discourse in a systematic and quantitative fashion"*. Whilst this definition relates to quantitative analysis, Hsieh and Shannon (2005: 1278) define qualitative content analysis as a "*research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or pattern"*. The most common way of using content analysis is where coding is based on categories designed to capture the dominant themes present in a text (Franzosi 2004). Content analysis allowed the researcher to test and utilise the evaluation framework developed in Chapter Four to evaluate the performance of policy instruments implemented by Member States investigated.

5.3 CONCLUSION

The aim of this Chapter is to discuss the methods used to collect data analysed and presented in Chapters Six to Nine of this study. Qualitative research methodology was chosen because of it flexibility and appropriateness. It allowed the researcher the leeway of exploring the performance of policy instruments implemented in the country cases, it flexibility allowed participants (interviewees) to provide their views about policy instruments while the researcher in turn had the opportunity to probe and ask questions which were not in the interview schedule but are important. The following three Chapters will present the findings and analyses from the three country cases. Arising from the findings, Chapter Nine will compare and contrast the performance of policy instruments and put in context the EU harmonisation debate which has been a subject of much conjecture.

CHAPTER SIX

COUNTRY ANALYSIS: GERMANY

6.1 INTRODUCTION

Following the discussion of the methods used for data collection in Chapter Five, this Chapter will now present the findings and analysis of the first country case (Germany) of this research. The development of wind power in Germany has been a great success (Busgen and Durrschmidt 2009; Lipp 2007; Toke and Lauber 2007; Agnolucci 2006; Bechberger and Reiche 2004). Germany is often heralded as one of the EU Member States with limited wind resource (Wustenhagen and Bilharz 2006; Ranci 2005) yet, the development of wind power has surpassed countries with great potentials[43] of wind resource in terms of capacity installed (EWEA 2010; Mints 2007; Michaelowa 2003).

Unlike The Netherlands and UK, Germany has adopted the feed-in tariff. The feed-in tariff began operation in 1991 and obliges regional or national transmission system operators to feed the full production of green electricity into the grid at a politically fixed price (Toke 2006; Agnolucci 2006). Germany has now passed its 12.5% target and is on course to meet its 2020 target (EU 2009; Busgen and Durrschmidt 2009). However, the bulk of this capacity comes from wind power. Thus, Germany is a first division member of deployed wind power capacity, along side Spain, China, and U.S.A.

The principal objective of this Chapter is twofold. First, is to critically examine the performance of the feed-in tariff (FIT) i.e. the German policy instrument for

[43] For example; UK, Denmark, and France

promoting wind power. Secondly, to examine the lessons learnt from the implementation and performance of the feed-in tariff. The aim is to set this argument in the context of the European Union harmonisation agenda and to compare and contrast the German policy instrument with the other two EU Member States investigated in this study. In doing this, historical institutional theory is utilised to explore wind power implementation in Germany using three parameters as outlined in Chapter One: emergence of policy instrument; policy architecture; and the outcome of the support and implementation of policy instrument. This Chapter presents the findings arising from the series of interviews undertaken with sixteen organisations widely involved in renewable activities in Germany. The next section provides an overview of Germany's wind power policies from 1970-2008.

6.2 GERMANY WIND POWER POLICY: 1970 - 2008

Germany is recognised internationally as a pioneering country in the development and application of wind power (Reiche and Bechberger 2004; Coenraads and de Vos 2004; Grotz 2002). This stems from the aspiration of the German government to promote the development of indigenous energy sources in a bid to solve the country's dependence on fossil fuel and other conventional forms of energy (Wustenhagen and Bilharz 2006; Ranci 2005; Shui-Fai 2005).

Like the UK, plans to promote renewable energy in Germany started after the 1970s with the introduction of the Federal Government framework programme for energy research (Gan *et al* 2007). The idea was conceived by the government to promote nuclear energy. However, in 1974, German citizens objected to this plan, hence the birth of the anti-nuclear power movement (Jacobsson and Lauber 2006).

The beginning of a strong anti-nuclear power movement brought about the emergence of the promotion of renewable energy projects. Following the lead, renewable energy technology was based on federal government R&D support for wind power turbines (Ranci 2005). Worthy of mention among this drive was the GROWIAN[44] Project, launched in 1978 primarily to support large scale manufacturing of wind turbines. However, due to the limitations and shortfalls in manufacturing and systems integration, the project was short lived and was regarded as an economic failure. Still, it led to the concentration of support for smaller wind turbine of 250kw from 1986 to 1988 (Ranci 2005; Bechberger and Reiche 2004).

Furthermore, in 1989 the programme was expanded to 100MW and gave an incentive of 3 cents per kWh to wind power generators thus, changing the spectrum from an R&D funding to production incentive (Reiche and Bechberger 2004:1684). Moreover, the success of the programme also led to another upgrade of the wind generation capacity from 100MW to 250MW in 1991. This time, obligation was placed on wind generators to participate in a scientific measurement evaluation programme (WMEP), helping to create a database on the operational behaviour of wind turbines in Germany (Wustenhagen and Bilharz 2006; Ranci 2005; Bechberger and Reiche 2004).

Lauber and Metz (2006), Lauber (2002a) noted that the German farmers in the 1990s began to face heavy competition, due to market liberalisation pursued by the EU, through its common agricultural policy (CAP). Thus, German farmers began to source for alternative means of earning income. With the government programmes

[44] Big wind power system

established, investing into wind power became a great opportunity, especially in northern Germany. The availability of good wind speed in this region served as motivation for farmers, who seized the opportunity to earn more income. Agnollucci (2008) noted that farmers did not opt for the production of biomass because wind power investment complements commercial crop production and the same land is used for both wind farms and farming, while investment into biomass acted as a substitute for commercial crop production, as the land used for its generation cannot be used for farming. Lauber (2004, 2002a) also pointed out that the law to promote wind power at this time was pushed forward by two MPs from the Northern Lander as a private members bill. At the same time, some politicians in this region also became involved and helped generate further support at parliamentary level. To this end, Lauber (2002b, 2001) noted that two Conservative (CDU) Party members of the Bundestag from the Northern Germany district submitted a private members bill for a feed-in tariff for electricity from renewable energy sources in 1990. This received much interest and support from other political parties. Thus, what today is known as the feed-in tariff was born and named Stromeinspeisegestz (StrEG 1990).

The StrEG 1990 was the first significant move to promote wind power in Germany. It was finally adopted in 1991, having the distinctive feature of obligating public utilities to purchase renewable generated power from solar, hydro, biomass and other renewables on a yearly fixed base rate (Bechberger and Reiche 2004; Ranci 2005). The compensation amounted to 90% of the total value of wind power in Germany. Ranci (2005) also noted that the StrEG 1991 subsidized the operation of the commercial wind installations at the price of 4.1 euro cents/kWh. Moreover, to enable projects to run well, a form of soft loan was granted to local farmers and investors by the state owned Deutsche Ausgleichs Bank (DtA).

Although the idea of the StrEG 1991 was brought forward by the coalition from all spectrums of political parties, except the Liberal Party (FDP), great opposition came from the electricity utility industry, e.g. E.ON, RWE, and the German Electricity Producers Association (VDEW). The reason behind the hostility, as pointed out by Agnollucci (2008), is that the FIT law obliges suppliers to take and pay for the electricity generated and fed into the grid, while the plants owned by same were exempt from the FIT scheme. The VDEW also claimed that it is too expensive to promote small hydro plants, and that the 'hardship clause', which places purchase obligation on utilities could result in an undue economic and technical burden, therefore the utility companies called for an amendment which eventually led to the redefinition of the hardship clause in 1998 (Wustenhagen and Bilharz 2006; BMU 2005). Suffice to say that the StrEG 1991 was a great success in the history of Germany's wind power market. From 1991 to 1999, wind power installed capacity increased from 98MW to 4444MW (BMU 2006b, 2006c) representing more than 100% growth rate.

With the liberalisation and deregulation of the German electricity market in 1998, the Social Democrats and the Red Green Party saw the need to improve the FIT. Therefore, the StrEG was amended and the EEG came into force in April 2000. The purpose of the EEG 2000 was:

> *"To facilitate a sustainable development of energy supply in the interest of managing global warming and protecting the environment and to achieve a substantial increase in the percentage contribution made by renewable energy sources to*

> *power supply in order at least to double the share of renewable energy sources in total energy consumption by the year 2010, in keeping with the objectives defined by the EU and by the Federal Republic of Germany."* (Renewable Energy Sources (RES) Act 2000)

One key aspect, which the Act dealt with, was the purchase of and compensation paid for electricity generated by wind power (RES Act 2000). Grid operators were obliged to connect to their grid electricity generation installations from renewable energy sources. For wind, the compensation paid for electricity generated was at least 9.10 cents per kWh for a period of 5 years, starting from the date of commissioning. One advantage of the system was that the EEG's remuneration system was based on fixed regressive tariffs, whereby low cost renewable producers are compensated less than the high cost generation producers (Ranci 2005). For wind power, gusty sites are compensated less than not so windy sites. Apart from the obligation placed on grid operators, provision was made in the Act for a national equalisation scheme to help reduce and record the cost differences in the amount of energy purchased and paid by the grid operators in different locations in Germany.

Bechberger and Reiche (2004) also identified further provision in the Act which made it comply with the European law on state aid. Firstly, on 30th June every other year, a report shall be submitted by the Ministry of Economics and Technology on the progress achieved, in terms of market introduction and the cost development of power generation installations. This is to allow the government and the Ministry of Environment to identify areas of the Act that require adjustment, and be able to act upon it without delay. Secondly, the Act also created a kind of incentive by providing justifiable means to avoid payments of compensation rates higher than the costs of having an effective operation. As such, windy sites receive lower tariffs than less gusty sites. This also helps check and balance the level of compensation received by both sides.

The Act was a great success, as the installed capacity rose from 4444 MW in 1999 to 16,629 MW in 2004. Again, over 70% increase in total installed capacity was recorded during the same period. Due to the huge success noted during this period, the national electricity associations began to hold divergent views on the RES Act and as a result, support and opposition were divided between different parties. Nevertheless, the VDEW and the BDI which comprise the utilities and other industries opposed the Act strenuously. However, support from various political parties and coalition grew and there was a unanimous call for the amendment of the Act by 2004 (Wustenhagen and Bilharz 2006).

The RES Act amendment came into force in July 2004 and its aim was not too different from the RES Act 2000. The purpose of the RES Act was- (i) To facilitate a sustainable development of energy supply, particularly for the sake of protecting climate change, nature and the environment, to reduce the costs of energy supply to national economy, to incorporate long-term external effects, to protect nature and the environment, to contribute to avoiding conflicts over fossil fuels and to promote the further development of technologies for the generation of electricity from renewable energy sources; (ii) To contribute to the increase in the percentage of renewable energy sources in the supply of power by at least 12.5% by 2010 and by at least 20% by 2020 (BMU 2004).

Added to the structure of the Act was the clear definition of renewable energy sources including wind power in any capacity. Secondly, the issue of transparency on the part of the utilities and grid operators was also clearly defined. They are obliged to give notice of the different fees paid in renewable energy sources installations to any third party. Grid operators are also mandated to publish the data necessary to determine the energy quantities and fees for all RES installations. Thirdly, the introduction of the Guarantee of Origin enables the required organisations to guarantee the electricity produced from renewables (BMU 2004a, 2004b).

In order to comply with the EU law on state aid, the 2004 Act demands that remuneration for wind power should be at least 5.5 eurocents per kWh for a period of five years, starting from the date of commissioning. This is expected to increase by 3.2 eurocents per kWh for electricity generated from plants which achieve 150 percent during a five year period. For other installations that cannot meet this requirement, the period is extended by 2 months for each .75 cents per kWh of the reference yield (BMU 2004b; Bechberger and Reiche 2004).

The aim of this is to maintain the cost effectiveness of the operations of wind power installed capacity, especially with the re-powering process currently ongoing in Germany. Overall, the RES Act 2004 has proved successful, installed capacity is now over 20,000 MW. After a series of consultations, workshops, and seminars on the revision and amendment of the RES Act 2004, the new RES Act was signed to law in June 2008 by the German Parliament (WWEA 2008) and came into force in January 2009. Table 6.1 provides a summary of the key components of German wind power policy.

Table 6.1: An Overview of the German Wind Power Policies 1970-2008

Year	Law or measure	Focus
1970	Federal Government Framework Programme	All energy research
1974	Federal Government R&D	Support for wind power turbines
1978	GROWIAN Project	Support for big wind power systems
1987	NRW REN-Programme	Comprehensive support for renewables
1989	Federal 100 MW/ 250MW Wind Programme	Investment incentive payment per kWh for renewable electricity
1991	Federal Electricity Law (StrEG)	Feed-in tariff for renewable electricity Requirement for utilities to purchase renewable electricity Tariff wind power: 90% of consumer price electricity
1994	NRW change Nature Protection law	Facilitating projects of 1 or 2 turbines
1996	NRW Wind ordinance (renewed in 2000, 2002	Planning and permitting procedures and nature protection laws
1997	Federal Change Federal Construction Law	Privileging wind power in outlying areas. Municipal designation of wind priority zones
1998	Federal Energy Reform Act, amending the StrEG	Geographical equalisation of reimbursement obligation utilities
2000	NRW Wind Ordinance Renewable Energy Act (EEG)	Renewal of 1996 ordinance Feed-in tariff for 20 years Tariff decoupled from electricity price Differentiation for location and over time. Requirement for electricity suppliers to purchase renewable electricity
2002	NRW Wind Ordinance	Renewal of 2000 Ordinance
2004	Renewable Energy Act (EEG) 2004	Renewal of 2000 EEG Stronger degression in tariffs for wind power
2008	Renewable Energy Act (EEG) 2009	Renewal of 2004 EEG

Source: Breukers (2006)

6.3 EVALUATION FRAMEWORK

The evaluation framework utilised for analysis in this study was discussed in detail in Chapter Four. Sample selection focused mainly on the organisations that have stakes in renewable energy, vis-à-vis wind power policy in Germany. Sixteen organisations were contacted through telephone and e-mail, of which none of them refused the request to participate in the data collection process.

Interestingly, there was no condition attached to the agreement by the respondents to participate in the data gathering process. The respondents interviewed were personnel directly charged with the responsibility related to wind power policy management for their organisation. This was very helpful during the data collection process. The researcher found that all the respondents were very knowledgeable in the area of wind power policy and as such the assurance of the reliability and validity of data obtained was guaranteed. The mode of data collection was through in-depth semi-structured face-to-face, and telephone interviews. Eleven of the seventeen interviews were conducted by telephone with each interview lasting between forty to sixty minutes (see Appendix Two for breakdown). Considerable time was also spent arranging the face-to-face interviews. The rationale for opting for telephone interviews is discussed fully in Chapter Five.

The issues covered during the interviews include: (i) principal wind power market drivers facing Germany; (ii) the process of policy instrument design, implementation, stakeholders' support and involvement; (iii) the performance of the policy instrument and the impact of harmonisation of wind power policy instrument; and (iv) significant issues impeding the deployment of wind power in Germany. More generally, the series of interviews conducted, focused on the second and third issues, as these form the central theme of the research. This also offered the researcher the opportunity to obtain rich data on the operations and performance of the FIT of Germany. Furthermore, the richness of the data facilitated the data analysis process and helped in providing a critical analysis of the FIT. The next section provides the findings and analysis of the data obtained through the interviews conducted with the seventeen personnel.

6.4 RESEARCH FINDINGS AND DISCUSSION

6.4.1 Principal Market Drivers

According to Gan *et al* (2007:147) wind power policies in Germany are driven by a broad coalition and a strongly involved parliament. Evidence from the interviews reveals that a willing parliament in support of wind power seems to be an important driver, not just for political reasons, but also in the promotion of economic opportunities and progress to the deployment of wind power in Germany. The German policy instrument developed earlier was basically the idea of the Conservatives (CDU). The Red-Green coalition helped reform part of the Renewable Energy Source Act to make it conform to the current day demands.

Strongly evident in the past was the awareness of environmental problems (e.g. the Chernobyl accident of 1986), and the demand for a sustainable means of energy supply. The climate change threat, in particular, helped bring to the government's and public's attention, the urgent need to substitute the conventional sources with a viable alternative, such as wind power. During the interviews, evidence revealed that the deployment of renewable energy sources in Germany came top on the governmental agenda to demonstrate efforts aimed at protecting the environment. Illustrating this, a senior executive officer of a popular renewable energy association state that: "*In the beginning the main reason was to protect the environment and also to protect other environmental aspects and the climate change, also to avoid using materials which* *are not too healthy that's why the use of RES is important."* (Interview undertaken: 26th September 2006).

Thus, wind power became very important in order to ensure the German Government pursued a carbon free economy and most especially to ensure security of energy supply. Wind power deployment could also help cut down on excessive fossil fuel import bills and help promote domestic production of renewable energies thus creating employments. Germany is an industrialised nation and the deployment of wind power was an opportunity to develop wind turbine and component parts for a market beyond Germany. To further strengthen this course, the feed-in tariff was also adopted in 1991 and amended by parliament in 2000, 2004, and 2008.

This is evident in the capacity that has been delivered by the feed-in tariff (over 20,000 MW). During an interview one renewable energy policy expert confirmed this and claimed that wind power has been the German renewable specialty. Interestingly, the feed-in tariff was also designed in a way that wind power development could be achieved, not only in the best sites, but also in the less windy areas. The remuneration for every wind park is calculated, based on the output of individual wind parks. The FIT also offered investment or planning security for potential investors and created a stable enabling environment for the development of a strong wind power market. Illustrating further, a senior manager of one of the big utilities said:

> *You get a feed-in tariff depending on what technology you use and where your wind farm or your generator is located. You also get a fixed price for bringing the electricity into the grid and the grid operators must take the electricity and pay the owner of the wind farm, and that is the main market driver in Germany because it guarantees for over 20 years that you will be paid and get the money back for your investment."* (Interview undertaken: 30th November 2006).

Another important factor in driving wind power in Germany was the change in building law. Wind power projects are classified as privileged projects at local authority level and do not require planning permission for the building and construction of turbines. Local authorities are obliged to accept windfarm sites, except when the proposed windfarm has military issues. Notwithstanding, environmental impact assessments (EIA) are carried out to ensure the suitability all the sites.

In addition, you need businesses and farmers to invest in the technology and as was the case in Germany in the early years wind power deployment. There was a great level of public acceptance for wind power and in the early1990s, farmers and small local communities in the north of Germany often joined together to share ownership in wind farms. People were interested in being independent energy producers and with the generous FIT in place they were offered the opportunity to make their energy available to the market.

One other strong incentive available to the farmers and corporate investors was a guaranteed tax exemption over a certain period of time. Other incentives outlined by Toke and Lauber (2007), Jacobsson and Lauber (2006), Ranci (2005), Bechberger and Reiche (2004), and Ibenholt (2002) include: support through R&D and technology demonstrations, soft loans, and the general willingness of banks and investment companies to offer finance to farmers and capable investors. Table 6.2 provides a summary of the drivers discussed above.

Table 6.2: Summary of the German Wind Power Market Drivers

- Strong Parliamentary Support
- Climate Change and Environmental Protection
- Security of Energy Supply and Electricity/Energy Cost Reductions
- The Feed-in Law
- Change in the Building Law
- Strong R&D Programmes
- Renewable Energy Technology Demonstration
- Availability of Soft Loans and willingness to Invest

Source: Author Generated

6.4.2 Evaluation of the Performance of the Feed-in tariff (FIT)

6.4.2.1 Administration

According to Sijm (2002:14) the administrative demand for the FIT is simple, and it is one of the shortest laws implemented in Germany. There is one law which fixes the price and a single mechanism which calculates the cost and converts it, so it is payable. Two remarkable features of the FIT are its transparency and flexibility. The FIT sets the price for each renewable energy technology and allows each to develop. Evidence from the interviews also reveals that once the price for each renewable technology is fixed, the government make regular adjustments when necessary thus, making the transaction costs of the FIT much lower than the market based systems. Another important factor regarding the transparency of the FIT is that the price for each renewable energy technology is decided with the help and input from research institutes and industries (Sawin 2004). It is not surprising then that investors are aware of the wind potential of any particular site and are conscious of what a single turbine can or could produce each year. Thus, they can make calculations and decide if further investments are economically viable or not.

Evidence from the interviews also demonstrates that the FIT is flexible. This is contrary to the views of Wiser *et al* (2002) who believe that the FIT is inflexible. As way of explanation, the FIT allows adjustment of the fixed price and can be designed to account for changes in technology and the market place. The law itself requires that a bi-annual evaluation be carried out. When this happens, changes can be made to the FIT without damaging investors' confidence and investment security (Szarka 2007).

Evidence from the interviews reveals that there is conflict between conventional energy supplies (the utility companies) and wind power generators or producers. The utilities represented by the German Association of Electricity Producers (VDEW) challenged the transparency of the FIT, especially with the bureaucratic technicalities involved in the handling of the law, the larger the number of plants involved in the system the higher the technical complexity involved and vice versa. Similarly, the FIT law mandates utilities to pay and feed into the grid all energy generated from wind without making provision for system balancing thus, creating addition burden and costs for the utilities which they, in turn, pass on to the final consumers. To deal with this conflict there is need to amend the feed-in law in such a way that will retain its current features and in addition allow for system balancing of all energy generated and fed into the grid.

6.4.2.2 Stakeholders support /involvement

One of the principal arguments in support of the FIT is the wide involvement of stakeholders in the process of design and implementation. Renewable energy actors, utilities companies, research institutes, and environmental NGOs play a key role in the development of wind power policy in Germany. This is also consistent with Valle Costa *et al* (2008: 78) who claim that:

> *"Politics in Germany are decentralised. Together with the Federal Government, and local government, the state administrators have an important role in governance and the three levels have priority."*

In similar way to The Netherlands and the UK, the Ministry of Environment and Nuclear Safety (BMU) has the sole responsibility of the Feed-in Tariff (FIT) and its administration on behalf of the German Parliament. The Ministry of Environment, acting for the German Parliament engages all the stakeholders in discussion on the operations of the FIT and ensures that all the stakeholders are heard throughout the legal process and adoption of the FIT. During the bi-annual review the draft and the proposal of amendments of the law also comes from the Ministry of Environment who arrange different rounds of discussion with various stakeholder groups before passing the report, in a document, to the parliament for ratification. Although not all the opinions of the stakeholders are taken on board since the Parliament is the final decision maker, evidence from the respondents interviewed reveal that to date, many of opinions and suggestions from the public hearings, workshops, and seminars are adopted in the final law. A very important contributing element to the outcome of a strong institutional relationship between the government and the wind power industry is the existence of good wind power research institutes and associations e.g. DEWI, DENA, and BWE. Breukers (2006) noted that these institutions bring together the wind power industry actors and the government, thus helping to minimise institutional conflicts that otherwise could hamper the investment security provided by the FIT. It also affords the Ministry of Environment the opportunity of obtaining a wider view and representation of public perception of the FIT law.

It is not surprising, therefore, that the feed-in tariff is supported and accepted by almost all the parties affected, except for the utilities who feel that the feed-in tariff should be replaced with a market based system. Illustrating and confirming this, one policy advisor of a wind research institute stated that:

> *"Yes, the government does involve other stakeholders. There are some consulting works and some issues like the cost situation, and the development experience and other aspects that are carried out by the stakeholders; we are also involved with these …"* (Interview undertaken: 9th November 2006)

Therefore, stakeholders are involved in different capacities, ranging from advisory, consultation, the decision making process, and in the implementation of the FIT. The German wind energy association, for instance, is responsible for making proposals and represents the views of all the trade associations from the wind power perspective and speaks in one voice for all the trade associations they represent.

6.4.2.2.1 Wind power implementation and scale

As mentioned earlier, stakes in the German wind power industry is predominantly farmer and local cooperative based. Breukers (2006) traced this back to pre 1974 when the anti-nuclear and environmental movement began the search for alternative energy. Agnollucci (2008) also adds that with introduction of the EU Common Agricultural Policy (CAP), farmers became more interested in seeking an alternative means of income generation. Evidence from the interviews reveals that the first set of wind farms in Germany were owned and managed by farmers and landowners especially in the northern costal Lander (also see Szarka and Blühdorn 2006). With the availability of bigger turbines and an increase in maintenance costs, wind power ownership gradually shifted to cooperatives where group of farmers, local individuals, and developers teamed up together to own wind farm sites. However, the FIT was instrumental to this movement as it tends to support this form of wind power ownership and implementation. The reasons offered by respondents to explain this, were that the risk is not so high thanks to the FIT law and does not divide capacities of scale, neither does it discriminate between large and small producers, but rather it encourages any investor. As soon as a farmer installs his wind turbine he is certain to receive a specified tariff for a couple of years and with that he can obtain finance for his investment. Interestingly, the banks and other building societies have learnt over time how to calculate wind power investment returns and are prepared to weigh up the risks. Evidence from the data gathered also revealed that this is not the case with other systems (Soderholm 2008a). The banks are more hesitant to finance wind power projects thus, stronger players who can afford to take market risks are required in order to sustain the market. It is not surprising then, that the countries with quota systems have bigger utility companies as they are the main investors in renewables since they have the financial resources to contend with uncertainties and conditions in such markets.

Respondents to this also claimed that the FIT is a very good system that encourages an early take-off of wind power investment. As such, it removes all entry barriers to the market, because with the FIT, all the risks associated with the market are well controlled and every investor has the guaranteed right to feed any generated amount of energy into the grid. Investors are fully informed about the market and know how high or low the tariffs are at any time. Since the tariffs are paid for a twenty year period, there is a high level certainty guarantee of investment security for small players who cannot afford much risk.

To date, wind power ownership in Germany is still dominated by local ownerships. This is consistent with the findings of Toke (2007a, 2007b, 2006), and Szarka and Blühdorn (2006). Toke (2006) in particular argued that the German wind power ownership consists of the small and local ownership system. The key factor responsible for this is that farmers are the land owners and they have a very limited institutional barrier to the siting of wind farms and as such they are the backbone of the German wind industry. Farmers usually converge and site windfarms in areas very close to the grid.

To summarize, the success story of the German wind industry can be linked to the small and local ownership implementation structure. Clearly, the deployment of wind power in Germany follows the bottom-up approach. This was further strengthened by the strong positive relationship between political and institutional actors. The strength of the relationship created an economic and political enabling environment in which the FIT could operate. Hence Breukers (2006:219) pointed out that*:* "*the strength of the policy community around wind power [in Germany] lies in the diversity of interests and political affiliations, represented by actors at various levels.*" It is not surprising, therefore, the German wind sector attracted a high level of acceptance and support from the public.

6.4.2.3 Certainty for industry

The stability of any policy instrument is essential in promoting a healthy renewable energy market and in developing domestic turbine manufacturing industry. This is typical of the German renewable industry. The German FIT has been regarded as a very stable and certain instrument for promoting wind power (Toke and Lauber 2007) because it offers a very high level of investment certainty. It has been in existence for over fifteen years and guarantees a return on investment, due to the 15-20 year period support it offers. del Rio and Gual (2007: 997) noted that:

> "*The FIT provides a high level of security for (risk-averse) investors, by guaranteeing revenue stability to high initial capital investments especially in short to medium term*".

Before embarking on a project, investors would usually assess the feasibility of the project and investment risks. To date, investment risks of renewable energy sources are still high compared to the non renewables/conventional energy sources, thus a renewable energy project cannot be left without adequate support to promote investment growth. Hence, the FIT is guaranteed for fifteen years or more and avoids unnecessary price fluctuations that destroy investors' confidence.

Furthermore, the FIT is also a political tool, used as a means of achieving technological and industrial development. Evidence from the interviews reveals that the result of the political stability of the FIT is evident in the robust manufacturing industry that has emerged in recent years. With a stable market condition, the turbine manufacturing industry is able to invest in turbine development through R&D finance, thus improving the efficiency of existing wind turbine capacity. It is not surprising then that German made wind turbines and component parts are sold all over the world and rank among the world market leaders in this regard. This is not the case with Belgium, Italy, and UK that implement the market based system (Lund 2009; Verbruggen 2009; Wang 2006; Farinelli 2004). Similarly, with the controlled risk level, small or local private investors are assured of investment certainty, especially when two or more people combine resources to own a share in wind power projects. This also provides an explanation as to why there are many small-medium and large scale players in the German wind power market. The investors are clear of the insecurity of the level of financial support they receive from the FIT and investors can calculate exactly how much the power station will pay them for kWh supplied. Investors know precisely what they will receive over a period of fifteen to twenty years and can base their estimate on the tariff to calculate what the return on investment would be for the future. Another interesting fact is that the FIT offers different levels of payments for windy and less windy sites. However, this is not to say there are no investment risks associated with the FIT, however, the risks are much lower and negligible.

The RES Act (BMU 2004b) has now been amended and changes made as regards some key elements relating to wind power tariffs, but that notwithstanding, there is no evidence yet if these changes will affect investors' confidence, as the fundamental principle of the FIT is still preserved. The Renewable Energy Act which established the FIT was reviewed and signed into law in June 2008 (WWEA 2008).

6.4.2.4 Effectiveness

Simj (2002) observed that the FIT is very effective in promoting the renewable energy generated electricity system in countries like Germany, Spain, and formerly in Denmark. The renewable energy industry in these countries relies largely on tariffs set by the authority as well as production cost, administrative procedures and natural conditions. More specifically, the German FIT has been generally considered as being very effective in the delivery of a record level of wind installed capacity. This is further confirmed in the EU Commission Report (EU 2005a). When asked about the effectiveness of the FIT in delivering a politically fixed target, the respondents interviewed argued in the favour of the FIT and claimed that the FIT will undoubtedly meet the 12.5% politically fixed target. From the interviews, evidence reveals that there is a strong positive correlation between wind power installed capacity and the German national renewable energy target. One of the respondents claimed that in 2006, the share of renewable energy generated electricity to the national consumption or demand was 10.2%. Therefore, it was expected that at the end of 2007 Germany would have reached its 12.5% target. Evidence also reveals that out of this 10%, 4-5% account for the contribution from wind power. Thus, when the national target is finally reached, it is expected that half of the generated capacity will come from wind power. This is also consistent with the findings of Bechberger and Reiche (2004) and BMU (2007a, 2006a, 2003) that wind power plays a principal role in reaching the German national target. As pointed out earlier, the FIT has been very instrumental in the German wind power record achievements. It is therefore not misleading to say that Germany is committed to reaching its 12.5% target and exceeding it by 2010 and interestingly wind power will play a significant role in making this a reality. According to the EU (2005a) assessment, Germany is one of the few countries likely to achieve their target. Thus, in terms of effectiveness, the FIT has been a great success especially where wind power is concerned.

All the respondents interviewed pointed out that renewable energy [wind power] installed capacity growth has exceeded expectations. No doubt, if the FIT continues to reward investments, the growth rate in Germany will continue and reaching targets will not be problem. Evidence from the Ministry of Environment confirmed this. According to the Ministry, 11% of the 12.5% target has already been reached and the remaining 1.5% target will be achieved by the end of 2008, well ahead of time. The excess would be used to build a foundation for the 2020 target. A renewable energy policy officer who was interviewed confirmed:

> *"We had about 4-5% in the end of the 1990s…and at the end of 2006 have reached close to 11%, so compared to records from previous years it is a success and as long as we have the RES Act running, we will have 12.5% in 2008, so we will actually reach the target. Looking further to 2020, if the installations each year will stay as it is right now we may have little less in the wind industry for some year... we will come to 20-25% in 2020 and the official goal of the German government is at least 20% in 2020..."* (Interview undertaken: 30th October 2006)

According to EWEA (2007b), and GWEC (2007) reports, Germany ranked number one in Europe in terms of wind power installed capacity and for the past five years the country has remained the world leader in terms of wind technology development and market. By the end of 2006, Germany wind power installed capacity stood at 20,622MW. A total of 2,231.1MW was installed in 2006, thus representing an 11.9% increase on 2005 records. Reasons provided to explain why the FIT is successful can be divided into three; first, the FIT is a stable piece of legislation and the Government has been very committed and dedicated to its operations and implementation. A senior policy officer with a research institute noted that renewables [wind power] would always need a good law and favourable framework to enable them to grow and compete with other forms of energy. This is what exactly what the FIT does for people who use the law in Germany to generate wind power electricity capacity.

Secondly, not only does it provide a stable law but also the FIT comes with clear guidelines which enhance a proper delivery system. Hence, there is always a guarantee that all energy generated will be fed into the grid. During the interviews, evidence also revealed that planning laws are not complicated, but recently regional planning laws have become very important because the potential for onshore installed capacity is slowing down. All the major good locations have already been used. The re-powering system ongoing at the moment is slower than expected. Illustrating this further, a senior policy officer with one of the government institutions said that: "*re-powering systems may sometimes be very difficult especially if the regional state level planning laws do not allow the plant to grow bigger….this may be a potential barrier to further growth."* (Interview undertaken: 30th October 2006). Notwithstanding, respondents claimed that the financing structure of the FIT is very good. The FIT has a low risk exposure which paves the way for a dynamic and strong wind turbine and component parts manufacturing.

Thirdly, the German wind power market and framework is characterised as that which creates an enabling investment environment for all willing investors. A great deal of money is being invested into R&D, which to-date helps promote wind turbine technology development, making re-powering possible and furthermore, easing wind power generation problems.

Experience from the above analysis has shown that the relationship between institutional actors has been very useful as well as the generous FIT. Having a very favourable policy instrument in place for promoting wind power in Germany has helped achieved both the economic and technological development of wind power. As shown through the interviews, the record level wind installed capacity delivered in Germany has been brought about by: (i) industrialised companies that can produce wind power turbines with available infrastructure (ii) people with an open mind who are willing to put their little resources together to start investment into wind power and; (iii) a good finance structure built on low investment market risk. Thus, Germany has been earmarked as one of the few EU member states that will reach and possibly exceed the 2010 target. Notwithstanding the current situation of re-powering onshore wind projects in Germany, the German FIT system has delivered the fastest development of wind power installed capacity in Europe so far.

6.4.2.5 Efficiency

It is usually argued that the FIT is less efficient because it is not a market based system. This has largely been contested in recent studies (Butler and Neuhoff 2008, 2004; Elliot 2007, 2005; Toke 2007a, 2007b; BMU 2006a; Jacobsson and Lauber 2006; Szarka and Blühdorn 2006; Fouquet *et al* 2005; Grotz and Bischof 2005; Hvelplund 2005; Lauber 2005; Sawin 2004; Menanteau *et al* 2003). According to the EU report (2005a), the FIT currently offers less support than any other system operating in other EU countries.

Evidence from the interviews reveals that wind power tariffs in Germany are not as high as heralded by its critics, but just above the level to stimulate the market. Over time, the FIT leads to lower prices over a fixed period of 20 years. As pointed out by Sawin (2004) this is long enough to bring renewables through the learning curve/developmental stage. Thus, with national investments and a growing wind turbine manufacturing industry, cost can be reduced over time. The BWE report (2005:2) claimed that the payments for new turbines in 2005, for example in Germany, amounted to 8.53 euro cents/kwh (Grotz and Bischof 2005). The price offered by the FIT for wind power generated capacity is lower than in other systems. Hence, in terms of static efficiency, the regular adjustment to the FIT, in relation to how renewable technology matures, makes the law efficient. In terms of dynamic efficiency, the FIT law cuts down cost through the economic of scale brought to the turbine and component parts manufacturing industry. Project developers also benefit from this and as such can compete in the market by offering lower prices.

Evidence from the interviews also reveals that due to the degression of the tariffs, the payment would usually decrease, and over the years, depending on the site quality the base rate offered would usually decrease as well. Szarka and Blühdorn (2006) found that the payments to new wind farms reduced to 8.7eurocents/kwh for an initial period, and fell to a base rate of 5.5eurocents/kwh. During the interviews, evidence suggested that the respondents were more in support of the EU (2005a) findings. The EU Commission at the end of 2005 assessed the renewable policy instruments within the Member States. In the field of wind power one of the conclusions made was that the FIT is the most effective system, due to the way they initiated the developed wind power installations in the EU. On the other hand, it is the most cost effective way to promote wind power compared to other generation costs and schemes promoted for example, in the UK. In comparison with some specific technologies, i.e. onshore wind power, the respondents also argued that the

FIT is cost effective, cheaper and more efficient than the British or Italian system, which they regarded as being more expensive. This is also consistent with the findings of Toke (2006), Szarka and Blühdorn (2006), and Fouquet *et al* (2005). In addition there is also degression from the FIT. The FIT decreases by 2% (BMU 2007b) every year, thus one of the policy directors with a wind power association claimed that the degression allows onshore wind developers to use more developed and advanced technologies, hence promoting R&D and innovation.

Furthermore, the FIT is stable, it does not fluctuate and it also comes with low potential risk. Prices fixed for renewables are not determined by taking marginal costs from the most expensive technology. They are just above the level that promotes the market. The FIT also offers different prices for different technologies, thus helping each renewable technology to pass through the learning curve faster rather than slowly. Illustrating further, a senior policy officer with a government institution said that:

> "*The FIT is efficient because it promotes RES vis-à-vis wind power, it is not only a question of been cheap, and the costs that are proved with the FIT are good for a take off of projects.'* (Interview undertaken: 10th November 2006)

To date, the share of wind power of the total electricity generation in Germany is 4.34% (IEA Wind 2007). This shows that the FIT is very cost efficient in terms of bringing wind power into the market, and to a large extent provides a market price that is much cheaper than any other system. Mitchell *et al* (2006) also claimed that the FIT is better in balancing prices, risks, and volumes generated. This is also consistent with EREF (2005) report that the FIT shows that an established minimum price system does not guarantee higher prices than other systems. The price for

German wind installed capacity is about €89/Mwh for the first five years and €61 from year six to twenty.

Contrary to the views of this research and others (Toke 2007a, 2007b, 2006; Elliot 2007, 2005a; Szarka and Blühdorn 2006; Mitchell *et al* 2006; Fouquet *et al* 2005; del Rio 2004; Menanteau *et al* 2003), the FIT has been criticised for charging different prices for different renewable energy technologies, but critics fail to understand that renewable energy are near market technologies that need different levels of support. For example, solar PV, wave and tidal energies are still emerging and need to be supported for them to achieve the onshore wind record. Wind power is advanced and able to compete on a commercial basis with other non renewables. The cost of generating wind electricity in Germany is much lower than many other Member States.

In summary, the FIT has proved to be a good system in the delivery of wind power generated capacity at a low cost to consumers and it is very efficient in reducing production costs, risks and investment costs over time, through its 'degression principle'. For wind power, upon which this study is centred, it also provides a competitive price compared to other systems.

6.4.2.6 Market conformity

One major criticism about the FIT is that it could cause distortions in a free and competitive market; hence it is regarded as not being compatible with a liberalised electricity market (del Rio and Gual 2007; Sijm 2002). Bower *et al* (2001) noted that German electricity market was liberalised in 1998 by the Federal Energy Law EnWG

1998. Muller *et al* (2007), and Bower *et al* (2001) report that the German liberalisation programme was in accordance with the EU Directive on electricity markets, and its aim was to bring down the consumer prices in order to increase efficiency and to allow consumers to have the privilege of choosing their own suppliers. However, there seems to be an institutional conflict between the utilities and proponents of the FIT in this regard. One key conflicting issue is that the FIT does not offer a competitive price between the wind power/renewable energy generators. The FIT tends to charge different prices for each renewable energy technology, depending on the level of their development. Secondly, the FIT is only available for domestic generators and does not include imports from outside Germany. This in itself may conflict with EU laws.

Furthermore, the FIT achieved a percentage of the market by defining a niche (renewable energy generated electricity) outside the competitive pricing market. Though evidence from the interviews reveals that this is not a problem at the moment, but could be an issue of concern in the near future when Germany meets the 2020 renewable energy electricity target. After this period it is expected that a significant amount of renewable energy capacity will be fed into the grid. When this occurs respondents claimed the FIT would have to be amended to make it more flexible before feeding generated capacities into the grid.

Arising from the above, therefore, one key question that comes to mind is whether the FIT is compatible to the national and EU legal provision? In answering this question it is important to note that green electricity is still increasing to a point of maturity and needs incentives to be able to compete in the market. Without policy instruments, renewable energy source technology will be too expensive and unaffordable. Though there have been one or two legal cases against the FIT in the past at EU level, the respondents claimed that it has not yet been proved in Germany that the FIT distorts market conditions. Comparing the electricity market in Germany with other EU Member States shows that conventional energy in Europe still has a lot of market distortions, e.g. in France EDF is the main supplier of electricity, consumers cannot freely choose an energy supplier to buy their electricity from. In Germany there are four large utility companies which control German territories. It is against this backdrop that the FIT cannot be criticised as being incompatible with the German legal and regulatory provisions. However, because the utility companies are not in favour of the FIT, they rejected the notion that the FIT is compatible with the liberalised market system preferred by the EU (BMU 2003).

The argument presented in support of this is that by 2020 about 20% of the electricity shares will be taken off the market when the renewable electricity (RES-E) target is reached in Germany. The electricity grid operators have no power to bargain or negotiate prices with the renewable electricity generators. Grid operators are mandated to take the electricity from the generators at a fixed price, thus forcing them to pay for them, whether there is need for electricity or not. Illustrating this further, a senior policy manager with the VDEW said that:

> *"Our main criticism of the system is that we feel it is not suitable to the internal market. It is not logical because the power producer gets his money for each kWh which he feeds in, he does not care about when the feed-in is done or whether there is a customer. The idea of a liberalised market is that each supplier has to find a customer or otherwise each customer has to find a supplier so in each second and hour, the supplier in the whole system has to be exactly the same as the consumption.........we have already reached in Germany where the wind power feed in is higher than other consumption and this at the moment causes a lot of work and a lot of power to*

> *equalise this and on a longer term this can't fit together with the internal market."* (Interview undertaken: 2nd November 2006).

Earlier on, in the 1990s, PreussenElektra and RWE (two German utilities) had opposed the implementation of the 1991 feed-in law. The reason for this opposition, as pointed out by Szarka (2007:33), was down to two reasons: first the financial burden of paying state-imposed minimum prices for generation from renewable sources, particularly for firms having high levels of wind generation in their grid. Secondly, existing generators were losing their market share to new entrants. In March 2001, the case of PreussenElektra VS Schleswag, was referred by referred by the German court of first instance to the European Court of Justice (ECJ). This case centred on whether the obligation on suppliers to buy renewable energy resulted in fixed prices being higher than the real economic value of that type of electricity constituted under State aid (Armenteros and Lefevere 2001). Ruling, the ECJ decided that the provision of the FIT law was compatible with the EC regulations based on Article 87(1) EC Treaty[45]. Referring to the ECJ's decision, Szarka (2007), and Armenteros and Lefevere (2001) noted that the ECJ reasoned that only advantages granted directly, or indirectly, through State resources occurred under the scope of Article 87(1) thus, the court rejected the claim that the FIT law does not conform to EC treaty (Klinski 2005). Further, (Szarka 2007: 33) noted that the ECJ decided that the FIT law *"was justified on environmental grounds by the virtue the EC's legislation and the international treaties to reduce GHG emissions, making reference to the 1992 United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol"*.

[45] Any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods is, in as far as it affects trade between Member States, incompatible with the common market.

The renewable electricity directive 2001/77/EC also allowed and gave the Member States the opportunity to choose the mechanism that best suits the market system of each Member State. Therefore, in this context the FIT is completely compatible with the German and the EU legal provisions.

6.4.2.7 Finance

The nature and framework of the FIT helps to create trust and confidence amongst investors. The FIT is valid for at least fifteen years, thus removing insecurity and uncertainty in the market place.

With the absence of market uncertainties, financial institutions are more willing to lend and finance wind power projects. The guarantee of return on investment also makes risk avoidable. Equally, investment risks are averted while producers are able to calculate total income earnings of a turbine. Hence, the FIT is considered to be highly dependable and very rewarding. It is also characterised as a market with a relatively manageable investment risks. Banks are willing to finance projects because of the absolute certainty of return on investment and the lower risk margin than in any other non FIT system. Also, as pointed out by Sawin (2004), banks in Germany even go a long way to lobby for the continuation of the FIT in Germany. According to the author, companies are also willing to invest in wind power technology and train their staff because of the financial security they enjoy. This explains the reason why it is easy to realise and operate wind farm projects of various sizes in Germany. Illustrating this further a Manager with one of the German wind energy agencies said that:

> *"If you want to finance a project, the investors will have to be confident over a period of time, so the FIT provides this, and*

> *investors usually can calculate using the speed of the wind and the viability of the project, and then it lot easier to get finance with the guaranteed premium for 20 years period."* (Interview undertaken: 10th November 2006)

It is not surprising then that the ownership structure of wind power projects and investment are completely different from that of the UK. Investment in wind power is highly favoured by local farmers and landowners. Thus, there seems to be little resistance to the deployment of wind power. Szarka (2007) noted that the actions of anti-wind power groups are not as pronounced in Germany as in the UK.

Evidence from the interviews reveals that small wind power companies account for a 60-70% share of the German wind power market. The FIT is generally regarded as a fair system that does not require the assistance of big companies to operate. It is a perfect system for farmers to operate and manage without any problem, since most of the farmers are land owners they can decide on what to do with their land. With low maintenance costs, farmers can maintain the wind farm throughout the life time of the turbines. Findings from the interviews reveal that it is a lot easier for farmers to obtain credit from finance houses. Banks are guaranteed of long term security and investments enabling them to recoup their funds. Furthermore, the farmers or local investors are also guaranteed a regular income and profit at the end of the project's life span. With the guaranteed cash flow, it is very easy to obtain a loan for investment into wind power, hence farmers do not need much collateral unlike the UK scheme.

To summarise this discussion, the FIT favours small and large scale actors, hence it is not risky to invest with the FIT. However, from the large players' point of view, the offshore wind investments demand finance, which may ultimately eliminate small investors. Of course in Germany this is still relatively very slow at the moment because of the huge uncertainties surrounding offshore investment. During the interviews, evidence revealed that the FIT is not the only factor that determines how successful a project would be, however, investors need to be careful when selecting a site for wind parks. Finance institutions are still very careful in this regard, the fact that the FIT is guaranteed for long term investments is not the final guarantee of securing funds from the banks, projects also need to be carefully selected and properly designed. It is not surprising then that most of the wind farms are located in the north Lander of Germany where local conditions are most favourable. Finally, following the historical path of the deployment of wind power in Germany, it can be concluded that FIT creates the opportunity for institutional and economic development through the support the wind power industry received from financial institutions. This support however is also very rewarding as banks tend to benefit and profit from investments embarked upon.

6.4.2.8 Impact on development

The FIT has been an important tool in the development of onshore wind power in Germany. Without the policy instrument, it would have been almost impossible for Germany to attain its current height and position in the world. Although the FIT has been criticised for being inefficient in promoting other sources of renewables, respondents during the interviews claimed that the FIT - as well as the public acceptance factor - has also helped to deliver 100% wind capacity in Germany to date. The FIT has undoubtedly helped to stimulate growth in the wind power market and without it the development would have been different.

To recap, by the end of 2008, the total installed capacity of wind power reached 23,903 MW representing about a 7.4% increase compared with 2007. The total electricity output from wind power also stood at 30.5Twh representing 5% of national electricity demand and total turnover was well over €7000 Billion in year 2006 (IEA Wind 2007; BMU 2007). When asked about the economic contribution of wind power to the German national economy, mixed feelings were reported. Five of the respondents from the utility companies interviewed claimed that the benefits attributed to the wind industry sector were superficial, especially in the employment figures often heralded by the supporters of the wind industry. This is contrary to the findings of Lehr *et al* (2008), and Krewitt and Nitsch (2003). The jobs created to date by the wind power industry specifically, are significant to the achievement of the German wind power industry (Blanco and Rodrigues 2009; Busgen and Durrschmidt 2009; Lehr *et al* 2008; Lipp 2007; Hillebrand *et al* 2006). Furthermore, the German wind turbine manufacturing industry is still expanding and occupies a strong position in the growing world wind market, and according to IEA Wind (2007:126) *"some of the German wind turbine manufacturers doubled their production in year 2006 with 5 MW capacity machine design in progress"*. The wind sector employs 70,000 people and this is expected to increase as soon as the plans to move offshore are perfected (BMU 2007). The findings from the interviews reveal that most of the wind industries are located in the north of Germany. Consequently, wind power industries in this region of Germany have added economic value to poor regions and, in that sense, it is difficult to deny the positive impact of the wind sector in the country. This is consistent with the findings of Krewitt and Nitsch (2003). Krewitt and Nitsch (2003) claimed that the economic benefit of implementing the FIT in Germany to promote renewables, outweighs the widely claimed cost brought to the society by the FIT.

Also important is the contribution wind power makes to the reduction of greenhouse gas emissions and achieving the German Kyoto targets. IEA Wind (2006) report shows that with 18,685 operational turbines, Germany was able to cut down 26.1 million tonnes of carbon dioxide emissions in 2006 compared to 24.6 million tonnes in year 2005.

To summarise this discussion, contrary to the views of the German utilities, the FIT has been a useful instrument in terms of (1) pushing both local and national development of wind power, (2) for industrial development and (3) for employment or job creation.

The next section discusses the lessons and outcomes of the implementation of the FIT in Germany. Arising from the analysis above, it is evident that the strengths of the FIT outweigh its potential weaknesses. However, there can not be a perfect policy instrument. A policy instrument, such as the FIT, may work well in promoting renewables in one region of the EU, while failing to do so in other regions. In other words, the success of any policy instrument is not only determined by how it is designed and implemented (Sawin 2004) but also on the industry structures, and stakeholder groups at play in the business environment of the Member States.

6.5 POLICY LESSONS AND OUTCOMES

From the analysis above, a few policy lessons can be learnt from the implementation of the FIT in Germany. First, the historical path of the deployment of wind power in Germany created a strong institutional relationship between various actors in the wind power industry. This relationship has created economic and institutional benefits that have expanded the installed wind capacity of Germany because of the bottom-up approach to the development of wind power. Wind power policy is characterised as effective and efficient. With a robust planning system, administrative and application processes are streamlined, thus paving way for a credible and enforceable policy instrument. Furthermore, the past two decades have witnessed a very stable policy instrument that guarantee access to grid and covers cost to a level that investment into wind power is profitable. An important lesson learnt is the market opportunity for renewable energy brought about with the implementation of the FIT. Overall, this has helped to encourage investor confidence thus, Germany has witnessed broad participation of stakeholders in policy design and implementation. Experiences with the FIT also demonstrate how renewable energy policy implementation can be linked with four core objectives: security of energy supply, environmental protection, economic and technology development. This is consistent with the claims of Szarka (2007) that the FIT provides a linking ground for energy policy, industrial policy, and environmental policy. According to BMU (2007), wind power installed capacity supplies over 5% of the total electricity demand. With this, Germany has also achieved significant reduction in CO_2 emissions. Similarly, with a favourable investment environment, wind turbine and component part manufacturers have seized the opportunity to develop through technological learning and improvement in the design of more efficient turbines and component parts (Mendonca 2007). Linking this to the FIT, Lipp (2007), also pointed out that it is the success of the FIT that carried Germany to its current lead position, and has allowed it to survive three changes in government.

Another lesson learnt from the experiences of the FIT is that a policy instrument can be flexible without reducing investors' confidence. The flexibility of the FIT demonstrates how a policy instrument can be used to provide support which enables renewable energy technologies to develop. This also demonstrates that a transparent policy instrument brings together the suppliers and consumers of renewable energy. The large companies do not preside over the smaller ones, entry and exit is possible without restrictions. Mendonca (2007) pointed out that the FIT facilitates enforcement, maximises confidence in policies, and helps ensure that the mechanisms are open and fair. Szarka (2007) also noted that the FIT creates a balance of power between the utility companies, because of the low investment risks offered by the FIT. Hence the FIT is open to all levels of investment and creates the opportunity for broad participation.

6.6 CONCLUSION

Energy policies aimed at addressing the problems of the security of energy supply and climate change began in the 1970s, with federal government R&D programmes. A significant move towards the achievement of these goals was further encouraged by the introduction at the beginning in the 1990s, of the feed-in tariff system. Since then, the FIT has been in place and has undoubtedly helped in the delivery of huge installed wind power capacity.

To date, Germany remains the world leader in terms of onshore wind capacity. From the analysis provided in this Chapter, the FIT has been relatively effective and efficient in the delivery of low cost onshore wind power. When compared to other policy instruments investigated in this thesis, the FIT appears cheaper than the RO and almost on a par with the Dutch MEP.

The FIT also gives investors confidence and is an excellent mechanism for guaranteeing a return on investment. Furthermore, it does not put barriers between renewable technologies and large or small investors. It is not surprising then, that the German wind power sector is made up of mainly small scale generators and local ownership schemes. Though a greater percentage of the success rate of the wind power industry is delivered by the FIT, other factors also play important roles. These include wide stakeholders' involvement and support, a very good regulatory and market environment, stability, and the willingness of financial institutions to lend investors money. All these explain the reason for the success of the FIT. To this end, Germany has been named as one of the EU Member States that would reach and surpass its 12.5% renewable electricity target by 2010.

However, until recently when things began to change, obtaining planning permission was fast and simple. This explains the reason why the FIT, in eighteen years of its operation, has delivered over 20,000MW wind installed capacity. A Regime for the re-powering of older wind turbines is currently in place, but the process is slower than expected, thus the rate of expansion has declined. As yet, it is not clear what the offshore plans of the German government would be. Overall, this Chapter concludes that the FIT has performed very well and has achieved a significant record level of wind installed capacity and other renewables for Germany. Thus, Germany now remains a first division member for deployed wind power capacity, alongside Spain, the U.S.A, India, and China.

CHAPTER SEVEN

COUNTRY ANALYSIS: THE NETHERLANDS

7.1 INTRODUCTION

This Chapter provides an overview of the findings and analysis of the second country case (The Netherlands) of this research. The Netherlands is a pioneering country in wind power technology, along with Denmark and Germany; yet in recent times, has not adopted a stable policy instrument for the promotion of wind power generated electricity (Agnolucci 2007a; Agterbosch *et al* 2009, 2004; Gan *et al* 2007; van Rooijen and van Wees 2006). Therefore, The Netherlands remains a second division member of deployed wind power capacity – lagging behind Denmark, Germany, Spain, and alongside countries like France, Italy, Portugal and the UK (Otitoju *et al* 2010).

Thus, the principal objective of this Chapter is twofold. First, is to critically examine the performance of the Dutch policy instrument (Electricity Generation Environmental Quality (MEP)). Secondly, is the examination of the lessons learnt from the implementation and performance of the MEP. The key focus here is to set the critique in the context of the EU harmonisation agenda, and to compare and contrast The Netherlands policy instrument with the two other Member States investigated in this study. In doing this, historical institutional theory is utilised to explore wind power implementation in The Netherlands, using three parameters as outlined in Chapter One: emergence of policy instrument; policy architecture; and the outcome of the support and implementation of policy instrument.

Renewable energy policies in The Netherlands have been very complicated and volatile. The Dutch government has experimented with so many policy instruments which have made the renewable energy market a high risk and uncertain. To date it is not yet clear what would be the next policy option for promoting renewable energy sources after the MEP was abandoned in August 2006 (Agnolucci 2007; Breukers and Wolsink 2007; Agterbosch 2006; Breukers 2006). This Chapter presents the findings arising from the field work undertaken with fifteen organisations involved in renewable energy activities in The Netherlands. Meanwhile, before presenting the findings, the next section provides an overview of The Netherlands wind power policies from 1970-2008.

7.2 THE NETHERLANDS WIND POWER POLICY: 1970-2008

Renewable energy in The Netherlands was boosted shortly after the oil crisis of the 1970s (Gan *et al* 2007; van Rooijen and van Wees 2006; Junginger *et al* 2004; Wolsink 1996). Renewed interest in wind power found its origin in the energy crisis (Wolsink 1996). To this end the Ministry of Economic Affairs published the first White Energy Paper in 1974. The aim of the paper was to highlight the need to be energy efficient and to diversify the energy options available (Kamp *et al* 2004). Renewable energy sources were viewed as alternative energy sources (Breukers 2006). The Government initiated the promotion of renewable energy through a national research programme for the development and application of wind power. Thus, the period between 1976 and 1987 witnessed the introduction of two R&D programmes (NOW I and II), where the Dutch wind turbine manufacturing industry received support for the development of different megawatt capacity turbines

(Breukers 2006). The programmes failed because of the lack of agreement between the government and the organisation of cooperating power producers (NV SEP).

With the failure of NOW I & II, the government moved to set specific targets for different technologies hence, the Integrated Wind Energy programme (IPW) was introduced in 1986 (Junginger *et al* 2004). For wind power, the government planned to have a cost-effective wind turbine on the market by 1991. To this end, the target of 100 to 150 MW installed capacity was expected to be reached by 1990 and 1000MW by 2000 (Breukers 2006; Wolsink 1996). Breukers (2006) also noted that the Dutch government made €60 million and other investment subsidies available for each installed kW equivalent to €300/kW in 1986 and 1987. However, the IPW was not successful and did not meet these targets. Two or more reasons accounted for this. First was as a result of the failure of NOW I & II. The failure of both programmes paved way for the support of small scale wind turbine manufacturing which could not meet the requirement of achieving government set targets. Secondly, the manufacturers of wind turbine also faced pressures from the market. Breukers (2006) pointed out that instead of going through the learning process (see also: Kamp *et al* 2010, 2007); manufacturers relied on the research institutes knowledge. Rather than producing turbines that worked, manufacturers had to change their practices to follow recommendations from research institutes in order to make them cost-effective (Kamp *et al* 2004). Consequently, the Dutch wind turbine manufacturing industry failed and remained small and could not compete internationally with others, hence most of the turbine manufacturers lost the opportunity to grow and did not survive the 1990s. Lastly, as wind power became more popular, local opposition increased. Finding sites for building wind turbine became very difficult (Breukers and Wolsink 2007).

In place of the unsuccessful IPW, the Dutch government adopted the Wind Energy Application programme (TWIN I & II). TWIN I focussed on the development of commercial turbines through subsidies on wind turbine rotors. Wind turbine manufactures were awarded grants to encourage the production of large wind turbines. This programme also failed because the domestic wind turbines did not have an advantage over the imported ones. Again the Dutch turbines could not compete with their foreign counterparts (Wolsink 1996; Breukers 2006). As a corrective measure the TWIN II R&D programme was adopted. The programme was aimed at promoting better relationships between turbine manufacturers and research institutes. This aim was partly achieved, but Breukers (2006) revealed that it was too late to salvage the Dutch wind turbine industry at this time, and most of most of the manufacturers went bankrupt in subsequent years.

Following on from this, the Environmental Action Plan (MAP I-III) covenants were adopted from 1991-2001. The aim of the MAP was: (i) to cut down the CO_2 emission (Keijzers 2002), and (ii) to help diversify the fuel supply system by reducing the dependency on fossil fuel through the deployment of renewable sources (IEA 2007, 2004; Dinica 2006; Junginger *et al* 2004; Koster 1998; Kwant 2003; IEA Wind 2000). The government signed a covenant in 1990 with the energy industry to comply with its CO_2 emission reduction targets (Agterbosch *et al* 2004). As a result, the MAP provided a series of measures for energy savings and conservation, and for the introduction of renewable energy sources (do Valle Costa *et al* 2008). Thus, van Rooijen and van Wees (2006) pointed out that the introduction of the MAP obliged energy distributors to commit to the voluntary sales target of 3.2 per cent of renewable electricity, 0.7% of gas, and a 2.7 Mtons CO_2 reduction of emissions by 2000. This was a further incentive for the Dutch wind power sector to grow. Consumers paid the environmental levy while, energy distributors and generators applied for the money to support the generation of renewables (Agterbosch *et al* 2004). The institutional and social conditions were in favour of the energy distributors as long as they were able to comply with the CO_2 reduction target (Agterbosch *et al* 2004). Before long, the opportunity to develop the Dutch wind power sector was lost when the distributors dominated the market and it later became unclear how the MAP funds were managed. Hence, the MAP was withdrawn and voluntary targets were not achieved (Breukers 2006; van Rooijen and van Wees 2006). The failure of the MAP saw the end to the subsidy era and the introduction of the fiscal system or the creation of green funds (Junginger *et al* 2004). The first among the fiscal schemes, introduced by the Dutch government, was the Accelerated Depreciation Scheme on Environmental Investments (VAMIL). This scheme, offered companies the option of an accelerated depreciation of environmentally friendly equipment, like wind turbines, from 1996-2003 (Breukers 2006). Thus, VAMIL served as an opportunity for companies to reduce production costs.

The second fiscal scheme was the Investment Reduction Scheme (EIA) which offered tax credits on renewable energy technologies and made it possible for companies investing into renewables to reduce their taxable profit. Breukers (2006) pointed out that the EIA excluded the non-profit organisations, as such, the Energy

Investment Regulation for the non-profit and special sectors (EINP) was introduced to provide subsidies on investment costs for projects owned by cooperatives which were exempt from the EIA (Agterbosch *et al* 2004; Dinica and Arentsen 2003).

Following the introduction of the EINP three fundamental institutional changes came about during the period 1998-2002 (Agterbosch *et al* 2004). The first of these three changes was the Regulatory Energy Tax (REB/ecotax) introduced in 1996. Households and small-medium sized enterprises were required to pay an environmental energy tax on electricity, generated on both conventional and renewables electricity. The REB/ecotax is divided into two: (i) REB 36o- a payment made by electricity consumers to support green energy producers; and (ii) REB 36i- a tax exemption for green energy purchases (Breukers and Wolsink 2007; Breukers 2006; Agterbosch *et al* 2004).

The second fundamental change, as pointed out by Agterbosch *et al* (2004), was the liberalisation process which began in 1998. This led to the third change in July 2001 when green electricity market was fully liberalised. Customers, irrespective of the rate or value of the electricity consumed, could choose their energy provider, hence making it possible to match energy policy and liberalisation of the electricity market. The goal of matching both markets was again to stimulate the domestic market and the production of green electricity and also to cut down on the costs for both the producers and consumers respectively (do Valle Costa *et al* 2008; Gan *et al* 2007; Dinica and Arentsen 2003). This led to two results; (i) independent wind power developers had the opportunity to deploy more wind capacity (Breukers 2006); (ii) the disintegration of the monopoly powers of energy distributors.

Producers are free to sell to the highest bidder in the market, rather than being restricted to local distributors (Agterbosch *et al* 2004). However, with the complexity of the Dutch planning system and the increasing difficulty in finding suitable sites for wind power, due to the local resistance faced by developers, the REB did not add much value to the Dutch wind installed capacity. Rather, it profited from imports from outside The Netherlands. do Valle Costa *et al* (2008:74) noted that: "*there was a flow of the ecotax to foreign markets which does not reflect additional investment in the capacity in renewable energy in the countries of origin, as such it was not capable of ensuring security for investors domestically who had to compete with low costs of imported energy*". The REB was also not stable in terms of the prices it offered, it changed annually and as such, its credibility was affected (Breukers and Wolsink 2007). Therefore, due to the inherent problems of the ecotax (Reijnders 2002), the Ministry of Economic Affairs in its 2002 Energy Report called for the amendment of the 1988 Electricity law. As a result, a new policy instrument was introduced by the Dutch Government in 2003 called the 'Environmental Quality of Electricity Production' (MEP). This is a form of feed-in tariff available for domestic renewable energy generators, and it was meant to reduce investment risks and to improve the cost effectiveness of renewable electricity. This is facilitated through a feed-in tariff, combined with ecotax exemption (do Valle Costa *et al* 2008; Gan *et al* 2007; van Rooijen and van Wees 2007; Junginger *et al* 2004; Kwant 2003). The MEP subsidy was fixed for a period of ten years and is available and applicable to only renewable electricity produced in The Netherlands. It was financed by an annual €34 levy on electricity connections of every household (do Valle Costa *et al* 2008; Gan *et al* 2007; Breukers 2006; van

Rooijen and van Wees 2006). Table 7.1, therefore, shows the breakdown of the Dutch policy discussed above, during the period 1975 – 2008.

Table 7.1: Overview of the Dutch Wind Power Policies 1975-2008

Policies and Programmes		Period	Focus
National Research Programme Wind Energy	**NOW 1**	1976-1981	R&D&D Large scale applications
National Research Programme Wind Energy	**NOW2**	1982-1887	R&D&D Large scale applications
Integrated Programme Wind Energy	**IPW**	1986-1990	Development of commercial turbines, Large scale application, Subsidy on the rotor area
Application Wind Energy in The Netherlands Programme **Decision Subsidy Wind Energy (BSW): (until 1996)**	**TWIN I**	1991-1994	Development of commercial turbines, Large scale application, Subsidy on the rotor area
Application Wind Energy in The Netherlands Programme	**TWIN II**	1996-2000	National R&D plan (NRW) Investment subsidy for demonstration Price-performance relationship of turbines Market creation
Environmental Action Plans-related to first National Environmental Policy (NMP)	**MAP I-III**	1991-2001	Investment and production subsidies- managed by distributors Green label system
Accelerated Depreciation Scheme on Environmental Investments	**VAMIL**	1996/97	Fiscal incentive for investments
Green Funding		1996	Lowest interest rates for loans
Green Investment Reduction Scheme	**EIA**	1997	Fiscal incentive for investments
Energy Investment Regulation for the Non-Profit and Special Sectors	**EINP**	1998	Fiscal incentive for investments
CO_2 reduction plan		1997	Investment subsidy
Ecotax		1996	Tax on electricity and energy consumption
REB360		1996	Option to provide production subsidy
REB 36i-Ecotax exemption		1997	Exemption for buyers of renewable electricity
Environmental Quality of Electricity	**MEP**	2002-2006	Feed-in tariff with Utility companies mandated to feed into the grid all generated electricity at a fixed premium price.

Source: (Breukers 2006)

7.3 EVALUATION FRAMEWORK

The evaluation framework applied in examining the performance of The Netherlands support scheme (MEP) was reviewed in detail in Chapter Four.

Considerable time was taken by the researcher to understand the role of the government, renewable energy associations, and Environmental NGOs in the implementation of the MEP before embarking on the careful selection of the respondents. Hence the Ministry of Economic Affairs plays a predominant role in the Dutch's choice of policy instruments for renewable energy sources.

The role of other stakeholders is minimal and in some cases they are only consulted years after the policy has been decided. Notwithstanding, organisations that have stakes and contribute in one way or another to the renewable energy market were identified and selected for interview. Due to the importance of the data, the researcher also took considerable time to contact the right officers and personnel involved in the renewable energy policy for each organisation, hence fifteen out of the sixteen respondents interviewed were well informed about the policy instrument (MEP) implemented in The Netherlands. For the researcher, it ensured the accuracy, reliability and validity of the data collected. Of the seventeen organisations selected, sixteen were very willing to be interviewed, while two of the organisations eventually backed out and refused to respond to emails and telephone calls. The interview schedule was constructed from the framework discussed in Chapter Four. This allowed the researcher a little flexibility. Thus, all the interviews were semi-structured, each lasting an average of forty-five minutes. The in-depth semi structured interview afforded the researcher the opportunity of obtaining very rich data and a broad sense of the policy instrument. Detailed analysis of the MEP's operation and performance is presented in the next section of this Chapter, while a detailed comparison of the MEP and other policy instruments investigated in this thesis is presented in Chapter Nine.

7.4 RESEARCH FINDINGS AND DISCUSSION

7.4.1 The Principal Market Drivers for Promoting Wind Power in The Netherlands

According to Kwant (2003), renewable energy policies are driven by the well-organised need for a sustained society. Over the years this has served as an important driver to the deployment of wind power in The Netherlands. Unfortunately, in recent times no policy instrument or market driver exists for the promotion of wind power and other renewables in The Netherlands.

The MEP which served as the principal market driver in the past (2003-2006) was withdrawn by the Government. Evidence from the interviews revealed that the Government, through the Ministry of Economic Affairs, is working in collaboration with the stakeholders on implementing a new policy instrument. As mentioned earlier, the MEP was similar to Germany's FIT and during its lifetime helped to bring forward the development of significant wind power installations in The Netherlands.

Apart from the legislative instrument market driver, The Netherlands have the additional goal of reaching 9% of renewable energy sources electricity by 2010 and an overall or general renewable energy capacity of 10% in 2020. Findings from the interviews reveal that these goals have not been written into an act or bill. They are Government policy goals written in the form of a policy document and are reviewed annually in the energy papers published by the Government institution concerned. In a broader sense, there are three key issues responsible for driving renewable energy vis-à-vis wind power market in The Netherlands, namely: security of energy supply; environmental protection and the threat of climate change; and low prices. This is evident in the past government policies. For example, the REB eco-tax was aimed at stimulating the market by encouraging investment into energy. It offered an equal price for both renewables and non renewables regenerated electricity, hence consumers demanding green electricity were willing to pay for it. Consequently, Agterbosch *et al* (2004) noted that the institutional and social conditions were favourable for the energy distributors who took the advantage to boost the total capacity installed in renewables. It is not surprising that the energy distributors and utilities were able to diversify their portfolio and include all forms of energy. It also proved to the consumers that the utility and energy distributors are environmentally friendly and aware of the threat of global warming, especially with regards to the Kyoto Protocol and the EU carbon di-oxide emission reduction. Hence, the need to comply with Government regulations, expand the market share while at the same time providing consumer satisfaction are the key drivers for promoting and investing renewables in The Netherlands. Table 7.2 presents a summary of the drivers discussed in this section. The next section gives a detailed analysis of the performance of the MEP.

Table 7.2: Summary of the Dutch Wind Power Market Drivers

- The need for a well organised sustained society
- Climate change and environmental protection
- Security of energy supply and electricity/energy costs reduction
- The MEP during a three year period (2003-2006)
- The need to comply with the government regulations
- To satisfy consumers' demand for renewable electricity
- A strong consumer demand for clean electricity

Author Generated

7.4.2 Evaluation of the Performance of the MEP

7.4.2.1 Administration

Interestingly, the MEP is a form of feed-in tariff similar to the German system, but in practical terms it was costly and difficult for the Government to implement and administer. This is because the administrative and transaction costs of the MEP are very high and that was the main reason why the Government, through the Ministry of Economic Affairs, had to withdraw it. The Government's budget for renewables was always exceeded throughout the lifetime of the MEP. Like the German FIT, the MEP sets out prices for renewable energy technology. Thus, investors are aware of the wind potential of any particular site and what a single turbine can produce each year. However because the MEP was not properly designed, respondents claimed that the MEP was too successful and over stimulated the market as investors were rewarded too much and sometimes made windfall profits on their investment. For example Breukers and Wolsink (2007) noted that the remuneration period for wind power is equal to 18000 full load capacity hours over a maximum period of 10 years thus, 850 kW wind turbines are likely to reach these full load hours in just 7.6 years.

Like the German system, the MEP is easy to understand and to some extent transparent, because farmers know what they will receive for selling each kilowatt hour of wind power in the market. On the other hand, the computation and calculations from the utility point of view is where the complexity lies. Since it is expensive to maintain, the MEP scheme requires modification and as such, it is almost impracticable and very inflexible. As a way of explanation, the MEP does not allow adjustment of fixed prices. It is very difficult to make changes because in its original design no provision for this was made. This is also consistent with do Valle Costa *et al* (2008:73) findings about the Dutch wind power policy instruments:

> *"The policy for promoting RES-E in The Netherlands was developed in a complex manner. The various phase-ins and -outs of the support instruments and the confusing political context leads to uncertainties in markets, making the implementation of renewable energy projects difficult, particularly wind power."*

To summarise this discussion, it can be inferred that the MEP, in its original state, is a simple system but complex in administration. Furthermore, because it was not carefully thought through at the beginning, it did not endure. Like the previous policy instrument it was stopped abruptly by the Government, effectively, making the Dutch wind industry high risk and uncertain.

7.4.2.2 Stakeholder support/involvement

One key criticism directed against the wind power policy instruments implemented in The Netherlands is that they lack wide stakeholder support and involvement. Renewable energy actors, utilities companies, research institutes, and environmental NGOs play limited role in the development of wind power policy in The Netherlands. The Ministry of Economic Affairs remains the dominant player in deciding the choice of policy instrument, design and implementation. Gan *et al* (2007) pointed out that the renewable energy policy making process in The Netherlands is very different. Stakeholders are allowed to interfere when final decisions concerning a policy instrument have been reached. For example, a senior policy advisor interviewed in the Ministry of Economic Affairs said that:

> *"Well stakeholders were not very involved at the moment we design the MEP because it was in a rush and hurry that we have*

to implement the system, so consulting the sector was no time for it, we did it rather quickly after two years we decided to evaluate the MEP and in that process many stakeholders were asked to give comments on the MEP. The result of that evaluation was used in the redesign of the MEP in 2005. So that was a change of the electricity law and the implementation of it will be taking place in January 2007. But from the start there was no much involvement of the stakeholders but in the meantime when we did the evaluation, there was involvement and in the redesign there was a short consultation period." (Interview undertaken: 30th November 2006)

This implies that the Ministry of Economic Affairs was the 'Architect' and 'Designer' of the MEP because the responsibility was placed on the Ministry by the Dutch Government. TenneT also has sole ownership and regulation of the grid and transmission system. Evidence gathered during interviews reveals that the Government did not involve other stakeholders during the early stage of the development and design of the renewable policy instruments. They (stakeholders) were only consulted after completing the design of the MEP. A senior member with The Netherlands' Wind Energy Association said that:

"...the government do it in a very late stage when they have developed the support scheme, then they come back to the market [us] and ask if the support scheme works well or not....." (Interview undertaken: 27th September 2006).

Thus, the Dutch renewable energy market lacks a healthy relationship between the government and the investors. According to Breukers and Wolsink (2007), cooperation among stakeholders, within the wind power sector, has been troublesome. The authors pointed out that there has been lack of trust and conflicts of interest between the wind power industry actors. In addition, the Government's action did not help matters; Dinica (2002) argued that the Government did not create a good investment environment for renewables. In the past, policy instruments were introduced to achieve short-term goals, there was no avenue for stakeholders to interact and minimise institutional conflicts that could hinder investment security. Although findings reveal that most stakeholders favoured the MEP and would have wanted such a scheme for The Netherlands, the Government could not sustain it.

7.4.2.2.1 Wind power implementation and scale

As mentioned earlier, 50% of the wind power stake in The Netherlands is owned by farmers and cooperatives (Breukers and Wolsink 2007). Evidence from the interviews also revealed that the MEP encourages the smaller generating companies in the same way it does the large scale generating companies, because it offers the same rate to all investors and does not discriminate amongst investors. This is largely responsible for the current nature of wind farm holdings in The Netherlands. There are many farmers who have stakes and holdings in wind power and sometimes wind parks are constructed by consortia of energy servicing companies. Illustrating the position of small companies in the share of onshore wind farms, a policy director, with one renewable association, claimed that most of the installed capacity of wind power in The Netherlands is owned by farmers, cooperatives and the like. As a way of explanation, farmers own the land and can decide where they want to install a wind turbine. They also have the ability to convince others to pool funds and initiate a joint investment because, with the MEP scheme, it is more beneficial to invest in wind than in subsistence farming. According to Breukers and Wolsink (2007), over 50 independent companies are now involved in the development of wind power in The Netherlands. The authors pointed out that farmers have been able to network with distributors and large energy companies and obtain a good price for generated capacity. Agterbosch *et al* (2009), and Agetrbosch

(2006) also add that the contribution of environmental movements and organisations like Greenpeace, Friends of the Earth, etc. has been very important to the development of wind power in The Netherlands. However, the big energy companies have a smaller portion of the installed wind capacity. This situation may change as plans to move offshore mature.

To summarise, whatever criticism is levied against the MEP, it was a good policy instrument. Comparing the MEP to previous systems Breukers and Wolsink (2007), van Rooijen *et al* (2006), and Agterbosch (2006) contested that the MEP has helped improve wind power and other renewable energy sources' level playing field. Due to the reward it offers, local farmers were encouraged to invest in wind power and have been able to own more stakes than the energy supply and distributing companies. Compared to the past policy instruments, wind installed capacity was higher with the MEP than with others. Had it been well designed it could have been a model of success for the Dutch wind industry.

7.4.2.3 Certainty for industry

As mentioned earlier, the stability of any policy instrument is essential in promoting a healthy renewable energy market and in a developing domestic turbine manufacturing industry. This has not been the case with The Netherlands. The Dutch renewable energy market has always been characterised as unstable and not being able to attract investors and financial support (Toke *et al* 2008; Agnolucci 2008). Evidence from the interviews reveals that there has been no consistent Government support for the wind power industry. Policy instruments developed in the past have not been sustained by the Government hence, the investors have lost confidence and trust in government programmes aimed at supporting renewable energy sources. As a result, there has been a gradual loss of wind turbine manufacturing industry in The Netherlands (Kamp *et al* 2004; Agterbosch *et al* 2004). Agnolucci (2008) pointed out that the opportunities which the Dutch wind power domestic companies had in the 1990s were gradually eroded away due to the lack of policy continuity. Furthermore, because the government does not create an enabling environment to encourage investments in wind power, risks and uncertainties have increased over the years. Due to the ‘stop’ and ‘go’ nature of The Netherlands’ policy instruments, the willingness of investors to enter into the wind power business has reduced drastically and most investors would prefer to diversify their investment portfolio towards a more stable and less risky venture, rather than investing into wind power and other renewables. Currently, Netherlands has no policy instrument in place that encourages new investments into renewable energy sources. The MEP was stopped in August 2006 thus, bringing all investment in wind power to a standstill. Only projects that were built or completed before the MEP was abandoned still benefit from the MEP support. Projects built after do not qualify, thus they had to be funded by investors or would have to wait for the proposed government policy instrument. Renewable energy sources are ‘near market technologies’ and cannot currently compete with other non renewables without adequate support. This help is lacking at the moment in The Netherlands. On the other hand, the turbine manufacturing industry has no financial and technological backing to carry out R&D programmes to improve on domestically manufactured turbines. It is not surprising, therefore, that the Dutch wind power market has lost its entire wind turbine manufacturing companies to Germany, Spain, and Denmark, where there are better investment environments. Once the

Government abandon a policy, investors are not clear what the next option will be and how long the next will last, hence they are very reluctant to invest into wind power. As a result, respondents claimed existing investors have cut down on their portfolios and are looking to other markets outside The Netherlands instead. Currently, Netherlands is ranked among one of the riskier markets in Europe in terms of renewable energy. It is not clear what the new policy instrument will be like and for how long it will last. It is very important that the Government involves all the stakeholders in the design and implementation of its renewable energy policy to restore the Dutch wind power credibility.

7.4.2.4 Effectiveness

Contrary to the findings of van Rooijen and van Wees (2006) that the effectiveness of the Dutch green electricity policy, between 1996 and 2006, has generally been limited, the MEP is regarded as the most effective instrument The Netherlands has ever used to promote wind power. It is not surprising then, that all the respondents' interviewed argued in support of the effectiveness of the MEP. Netherlands is committed to reaching the 9% target of RES-E by 2010 and wind power plays a significant role in making this a reality. Evidence from the interviews reveal that the Ministry of Economic Affairs, on behalf of the Dutch Government, stopped the MEP because of the predictions that Netherlands will meet and surpass its 9% renewable electricity target by 2010. Prior to the existence of the MEP, meeting the 2010 target was unsure. Recent evidence (EU 2006a) placed Netherlands among eight other Member States that would reach the 2010 target. The Ministry of Economic Affairs claimed that the key reason why the MEP was set at zero by the Government was that the 9% goal has now been reached. In 2005, renewable energy capacity was 6% and an additional 3% was contracted or allocated in 2006. Therefore, the government decided to stop all subsidies, since the EU renewable energy electricity target has been reached. Thus, it is not misleading to claim that the MEP was one of the tools used to deliver record capacity of renewables in The Netherlands.

According to EWEA (2007b), The Netherlands is ranked 8th in terms of wind power installed capacity in Europe and was placed among the first twelve in the world to have over 1500MW wind installed capacity. By the end of 2006, Dutch wind power installed capacity stood at 1560MW. A total of 341MW was installed in same year, thus representing a 29% increase in 2005 installed capacity. No doubt, the MEP would have delivered more capacity if it had not have been stopped by the Dutch government. Respondents noted that if a similar system was implemented in The Netherlands more renewables capacity could be delivered, especially wind power. The reason being that the MEP encourages the deployment of renewables from the grassroots. Wind power generators do not have to look for buyers of generated capacity. Like the German FIT, energy suppliers and distributors are mandated by law to take all generated capacities at a fixed premium price. Also the MEP is very attractive to investors because producers are guaranteed of profit upon investment. However, Agnolucci (2007) pointed out that due to the inherent problems in the design of the MEP, there was no provision made in the rules to curb excess profit. Even though targets are met, obtaining planning permission for wind sites is still a very complex and unclear process. Planning permission is still left in the hands of few actors who exert much authority and influence in favour of self or anti-wind organisations. Breukers and Wolsink (2007) pointed out that the action of nature and other landscape protection organisations in The Netherlands are on the increase. These organisations have formed a strong network that opposes wind power deployment at various levels.

It is therefore important that the Government re-introduces a similar system like the MEP if future targets are to be reached and exceeded. With system like the MEP, many landowners and farmers can invest in wind power while still using the same land for farming. Farmers that are not capable of doing this alone can come together as cooperatives to own stakes in wind power. Nevertheless, it is important that the Government designs and implements a policy instrument that can guarantee investors' confidence. The Dutch Government should remove any uncertainty and adopt a simple, clear, and stable policy instrument that will boost investment potential in wind power.

7.4.2.5 Efficiency

The efficiency of the MEP has generated many doubts and questions. The challenge of any policy instrument is usually to improve economic efficiency and to deliver RES-E at the least possible cost. The Dutch Government, through the Ministry of Economic Affairs initiated the MEP and later withdrew it because of its 'inefficiency'. A senior policy advisor with the Ministry of Economic Affairs claimed that renewable generated capacities were over subsidised thus, the market was over stimulated. The MEP is financed through an annual levy of €34 on electricity connections to Dutch households (van Rooijen and van Wees 2006). Evidence from the interviews reveals that this annual levy alone is not sufficient to cover the subsidies and fixed premiums associated with the MEP, hence, the

Government spends huge amounts of tax payers' money to finance the excess. Respondents pointed out that the budgeted excess is always surpassed by the Government throughout the lifetime of the MEP, thus causing budget deficits. It is not misleading, to argue that the MEP is weak and not efficient in static and dynamic terms. Two or more reasons can be given to explain this. Firstly, the MEP was so rigid that the Government could not adjust prices. Secondly, because the MEP rewards investments in renewables over and above what the market could offer, it was impossible to cut down cost, hence the final consumers bear the burden of paying higher prices for generated capacity. Supporting this claim, respondents revealed that the energy distributors and generators in The Netherlands are probably happier than their counterparts in Germany because they receive more money. Comparing the Dutch prices with other EU Member States, a senior policy advisor with a Government institution, claimed that onshore wind generators receive a 0.04 eurocents plus 0.06 eurocents [0.10 eurocents] subsidy, while in Germany generators are paid an overall subsidy of 0.08 euros. Thus, investors are more comfortable in The Netherlands than in most other countries in Europe.

7.4.2.6 Market Conformity

The MEP, a similar system to the German FIT, has been criticised by some authors (van Dijk *et al* 2003; Sijm 2002; Wiser *et al* 2002) as being an instrument that distorts market competition and not being capable of creating a single liberalised electricity market. The Dutch liberalisation of green electricity began in 2001 following the EU's drive for electricity market liberalisation. This clearly marked the first move in the relaxing of the Dutch retail electricity market. The liberalisation of the green electricity market was aimed at providing incentives for consumers to buy green electricity, thus creating a level playing field for both green electricity and conventionally sourced electricity (do Valle Costa *et al* 2008; Agnolucci 2007a; Gan *et al* 2007; van Rooijen and van Wees 2006). Respondents claimed that The Netherlands rank among the forerunners of liberalisation in Europe, alongside the UK and Germany. To demonstrate this, both conventional and renewable electricity markets in The Netherlands are liberalised and there is no price difference between them. van Rooijen and van Wees (2006) pointed out that electricity companies have used the green electricity liberalisation as a tool to retain existing customers as well as attracting new ones. Interestingly, there was no legal case against the MEP throughout its lifetime. Comparing the Dutch electricity market to other EU Member States, respondents claimed that the MEP was just part of the demands to fulfil the EU obligation of promoting renewable electricity. The MEP was designed and implemented to serve as a mechanism enabling The Netherlands to deliver the RES-E target, as demanded by the EU thus, exhibiting the commitment of The Netherlands government to promote RES-E. Besides, an investor building a wind farm is doing so in order to obtain a contract for selling generated electricity to the grid operators who are mandated by the Government to buy all generated renewable electricity at a fixed price. It is against this backdrop that the MEP cannot be criticised as being incompatible with the Dutch legal and regulatory provisions.

One interesting point regarding the Dutch electricity liberalisation, is that customers are allowed to choose their buyer and they can switch from one supplier to another. This is why The Netherlands is regarded as being one of the few countries having a high customer demand for green electricity. There is also no price difference between green and conventionally sourced electricity; hence customers are not disadvantaged by opting for green electricity. From the moment green electricity prices and conventional power cost the same, Dutch consumers were motivated to purchase green electricity, showing their loyalty to maintaining a sustainable environment.

To summarise therefore, the renewable electricity directive 2001/77/EC also allowed and gave the Member States the opportunity to choose the mechanism that best suits the market system of each Member State. Therefore, in this context the MEP is completely compatible with Dutch and EU legal provisions.

7.4.2.7 Finance

The ‘stop’ and ‘go’ nature of the Dutch renewable energy policy instruments causes renewables investors concern. There is currently no notable policy instrument in The Netherlands. The MEP was the last of the policy instruments and was abandoned three years after its design and implementation. New projects are not forthcoming, because investing into renewables, without any Governmental support, is practically impossible. Furthermore, financial institutions would always want to be sure of the returns on investment before they lend or finance any project. It is not surprising then that, throughout the lifetime of the MEP it was possible to obtain finance for projects that passed through the planning permission process successfully. The MEP guarantees payment for 10 years, but the problem lies in starting up the project before the expiry of the short lived policy instrument, like the MEP. It only existed for three years and projects that could not secure the subsidy before it was stopped do not receive any Government subsidy. Planning regulations in The Netherlands make it very difficult for projects to start operating within three years. Besides, the majority of the best sites for onshore wind are saturated, therefore with a policy instrument, whose lifespan is unknown or does not usually exceed three years, it is difficult for developers to begin a project and see it go through the planning stage successfully. Furthermore, a project does not qualify for the MEP until it is up and running. Before then, there is no possibility of a guaranteed return on investment. Unfortunately, the MEP subsidy no longer exists in The Netherlands therefore, only projects which were able to pass through the planning stage and could secure the Government's approval before the deadline were eligible for the MEP subsidy over the next 10 years. Thus, the renewable energy sources market at the moment is hugely characterised by high risks and uncertainties, as such investors are not certain of what the market holds, making it difficult to obtain finance for new projects.

Evidence from the interviews reveals that the actions the Government have taken to correct this are negligible at the moment. van Rooijen and van Wees (2006), and Dinica (2002) pointed out that all the Government has been concerned about in the past is implementing policy support to ensure The Netherlands meet the EU's renewable energy target. Hence, support for renewable energy sources is more of a political issue than one of economics. One of the key reasons why the MEP was stopped was because the 9% RES-E target for 2010 had been achieved. Investors are not too clear what happens next as support in the future could also be based on meeting the EU 2020 targets. This is what discourages support from financial institutions. Investors need to be sure before committing their resources. Right now in The Netherlands, there is no policy instrument in place for the RES-E project. All new projects are on hold because it is expensive to operate a RES-E project without finance, and financial institutions are reluctant to invest in a project where there is no assurance of its survival. The bottom line here is that the Government needs to come up with a single policy instrument that will endure for 10 to 15 years, like the FIT in Germany, and the FIT Premium in Spain. There is also the need to move away from the idea of developing policies in order to meet national or EU targets, and to implement policy instruments that give the development of the RES-E market a chance.

7.4.2.8 Impact on Development

The MEP was an important policy instrument in the development of wind power in The Netherlands. The Netherlands, previously a pioneer of wind power along with other EU Member States, lost this privilege as a result of the instability of its policy instrument. Before 2003, when the MEP was introduced, the total installed capacity of wind power was less than 1000MW (IEA Wind 2002). By the end of 2008, total installed capacity reached 2225MW. With the current record, it is evident that the MEP was a very good policy instrument for stimulating the growth of wind power, and technological advancement of wind turbine capacity was very beneficial to the capacity added during the life time of the MEP (Breukers and Wolsink 2007; Breukers 2006). The MEP gave rise to record levels of installed wind capacity generated by fewer large capacity turbines than the older windmills, producing less capacity.

In terms of the contribution of the wind industry to the Dutch economy, respondents pointed out that wind installations are built mostly in rural areas and as such bring some social benefits to these areas. Findings from the interviews also reveal that many of the wind turbines are owned by 'MARSHALS' or cooperatives, made up of groups of farmers and land owners. Therefore, for the farmers who have wind farms it is a means of external or additional income.

However, The Netherlands has lost its entire turbine manufacturing companies to countries like Denmark, Germany and Spain. Thus, it is difficult to measure the impact the wind industry's has on improving employment and social benefits. Findings from the interviews also reveal that, due the collapse of wind turbine manufacturing, the wind power sector no longer has a positive effect on the employment sector as it used to do in times past. Farmers, nowadays, import turbines from abroad and only the management and servicing of the turbines are carried out by Dutch companies. Hence, it can be concluded that the Dutch wind power sector's contribution to the employment sector is minimal. In terms of its contribution to the reduction of greenhouse gas emissions and The Netherlands Kyoto targets, IEA Wind (2006) reported that The Netherlands was able to cut down 3.1 million tonnes of CO_2 emissions in 2006. This is insignificant, compared to the figures and rates achieved in Germany.

To summarise, therefore, the MEP proved to be an important tool for the development of wind power in The Netherlands and without such a good policy there would not have been as many installations as there are today in The Netherlands. Be that as it may, the MEP only existed for a short period of three years and as such, it is difficult to measure the effect it had on employment figures and other benefits associated with the Dutch wind power sector. Doubtlessly, it would have done better if the Government had allowed it to remain in place.

7.5 POLICY LESSONS AND OUTCOMES

From the above analysis, some policy lessons can be learnt from the Dutch renewable energy policies. Over the years, Dutch renewable energy policies have been characterised as being inconsistent and uncertain. Historically, The Netherlands has experimented with more policy instruments than any other EU Member States, yet The Netherlands lags behind Germany, Spain, and Denmark in terms of installed wind capacity. One key reason explaining the need for this experimentation is the lack of clarity on the part of the Government on which is the best method to increase the deployment of renewable energy sources without affecting investment certainty. No doubt changes to policy instruments are necessary, especially in the case of wind power which is more advanced than other renewables as a near market technology. However, these changes should be reasonable and should not erode the economic benefits of the renewables market. In the late 1980s and 1990s, Agnolucci (2007) noted that the Dutch renewables/wind power industry was given the opportunity to develop domestically and as such could compete with other EU Member States in turbine manufacturing. However, as a result of policy failure, the Dutch wind industry lost this promising market to Germany and Denmark. Breukers and Wolsink (2007) add that this failure created economic and institutional conditions that narrowed future options. Following the historical path of the deployment of wind power in The Netherlands, there is a very weak institutional relationship between various actors in the wind industry. A few actors in the industry tend to dominate others and exert much power and influence. For example, renewable energy policies have, in the past, been designed and implemented solely by the Ministry of Economic Affairs. Planning permission, on the other hand, has been strongly influenced by the Spatial Planning Ministry. One key error in the Dutch spatial planning law is the exclusion of wind power in planning laws. The deployment of wind power has instead been complicated and limited to very controversial sites. There is no opportunity to appeal against any planning application rejected by the authorities. However, Breukers and Wolsink (2007) argue that permitting procedures do not constitute a bottleneck for the realisation of wind power. What constitutes a major bottleneck is the institutional failure and lack of direction and political will of the Government. Unlike Germany, the Dutch Government has not been able to integrate other actors into wind power programmes. The role of Government research institutes and industry actors has been very limited. As such the role of other actors has been divergent, rather than converging, with each pursuing a separate agenda and selfish interest. This is evident through the withdrawal of the MEP. A key reason for this was because the Government assumed that the political target set by the EU had been reached, as such the Dutch renewable energy market did not need any other incentive to stimulate the market. Focus has gradually shifted from building a viable renewable energy market to merely achieving targets. Not surprising, the domestic wind turbine manufacturing industry gradually fizzled out.

With regards to the MEP, the performance of the MEP over the three years of its existence, demonstrates that renewables can do better with long-term guaranteed support. It could also influence the change in the supposedly acclaimed Dutch top-down approach to the deployment of wind power to a bottom-up approach. The reason being- farmers and landowners are willing to engage and become involved in investing in wind power. Thus, deployment can originate from the grassroots. This encourages wider participation of stakeholders and actors as is the case in Germany. The Dutch renewable electricity market liberalisation programme could also be very helpful in this regard. Prices of conventional and non conventional energy are the same. Dutch households have the opportunity to demonstrate their commitment towards the global climate change abatement and challenge them. Hence, a policy that can bring together other strands of wind power is necessary at this point. This will enable actors with various level of experience to contribute in the improvement in the design and performance of future policy instruments (Breukers and Wolsink 2007).

7.6 CONCLUSION

Like Germany and the UK, renewable energy policies in The Netherlands began in the 1970s, with the aim of tackling climate change and cutting down on the dependency on fossil fuel available in only few regions of the world. Evidence from the analysis reveals that The Netherlands has not adopted a stable policy instrument for promoting wind power. At present, there is no policy instrument to support new investments into wind power. The last policy instrument was the MEP and it was stopped abruptly by the Dutch Government in August 2006. However, the Government is working together with other stakeholders to introduce a new scheme. This is expected to happen in 2009.

Prior to the introduction of the MEP in 2003, the rate of wind power deployment in The Netherlands was slow and ineffective. However, with the MEP, the Dutch wind power sector changed, hence the country was able to achieve a record level of onshore wind installed capacity. From the analysis presented in this Chapter, the MEP was very effective in bringing the market over 800MW installed capacity. The reason to explain this revolved around the fact that the MEP is a form of FIT and encourages the development of wind power market. Also, the Dutch wind power sector is made up of farmers and corporate ownerships. However, the MEP could not be sustained because of its inefficiencies. The Government claimed that the MEP had caused too many budget deficits and that extra costs could no longer be borne by the Government.

When compared with other policy instruments, the MEP seems to offer good tariffs, but it was short-lived because of the complexities surrounding its design, hence making the Dutch renewable market vulnerable and risky. Unlike the German system, planning permission is rather difficult and not easy to come by. There is little space available to build more onshore capacities. Notwithstanding, the Dutch government claimed that with the current level of wind installed capacity and other renewables, it will reach its 9% target by 2010.

Overall, this Chapter concludes that the Dutch Government needs to adopt a long lasting solution to the ‘stop’ and ‘go’ nature of the wind power policy instrument if The Netherlands is to meet renewable targets beyond 2010.

CHAPTER EIGHT

COUNTRY ANALYSIS: UNITED KINGDOM

8.1 INTRODUCTION

This Chapter provides an overview of the findings and analysis of the third country case (United Kingdom) of this research. To date, wind power is the most advanced and nearly competitive form of renewable energy in the UK (Strachan and Lal 2004). The UK is often heralded as one of the windiest countries in Europe and has great potential both onshore and offshore (Strachan *et al* 2006; BWEA 2004). Interestingly, the development of wind power in the UK has been slow, compared to countries like Germany and Spain which have less wind resource (Brennand 2004; Ibenholt 2002).

Unlike Germany and The Netherlands, the UK has adopted a different policy instrument. The renewables obligation began operation in 2002 and places an obligation on utility companies to supply 10% of their electricity mix from renewables, by 2010. This target is expected to reach 15% by 2015 and 20% by 2020 (Toke 2005; Connor 2003). The bulk of the renewable capacity is expected to come from wind power because onshore wind at the moment is presented as being the most advanced among other renewables. Scotland has been a significant player in helping the UK achieve this target. Currently, Scotland is on its way to reach the 18% target of renewable electricity by 2010 and 50% by 2020 (Otitoju *et al* 2010; Scottish Government 2009).

However, unlike Germany and The Netherlands, the UK is not on course to meet its 10% target by 2010 (Prag 2007; Helm 2002a). Reasons outlined to explain this revolve around the strict UK planning and permission laws for onshore and offshore wind power projects. Other reasons include a strong landscape protection movement, a weak transmission system in Scotland, and the presence of a well organised anti-wind lobby groups (Cowell 2007; Cowell and Strachan 2007; Parkhill 2007; Szarka 2007; Strachan and Lal 2004). Thus, like The Netherlands, the UK remains a second division member of deployed wind power capacity, behind Denmark, Spain, and alongside countries like France, Italy, and Portugal.

The principal objective of this Chapter is twofold. Firstly, is to critically examine the performance of the RO, i.e. the UK policy instrument for the promotion of wind power. Secondly, it aims to explore key policy lessons that can be learnt from the implementation and performance of the RO. The key focus is to set this argument in the context of the European Union harmonisation agenda and to compare and contrast the UK policy instrument with the other two EU Member States investigated in this study. In doing this, historical institutional theory is utilised to explore wind power implementation in the UK using three parameters as outlined in Chapter One: emergence of policy instrument; policy architecture; and the outcome of the support and implementation of policy instrument.

This Chapter presents the findings arising from in-depth semi-structured interview, undertaken with eighteen stakeholder organisations widely involved in renewables activities in the UK. Meanwhile, before presenting the findings, the next section provides an overview of UK's wind power policies from 1970-2008.

8.2 UK WIND POWER POLICY: 1970-2008

Plans to promote renewable energy in the UK can be traced back to the 1970s. At this time, renewable energy was based on research and development, with only very limited electricity being produced from renewable energies. During the 1970s and 1980s, renewable energy was both marginalised and shackled by the technocratic corporatism of the then nationalised energy industry.

During the 1980s, the UK government began to pursue a wholesale liberalisation and privatisation of the electricity market. Becoming the first EU Member State to open up its market for competition through the adoption of Electricity Act in 1989 (Meyer 2003), the regulatory framework was geared towards promoting competition, and lower consumer prices and avoiding market distortions.

While the Non Fossil Fuel Obligation (NFFO) introduced in 1990, did kick-start the wind power sector in the UK, its failings have been well studied. Though the NFFO served as an initial financial policy instrument to promote the take-off of most commercially viable renewable energy technologies, Mitchell and Connor (2004:136) reveal, however that the NFFO was set up as a means to subsidise nuclear generation, which had proved too difficult to privatise. At that time, as Szarka and Blühdorn (2006) outline, only limited support was provided to renewable energies.

The NFFO was arranged in rounds, as a form of tender system, which allowed companies to compete for financial support for investing in renewables. In simple terms, the cheapest bid submitted won the contract and the company then received a subsidy. By 2000, a total of 1500MW installed capacity of renewable energy sources was proposed, but after all of the NFFO rounds, it failed to deliver the required target. Hence, Brennand (2004:89) noted that:

> *"The failure of the NFFO to achieve its 1500 MW target of new renewable generating capacity in the UK by the year 2000 led the government in the same year to declare a new target of 10%, therefore the NFFO was put on a hold."*

Much was said about the planning problems faced by wind power schemes (Connor and Mitchell 2004), but perhaps a bigger factor contributing to the disappointing rate of windfarm installation was due to the competitive bidding system itself. It encouraged low-cost schemes. Unfortunately, many seemed to be proposed on the basis of optimism and a desire to win a contract, rather than the development of real schemes, which in reality often proved to be rather more costly than the original bids suggested.

The change in Government in 1997 and its commitment to the ecological modernisation of the UK economy brought about significant changes to energy policy. do Valle Costa *et al* (2008) indicated that the Utility Act which was introduced in 2000 was intended to strengthen these changes further and to establish a new regulatory framework for gas and electricity markets, thus the New Electricity Trading Agreement (NETA) came into operation in 2001. However, the uncertainty created by the formation of NETA effectively put a halt to renewable energy developments at that time.

NETA was designed, more or less, like a community market and it was meant to drive down the price of bulk electricity. To further encourage a low carbon economy and to reduce CO_2 emissions, the Carbon Trust was created in 2001. In the same year, the UK climate change programme was published by the Government. Strachan and Lal (2004) reported that the climate change programme has pushed forward governmental policies that gave way for renewable energy to further strengthen the government's intention of reaching the 10.4% target by 2010.

In 2002, the RO was introduced to replace the NFFO in England, Wales, and Scotland. While in the Northern Ireland, the RO came into force in April 2005 (Ofgem 2009). This once again stimulated investor confidence in wind power, the best-developed technology, amongst in particular, large and integrated utility companies. To recap, the RO order is a form of Renewable Portfolio Standard (RPS) that places an obligation on licensed electricity suppliers in England, Wales, Scotland, and Northern Ireland to source an increasing proportion of renewable electricity (Ofgem 2008). The RO set a target of 10.4% and 15.4% for 2010 and 2015 respectively. This was intended to increase annually, beginning with 3% in 2002-2003, 7.9% in 2007-2008, and 9.1% in 2008-2009 (Ofgem 2008). The quotas are intended to be achievable through the issue of a green certificate for each unit of generation. The RO is guaranteed for twenty-five years and as such will be in force up to 31 March, 2027 (Szarka 2007). Like the FIT and the MEP, the RO is financed by electricity consumers. Szarka (2007:83) noted that: *"RES-E sell their electricity by the usual means, but they also receive a subsidy through the RO"*. Renewable energy generators receive renewables obligation certificates (ROCs) for each MWh of renewable energy electricity generated. The ROCs can either be obtained by buying from generators or from the ROCs market. According to Ofgem (2009) report, a total of 16,466,751 ROCs was submitted during the 2007-2008 period, equating the value of £871,914,465. Failure of suppliers or utilities to meet the required ROCs, leads to the payment of a “buy-out price”. The buy-out price allows electricity suppliers to make up any shortfall between the amount of their obligation and the number of renewables obligation certificates presented. The funds from the buy-out price are recycled amongst the generators that meet their quotas. Table 8.1 below indicates the buy-out price from 2002-2010.

Table 8.1: Buy-out Price (2002-2010)

Period	Buy-out Price
2002-2003	£30/ MWh
2003-2004	£30.51/ MWh
2004-2005	£31.39/ MWh
2005-2006	£32.33/ MWh
2006-2007	£33.24/ MWh
2007-2008	£34.30/ MWh
2008-2009	£35.36/ MWh
2009-2010	£37.19/ MWh

Source: OFGEM 2008; 2009
Author Generated

About 70% of the buy-out price recycled to suppliers went to six main suppliers (British Gas 15.83%; EDF 16.74%; E.ON Energy Limited 14.18%; Npower Ltd 10.76%; Scottish Power 8.53%; SSE 16.98%) (Ofgem 2008). The fluctuations in the prices of the ROC and the buy-out price has created further uncertainties and risks for the market however, to date the RO has helped to deliver the surge in onshore wind power investment and installed capacity.

The Energy White Paper, published in 2003 (DTI 2003), arose from the need to address a series of emerging energy challenges i.e. meeting the UK energy demand, dealing with the threat of climate change, and reducing dependency on fossil fuels especially from other parts of the world. The 2003 Energy White Paper set out four principal goals which have continued to date: (i) putting the UK on course to reduce its CO_2 emissions by 60% by 2050; (ii) maintaining reliability of energy supplies; (iii) promoting competitive markets in the UK and abroad; and (iv) ensuring that every home is adequately and affordably heated. Renewable energy – particularly wind power – is expected to play an important role in making this become a reality (Foxon and Pearson 2007; Odenberger and Johnsson 2007; Foxon *et al* 2005; DTI 2003).

The 'New' Labour Government has also sought to improve the planning environment for windfarms. This has featured in the adoption of the Planning Policy Statement 22 (PPS22) guidelines for local authorities in England. These guidelines introduced 'criteria based' assessment of windfarms and undermined efforts by local authorities to declare 'no-go' areas for windfarms. However the Westminster Government no longer has control over wind power planning in Wales (except for schemes over 50 MWe) and Scotland (not at all). The Welsh and Scottish Executives have both maintained pro-wind power planning policies, albeit in the case of Wales, under TAN-8 though limiting wind power development, mostly to a few small wind power development zones.

Scotland is more important than England in reaching the renewables target in onshore planning terms (Kelly 2006; Scottish Executive 2000). However, the previously high proportion of wind power planning approvals has been falling in Scotland. The most recent Scottish planning policy statement (SPP6) allows local authorities to earmark some areas for 'significant protection' (against windfarms).

The emergence of a Scottish National Party (SNP) Scottish Executive in May 2007 has further dampened the possibility of a high approval rate. Nevertheless, the Executive's attitude to onshore windfarms, while more cautious than Labour's, is still moderately supportive. It is thus still likely that half or more of the windfarms will be approved, in addition to many that have already received planning consent and the goal of achieving 50 per cent of Scottish electricity from renewable energy by 2020 is still realistic. There is no shortage of schemes in the planning pipeline. A large backlog already exists for windfarms awaiting planning approval, but they need transmission upgrades before they can be constructed. The 'Beauly-Denny line' (North-South Scotland) transmission line has been subject to a lengthy planning enquiry and while it seems likely to be approved, this will not be operational before 2010.

Various other delays have afflicted the offshore programme, although some of these can indeed be attributed to the operation of the RO. Since the RO favoured the cheapest projects, offshore schemes have sometimes been put on the 'back-burner'. This problem has been exacerbated by the increase in wind turbine prices since 2005, a consequence of the burgeoning global demand for wind turbines and increases in the cost of energy, steel and concrete. In addition, the British Government and its regulator, OFGEM, have been relatively slow to organise an agreement to allow the bulk of the charges for grid connection of offshore windfarms to be passed on to electricity consumers through the transmission change element of bills. Even so, it has to be said that Britain is now (end of 2007) roughly equal with Denmark in having around 400 MWe of offshore wind capacity, and is, therefore, the joint world leader in this particular sub-technology.

According to the first annual report after the implementation of the Energy White Paper (DTI 2004:5), out of the one hundred and twelve key milestones set as a first step towards achieving the White Paper's long term commitments, fifty-six had been completed by the end of March 2004. In the context of renewable energy sources, 1.6GW was consented with 2 GW capacities under way. While 2004 mainly set in place long-term strategies for achieving the targets outlined in the 2003 White Paper (DTI 2005). One important development was the change made to the RO order 2004. This increased the level of the obligation to 15.4% by 2015/16 which was meant to *"provide investors with additional confidence"* (DTI 2005: 5). During 2005, the UK became one of only eight countries to reach over 1000MW installed wind capacity (DTI 2006).

Following the Energy Review, the 2007 Energy White Paper (2007) was published and a "banding" system was introduced to the RO[46]. This reform was introduced in response to criticism that the RO was allowing development of only the cheapest technologies (including onshore wind), rather than more expensive renewables such as offshore wind and wave power. The aim of the banding system is to allocate more or less one ROC for each MW of electricity produced from renewable energy sources, depending on the stage of technological development and associated costs (DTI 2007:150). Thus, enabling the increase of the deployment of emerging marine (wave, tidal, etc.) renewable technologies, and improving the overall cost effectiveness of the RO (DTI 2007). Interestingly, this involved a reversal of policy established earlier by the DTI. This is an issue which is picked up later in the thesis when discussing the research findings. The new Energy White Paper came into

[46] The breakdown of the proposed banding regime is further found in page 151 of the Energy White Paper 2007.

operation in May 2007; therefore it is too early to comment further on its progress and success. Table 8.2 summarises the development of UK renewable energy policies discussed in this section.

Table 8.2: An Overview of UK Renewable Energy Policies 1970-2008

Policies and Programmes		**Period**	**Focus**
Development Initiatives	R & D	1970 - 1988	R & D & D Limited Renewables
Liberalisation and Privatisation of Electricity Market		1989	Opening up market for competition
NFFO Nuclear and Renewables	NFFO	1990- 2002	Nuclear Subsidy
Utility Act		2000	Gas & Electricity market
Regulating Framework (NETA)	NETA	2001	Reducing prices for bulk electricity
Carbon Trust		2001	CO_2 emissions reduction 12.5% Kyoto targets achievement
United Kingdom Climate Change Programme	UKCCP	2001	Kyoto target and renewable energy sources targets
Renewables Obligation	RO	2002	Renewable Energy Sources
Energy White Paper		2003	Meeting energy demand and climate change, and reducing dependency on fossil fuels from other parts of the world.
Energy White Paper		2007	Meeting energy demand and climate change, and Creating an enabling environment for all renewable energy sources to grow through the introduction of 'banding'

Source: Author Generated.

8.3 EVALUATION FRAMEWORK

The evaluation framework utilised in analysing the performance of the RO was discussed in detail in Chapter Four of this study. As with Germany and The Netherlands, considerable time was spent by the researcher to understand the role of the Government, renewable energy associations and environmental NGOs in the implementation of the RO in the UK hence, the DTI (now the BERR) plays a predominant role on behalf of the Government in the design of the RO. Other stakeholders mentioned also have a strong impact on the RO through consultations, seminars, workshops etc. Therefore, a sample of eighteen 18 organisations was drawn in the UK and like other countries, interviews were conducted. Only one of the organisations interviewed refused to participate fully, but after much persistence and persuasion, a twenty minute telephone interview was granted. A semi-structured interview schedule was drawn from the framework utilised as discussed in Chapter Five and it is also used in analysing the bulk of the data gathered from the eighteen respondents interviewed in the UK. On average, the semi-structured interview lasted between forty-five minutes and one hour. As with Germany and Netherlands, the in-depth semi-structured interview afforded the researcher the opportunity of obtaining very rich data and a broad sense of the policy instrument. This was useful during the data analysis process.

8.4 RESEARCH FINDINGS AND DISCUSSION

8. 4.1 Principal Market Drivers for Promoting Wind Power in the UK

According to McKay (2006) energy policies in the UK as a whole, are based on four considerations: environment, energy reliability and security, affordability for the poorest in society and competitive pricing for businesses, industries and households.

When asked about the principal market drivers for promoting renewable energy vis-à-vis wind power in the UK, all the interviewees claimed legislative instruments, principally the renewables obligation that have been in place since 2002 has been the major market driver. It came into force to replace the NFFO of the 1990s. Findings from the interviews reveal that the UK has the best renewable energy sources in Europe, particularly wind power. Now that onshore wind power is matured to a point where it is viable, probably the primary driver for making renewable energy sources especially wind power, is that there is a market for them through the renewables obligation to sell the electricity generated.

Furthermore, there are political and environmental drivers. According to McKay (2006) both environmental and energy security drivers have created political pressure which has resulted in a combination of regulation, fiscal incentives and support schemes to encourage renewables. From the evidence gathered, it can be deduced that the RO was put in place to stimulate the renewable energy market and to bring forward generated capacity to the market, hence enabling the UK to reduce its CO_2 emissions and reach its Kyoto targets. The UK also has the goal of reaching 10.4% of RES-E in 2010 and double that in 2020. Furthermore, according to the Kyoto agreement, the UK is expected to meet its target of a 12.5% reduction of CO_2 emissions by 2010-2012 respectively. The 2003 Energy White Paper outlined a set of visions of how the energy market should evolve over the next fifty years i.e. 2050. A senior officer with a government institution claimed that this was the first time the Government had officially adopted measures to reduce CO_2 emissions. Part of that vision was also to attain a low carbon economy through the deployment of renewable energy at a high level that would achieve a 30-40% target by 2050.

Evidence from the interviews reveal that without adopting a well designed energy efficiency strategy and other viable methods, reduction in carbon emissions can not be achieved in the UK. Therefore, for the UK to move to a fundamental low carbon economy, a high percentage of renewable energy sources need to be integrated into the country's energy mix. In addition, to the climate change driver is the increasing security of energy supply. Wind power has an advantage in this regard over other forms of fuel as it is local and do not need to be transported or imported. Hence, another key driver for promoting wind power in the UK is the need to have a diverse energy portfolio, which would allow UK businesses to become part of the global economy. Illustrating this further, a senior officer with a government institution said that:

> *"The driver for promoting renewables from our own perspective is the need to have a very diverse energy portfolio; therefore it is an opportunity for the UK business to be part of the global economy, so we can capture part of the global market in renewables which will be beneficial to the UK Plc ultimately. And the second driver is around being a global leader in climate change agenda, and our government have chosen and proven to be a global leader in climate change and to influence the world and part of that influence is based on our success of clear-cut support of renewable energy and climate change in the UK. It is very hard to preach to people who are not doing what they are supposed to be doing at home to stop if you don't practice some at home........" (*Interview undertaken: 14th June 2006)

From the utility company's perspective, the need to catch up with the current increase in crude oil and gas prices may be an additional driver to the deployment of wind power in the UK. Findings from the interviews reveal that in recent times there have been many uncertainties with the way gas prices are increasing. This may become unbearable in the future and therefore, wind power, whose generation costs are more or less fixed at the onset, can supplement demands to an extent. A senior manager with one of the big utility companies claimed that because of growing general concern the government decided to use energy supplies as a vehicle to promote renewables and place an obligation on the suppliers to produce a certain percentage of their electricity mix from other forms of energy, primarily the non conventional ones (Renewables).

To summarise, the renewables obligation is the most important legislative driver in the UK to date and it has been helpful in delivering a record level capacity of onshore wind in the last five years. Table 8.3 below provides a summary of the drivers discussed in this section. The next section provides the discussion on the performance of the renewables obligation, based on the evidence gathered from various interviews with eighteen organisations in the UK.

Table 8.3: Summary of UK Wind Power Market Drivers

- Availability of market for renewables through the RO
- The Environment
- Energy reliability and security- the need to catch up with the current increase in crude oil and gas prices
- Competitive pricing for businesses, industries, and households
- The need for a diversified portfolio

Source: Author Generated

8.4.2 Evaluation of the Performance of the Renewables Obligation (RO)

8.4.2.1 Administration

The administrative demand for the RO is far more complex to deal with than the other policy instruments investigated in this study (Sawin 2004; Sijm 2002). The RO does not fix the price for the choice of renewable energy technology that is near market rather, it sets targets, which suppliers should achieve in a fixed time period. However, because it is a market system, investors know the market position and, how the market operates. Stakeholders are also made aware of any changes to the RO through different rounds of statutory consultations. Draft orders are published first so the stakeholders can be kept well informed before they are finally signed into law.

The reason outlined to explain the complexity of the RO revolves around the fact that the RO is relatively new and has only been in operation for seven years, thus, more time is necessary to allow errors to surface and remedies to be put in place. This is consistent with van Dijk *et al* (2003:21) observations that:

> *"The targets of the RO themselves may be very transparent, the administrative rules of the TGC trading system are often a bit more complicated"*

While Sawin (2004), observed that many of the requirements of the quota systems are far more challenging especially in fixing targets. When targets are high, prices go up and vice-versa. Findings from the interviews also reveal that the RO is not flexible. It rewards some technologies (onshore wind) more than others who are still far from getting into the market, for example offshore wind, wave and tidal energy etc. Szarka (2007:86) noted that *"the consequence of the inflexibility design of the RO is that government cannot 'steer' policy towards targets precisely as with REFITs"*. It is difficult with the RO to a change target once it is fixed. This is also consistent with Sawin (2004:16) findings that the quota system is inflexible, "*Once targets and timetables are established, they are difficult to adjust. Even as markets change and technologies advance, experiencing major breakthroughs in efficiency* *and or in cost is difficult. Therefore, it is highly unlikely that targets or timetables can be altered….”*

This inflexibility however is not seen to be disadvantage from the perspective of most of the respondents. The certainty of the RO makes it desirable to investors. Investors know exactly what is going to happen to the market and how that is set out in the law, therefore, the RO cannot be altered carelessly and ad hoc by the Government. Financial decisions can be made, as the RO can not be changed. However, a vague and flexible change would dilute market confidence and make it difficult for stakeholders to base financial decisions on it. One identified problem is that RO personnel at the DTI (BERR) have changed on a regular basis, with some respondents saying that this had been detrimental to the scheme. Illustrating this, a senior manager with one utility company said that:

> *“The personnel that manage it (the RO) have changed every 16-18 months, so there is inconsistency on the government side which is an issue.”* (Interview undertaken: 28th November 2006)

From the perspective of this respondent this had affected the performance and credibility of the scheme.

To summarise this discussion, the RO seems to be a transparent scheme but one which is complex and not flexible in its operation. Once targets are fixed, it is usually not easy to reverse, though this was actually seen as a strength of the scheme by those interviewed in this study.

8.4.2.2 Stakeholder support/involvement

Unlike the MEP, one key argument in support of the RO is the wide support of stakeholders in the process of consultations[47] and design. Almost all the renewable energy actors and utility companies play key roles in the development of wind power policy in the UK. This is contrary to the report of do Valle Costa *et al* (2008: 68) that:

> *"The UK has a centralised system of government which provides the government with a great deal of capacity to control policy reforms. As a result there is little participation at local and regional levels of government, which in their turn have little political and financial capacity. The renewable energy industry does not have much political representation and traditional environmental organisations in England exert their role to promote renewable energies."*

The DTI, now BERR, is the dominant player in the design of the RO, while OFGEM is charged with the administration responsibility. The BERR, on behalf of the UK Government engages all the stakeholders in the amendments of the RO through an annual consultation. Although not all the opinions of the stakeholders are taken on board it is evident that stakeholders are heard in the design and implementation of the RO. Illustrating and confirming this, a senior manager of a major utility company stated that:

> *"I think the stakeholders are involved; there are consultation processes. And personally I think the RO is working at the moment, and it is giving what it is set out to do, so I think at the moment, it operating effectively."* (Interview undertaken: 13th December 2006)

From the perspective of the respondents there are plenty of opportunities to get involved in the consultation forum and contribute to the modus operandi of the RO

[47] BWEA, REA, Energy Institute, Friends of the Earth, AUPUK, Greenpeace UK, SRF, Country Guardian etc

thus, the finance community backs the RO because it is an attractive mechanism. However, the activities of organisations in support of wind power have not been able to break the hold of the strong anti-wind lobby groups in the UK, so that a strong network can be established between wind power institutions, the farmers and landowners. This may be a result of the absence of local ownerships or cooperatives in the UK (Toke *et al* 2008).

8.4.2.2.1 Wind power implementation and scale

Stakes in the UK wind power industry are predominantly owned by large corporations. Szarka and Blühdorn (2006:30) pointed out that: "*In the UK.... cases of* l*ocal ownerships are rare exception, with wind farms mostly owned by large operators (including utilities) which are national or international firms*". Evidence from the interviews reveals that the RO does not provide opportunities for small scale generating companies. The nature of the scheme makes it difficult for small scale investors to obtain financial backing. One renewable energy expert from a popular renewable energy association said that:

> "*The system is designed to attract a larger scale build and therefore it attracts large scale developers*". (Interview undertaken: 8th September 2006)

This is perhaps one of the key reasons that help to explain why so little community ownership has developed in the UK. The process of getting projects through the planning permission stage is very complicated and cumbersome. Illustrating the wind power ownership structure in the UK, a director with one renewable energy association claimed that it is very difficult for the small scale generating companies. This demonstrates that the small scale generating companies are not effective at all;

the ones already existing represent a small proportion of the market (Toke 2007b). The market risk is so high that small scale ownership investors are not able to bear the burden, thus the RO may not be suitable for the early take-off of wind power investment. On the contrary, the Government and the utility companies present a different argument. They both claim that the RO creates a level playing field for both small and big players and that rather than pursuing market players, the RO is a mechanism that was put in place to deliver renewable capacity in its own right and was not designed or structured to favour any party. It was intended to create mass deployment of renewable energy in the UK electricity sector, enabling the government to meet its obligation and to cut down on CO_2 emissions.

From the utility companies' perspective, evidence from the interviews demonstrates that small scale generators and community owned windfarms are not necessary and, in actual fact, they complicate things too much. A senior project manager with one of the utility companies said that:

> *"These things happen but they are not a means to an end.....why should a community have a part in a turbine, they don't have a part in the local TESCO, local car manufacturing plant, and other big manufacturing plants, so why should they have a part in turbines? There is no reason........"* (Interview undertaken: 12th December 2006)

From the Manager's perspective what is affecting the penetration of wind in the UK is the extremely effective campaign by the anti wind farm groups. They have done an incredibly effective job with very poor tools. The information they use is very misleading, but it is believable, and they convey their message very effectively. In essence, what the Government and the utility companies would rather have is as much wind power capacity up and running, instead of taking the nature of windfarm holdings in the UK into consideration. Toke (2006:26) found that: "*the lack of* *farmer and cooperative ownership in the UK has significantly exacerbated planning controversies."* Thus, from the perspective of this research, much could have been done had the RO encouraged smaller companies, like the German system. This may also explain the reason for the persistent high profile record of community resistance against the development of wind power in the UK (Kelly 2007).

8.4.2.3 Certainty for industry

It is very important that policy instruments implemented to promote the deployment of renewable energy technologies be consistent and sustained over a long period of time (Sawin 2004). The RO had been surrounded by uncertainty and this has had a detrimental effect on industry confidence. This was due partly to the early stages of RO implementation, but also later to changes made through consultations and amendments. This finding is consistent with van der Linden *et al* (2005), and van Dijk *et al* (2003), who reported that revisions to support schemes from annual reviews can easily lead to uncertainty amongst producers. The RO has been in existence for seven years, yet it has been remarkably unstable. It has undergone a series of amendments and will change fundamentally in 2009/2010. Sawin (2004) pointed out that pressure to minimise costs under the quota system often encourage producers to turn to overseas turbine manufacturers, hence the RO has not been able to create an enabling environment for the development of UK made turbines. The fact that there are a lot of investments into onshore wind power in the UK does not help matters, the market risk is still very high because the RO as been subjected to political interference from inception[48].

[48] Interview with the Head of Power REA (14 August 2006)

The recent energy review created further uncertainty in the market place, especially with the banding introduced into the RO by the Energy White Paper (DTI 2007). Most of the utility companies would have preferred for the RO to have remained largely unchanged. Prior to the recent Energy White Paper, a senior manager of one utility company claimed:

> *"The RO is rapidly moving to a phase of no confidence and no stability, and potentially could disintegrate into a heap with the review that is going on at the moment and the potential introduction of banding which fundamentally undermines the concept of the RO which was technology blind. Banding here means technology specific, fundamental change will just undermine the whole thing."* (Interview undertaken: 15th December 2006)

The RO may introduce yet another element of uncertainty which may potentially hurt investors' confidence. It makes it difficult for investors to fully understand the fundamental components of the RO so they can manage and mitigate associated risks. The introduction of different ROCs for renewable technologies contradicts the principle of the market system, which to some investors may not be the most efficient way of developing projects.

When asked if the changes to the RO had affected investments into wind power in the UK, almost all the respondents indicated that it had and it had made an impact on decisions to invest further in renewables. Trade association respondents indicated that from the interaction with investors, any changes on the RO affects project finance. Investors dislike change and prefer stable market conditions in the long term, which allows them to forecast a definite return on investment. Findings from the interviews reveal that the changes to the RO basically mean that the Government is allowed to make amendments at will to the operations of the RO, thus undermining the credibility of the RO.

From the Government's perspective, the changes to the RO are necessary to create an atmosphere for a convenient investment that is stable and attractive. A senior Government official said that:

> *"There is no doubt at the moment that the ROCs do not provide absolute certainty; I mean there is the rise of obligation up to 2015-2016 and they will plateau in 2027. So we need to think very carefully as to whether or not that should be extended to get guaranteed higher returns for a little longer period or whether or not the licence of the obligation in 2027 will or not need to be extended. We also do need to balance the desire to create a more stable and attractive scheme for investors against the cost the obligation imposes on all the consumers…"* (Interview undertaken: 5th June 2006)

Generally any change to the system introduces a kind of regulatory risk and potentially impacts on the investor's confidence. As such, the UK has no large manufacturing companies of wind turbines as the enabling environment for wind power is not yet there. Changes to the RO "*do not allow for continuous developments of the market, they discourage innovation, and they make it difficult to establish strong domestic industry because investment in production facilities will take place only with a short-term perspective*" (Sawin 2004:9). However, small turbine manufacturers are still available in the UK, though not enough to cope with the rise in the growth of wind power. As a result, the UK wind industry is also vulnerable to scarcity of components and high cost turbine prices from other parts the world.

In summary, it is important for the Government to improve the operation of the RO by making it free of any misrepresentation that would cause changes to be made and would stop it from being allowed to have an affect over a long period of time.

8.4.2.4 Effectiveness

Foxon and Parson (2007: 1541) reported that: "*the RO has succeeded in creating a niche for renewable generation in the electricity supply market*". However, when asked about the effectiveness of the RO in delivering the 10.4% politically fixed target by 2010, all of the respondents interviewed argued against the RO in this regard and claimed that the UK will not meet the 10.4% politically fixed target by 2010. There is no doubt, the RO has been very successful in delivering much onshore capacity, yet there is a long way to go in reaching the 10.4% target. During the interviews, evidence revealed that the inability of the UK to reach its target is due to the inherent fault in the design of the RO. Szarka (2007:96) adds that: "*the consequence of the technology neutrality of the RO is that targets are not set for individual technologies, creating uncertainties over future sourcing mix.*" A senior Manager in charge of the RO with one utility company said that:

> *"The RO has made a viable and valuable contribution in moving the UK towards the 10.4% goal, but realistically, it is not going to hit the target. And you could argue actually that the RO is a market mechanism and it does not intend to achieve set targets. But what it has helped to do is to stimulate onshore wind in particular..........."* (Interview undertaken: 29th November 2006)

Two main reasons account for why the RO will not meet the 10.4% by 2010. The first is attached to a design flaw, which means that the closer one gets to the target the less value the ROC is worth. To keep the market moving and to attract new investment, ambitious targets rather than realistic ones have to be set. During one interview, a senior deputy head with a renewable energy association policy said that:

> *".....the way the obligation is designed is not to get around reaching its target. And as you know pretty much effectively when supply is behind demand, that way the ROC retains its values and then people will continue to invest in certain projects, but the closer you get to actually hitting that target, then the less valuable the ROCs become. And there is a kind of phenomenon known as 'CLIFF EDGE' which suggests that if the whole renewable criteria are actually met in a given year, ROC prices will plunge down........."* (Interview undertaken: 5th June 2006)

Findings from the interviews reveal that the Government has two targets: the RO target which is the UK internal goal; and the EU target of 10.4%. The UK internal target is set such that the value of the RO can be preserved. Thus, the percentage capacity of renewable electricity generated is capped so as to maintain a market for renewables. Also, capacities generated from other non-conventional sources are not included in the RO, because they are classified as non renewables e.g. the majority of the large hydro and energy from waste by degradable content. They are not paid into the RO scheme thus, creating a detachment between them and renewables.

Secondly there is the issue of planning permission and connection to the grid. To date, planning applications still take a significant amount of time and effort on the part of developers. Less than 50% of planning applications are approved each year (Toke 2005) and there are still many projects in the queue waiting for connection to the grid, especially in Scotland. Sixteen of the eighteen respondents interviewed argued that the problem is not with the RO. The scheme has done exactly what it said it was going to do when it was set up. The failure of the UK in not meeting its target can be attributed to other factors, such as planning and consenting regimes. Wind power opposition in the UK can be traced back to path-dependent factors (Toke *et al* 2008). The actions of well organised anti-wind and landscape institutions have been instrumental in the delays in pushing forward wind installed capacity in the UK. (Toke *et al* 2008:1144) argues that there is less local energy activity in the UK than in countries like Germany and Demark, as such "*outcomes of wind power policy depend on long existing cultural dispositions towards landscape; previous local political activity; and institutionalised (existing and past) preferences in the energy domain*". Illustrating this further a senior Manager with one utility company said that:

> *"The RO has performed exemplarily..........what has failed arguably are the delivery channels, the consenting regimes and other aspects. But as an economic instrument it has been a whole heartedly 100% success. We have just witnessed a number of planning applications and a number of grid applications. What has failed is the delivery channel."* (Interview undertaken: 15th December 2006)

In summary, the effectiveness of the RO is still subject to a great deal of conjecture and debate. The BWEA (2007) statistics show an improvement in the rate of submissions and approvals. Of the ninety-five submissions (1801.85MW), fifty-nine approvals (1130 MW) were made in the same year. However, building has been very slow as only twenty-nine (449.85 MW) were built. Therefore, it remains to be seen whether or not 2010 targets will be met, but increasingly this looks very unlikely.

8.4.2.5 Efficiency

The renewables obligation is often heralded as an efficient mechanism for supporting renewable energy sources. This is highly contested by the EU (2005a) report. Evidence from the interviews also reveals that renewable energy prices are not as low as often heralded. This is also consistent with Szarka and Blühdorn (2006) findings. Szarka and Blühdorn (2006) argued that the efficiency of the RO is lower than stated. Szarka and Blühdorn (2006:13) also observed that during the winter of 2005-2006, wind power prices rose to 12-13 Euro cents/kWh. The EU Paper (2005a) also reported that, at the moment, the green certificate system (RO) presents a higher level of support compared to other systems operating in other EU countries, including Germany. Respondents from the interviews also claimed that the RO is not efficient because consumers pay high prices and it may be very difficult when resources are limited to reduce consumer cost (Sawin 2004). Moreover, the buy-out price paid for non compliance does not make things better because consumers are made to pay for what is not generated. Hence, in terms of static and dynamic efficiency the RO is less efficient than the FIT. Lipp (2007:5492) noted that: "*the uncertainty of the RO has driven up support costs and has resulted in more expensive wind development in the UK*".

Contrary to this view, the utility companies interviewed argued that the RO is not expensive and that it is the operation and people's perception that is voiced regularly that makes the RO look expensive. They also argue that the RO is a valid support mechanism that enables projects to compete in the market and without it, projects are not economical. Therefore, the general consensus of the utilities is that the RO, if allowed to work, is very efficient and becomes a self correcting mechanism in terms of the money it pays out to the parties involved. One senior Manager with a company confirmed this and said that:

> *"The problem is that…the RO looks expensive because if you compare the cost of the RO to the MW being built, the RO is absolutely expensive compared to the FIT, but that again is not the fault of the RO, that is because there are less MW being built; this has nothing to do with the RO, it is the planning system. So if all the stuff that is currently in the planning system*

> *is allowed to come through and fed through the grid system, then the RO will be highly competitive and highly effective when compared to any FIT system."* (Interview undertaken: 27th November 2006)

Looking at other available evidence Szarka and Blühdorn (2006:13) have reported that:

> *"The outcome during 2002-2006 indicated not only that the RO is failing to provide a more cost-effective system than continental FIT , but worse, the RO is making wind power progressively more expensive to the UK consumer at a time when digressive FIT rates are making it cheaper in Germany."*

To summarise, therefore, it is difficult under the RO to reduce production costs and investment costs. Developers had to import wind turbine and component parts and as such do not benefit from economic of scale through technology innovations, thus developers are exposed to higher risks and market uncertainties (Lipp 2007). Competition is also very limited as very few large companies control the market. The RO has been in place for just seven years now and is still going through major changes and restructuring, this alone presents a great deal of risk and uncertainties to investors.

8.4.2.6 Market conformity

Contrary to the views about the FIT and the MEP, the RO is credited by many commentators (Sawin 2004; Wiser *et al* 2002) as an instrument that works better with an open or liberalised market. In comparison with other countries investigated in this study, the UK was the first to liberalise its electricity market following the demand placed on the Member States by the EU to liberalise their energy market (Meyer 2003) and is now in the forefront of the campaign to encourage others.

When asked about the compatibility of the RO with the liberalisation of the electricity market pursued by the UK since 1989, fifteen of the eighteen interviewees claimed that the RO is a market based system and in that sense, it is compatible. Three reasons can be offered as a way of explaining the above claims. First, the RO affects all suppliers. Suppliers have the same obligation to meet a percentage of total demand via renewable energy sources electricity, so there is no discrimination between the suppliers. They work towards the same obligation and they have been able to provide electricity to a great number of customers in absolute and percentage terms. Secondly, is the desire to foster competition among suppliers and give consumers the opportunity to choose their own suppliers. It is argued that this is what the RO does for the renewable market because, in theory, it does not discriminate between small and large suppliers. It enables investors to make the most efficient decisions[49]. Thirdly, the RO is an economic incentive which leaves it up to the firms to decide how to meet the Government's renewable energy obligation. Failure to do this attracts a consequence, in the form of a penalty payment[50].

Therefore, the RO does create an incentive for renewable generated electricity to trade in the British Electricity Trading Agreement (BETA) and to compete with other forms of energy. It is also a form of quota that provides financial benefits to both customers and suppliers especially from the supplier's perspective. It helps to provide a way of recovering money from customers as a whole. It drives the development of the lowest cost technologies and best resources captured by market mechanism. Evidence from the interviews revealed that the RO does not require the Government to decide how much renewable technologies should be aspired towards, neither does

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[49] Interview undertaken: 29th November 2006
[50] Interview undertaken: 15th December 2006

it require the government to decide what kind of tariff level should be set for the different types of technology, it just puts in place one mechanism and allows it to develop. In addition, the project receives the ROC value as soon as they are built and there is no need for a contract, as required by the NFFO regimes.

On the contrary, one of the main arguments against the compatibility of the RO with market liberalisation is that it does not allow market entry. Findings from the interviews reveal that the RO falls short of the kind of competitive market investors would like to see. Investors expect a market system that allows new entrants, but the RO is not good in terms of encouraging new entrants into the market. To date the UK electricity supply sector is dominated by the 'big six' utilities. Evidence from the interviews, also revealed that the UK Government fixes renewable quotas and the buy-out price for the RO, as such, respondents claimed that the RO has worked well as an obligation, but not in terms of competition. The RO in its original design is meant to speed up competition. The RO does that without taking into consideration the supply or the number of people who dominate the market and as such the RO is viewed as an imposed market mechanism and not completely compatible with a liberalised market and cannot be viewed as a role model in a liberalised electricity market.

In summary, the RO as discussed, is designed as a market based system, and throughout its seven years of existence, it is not completely compatible with a liberalised market because the RO has not been able to promote technological innovations in the manufacturing of wind turbines, which can allow developers to compete and drive down costs (Szarka 2007; Lipp 2007; Sawin 2004). Also there are still a lot of issues about projects going through the grid, and the number of utility companies that tend to dominate the UK electricity market. There is also the issue of interference in the market through the recent banding introduced by the Government to the RES-E market /ROCs. Banding is not a bad idea but if it is not well planned it can introduce more complexities to the operation of the RO. Different levels of bands need to be decided upon and be appropriate for each technology. If not carefully thought through, it may result in more governmental interference in the future. However, this is greatly advantageous to technologies which are not yet developed or near market. Until these issues are resolved, the RO will not be completely compatible to the liberalisation of the electricity market and delivered renewable electricity will still be more expensive than other EU Member States using the FIT.

8.4.2.7 Finance

The RO is scheduled to remain in place until 2027, after which no one is really sure what will happen next. These uncertainties and fears sometimes determine wind power project ownership and investments. Sawin (2004:14) noted that: "*there are potential uncertainties through many steps in the process from project planning to operation."* Many of the developers are discouraged by the complexities of the RO because of its risks (Menanteau *et al* 2003). Illustrating further, the Director of Economics of a popular renewable association said that:

> *"The trouble of the RO is that it is a big boy's game, it is so complicated that you have to deal with complicated issues, risks assessments, and you have to also move with the market because the prices you will get may be higher than everywhere else. So with all these happenings it is not a system the small independent generator would meet and operate easily…"* (Interview undertaken: 14th June 2006)

Therefore, from the small players' point of view, the RO is characterised by many risks and uncertainties. For the large businesses that do not need equity and finance from financial institutions, this is not such an issue. This explains why the RO is criticised as an instrument that generates windfall profits for large utility companies who take up the risk to invest in wind power. A Manager with one major utility company said that:

> *"As a company we look at projects under individual merits and as a company look to have 100% finance when we own a project, we also look at individual projects, maybe we want to place it on balance sheet or off balance sheet finance. Each project will go on its own, we haven't got a preference, it depends on the risk and the returns of a given project, and probably it will end up on balance sheet because of the size of the company."* (Interview undertaken: 28th November 2006)

Financial institutions always want to be convinced of a project before committing funds to it. They prefer and are content to become involved in investments with low risk and market certainty. This may not be the case for the RO. Findings from the interviews reveal that the RO is weak in guaranteeing investment certainty because it is difficult to get liquidity from finance houses without the investor's corporate assets. This partly explains why there are so few new entrants into the market. New entrants, especially the small scale generators find it impossible to obtain finance based on the RO contract. Again from the utility perspective, it is generally accepted that there is a market risk operating within the RO. For them, the risks are negligible because the rate of investment is left for the market to decide.

In summary, the analysis shows that the RO does not favour small players because of its risks and price volatility. With the exception of big investors, obtaining finance is somewhat difficult. Small investors do not have what it takes to convince the financial institutions to obtain loans. But from the big investors' point of view, risks are also negligible. A senior Manager with a major utility company claimed that the RO is a market based system and there are chances that players in the market are able to make enough money out of it. Although there are obvious risks associated with the market, they are calculated and sorted out in the investment analysis such that any political interference and changes to price do not matter.

8.4.2.8 Impact on development

The RO is usually criticised as being a technologically blind mechanism, but it has been an important tool for delivering a very good capacity of onshore wind power. Evidence from the interviews reveals that the RO has, without a doubt, made an enormous difference to the onshore wind development since 2002. Projects have been developed at a great rate and certainly faster than they have ever been in the UK. Illustrating the importance of the RO in stimulating the market, a Director of Economics and Markets with a renewable energy association said that:

> "*oh massively, massively, there is absolutely no denial that the existence of the RO hugely stimulated the market for onshore wind power in the UK. If you look at our statistics of submissions in the planning system in the last few years, there has massive rate of change in the submissions. When the RO was a kind of introduced people were like you have got a system where in we can bank on or we can trust, it brings a long term market signal, lets go for it. Like I keep saying, the failure is not all the fault of the RO.*" (Interview undertaken: 14th June 2006)

At the end of year 2006, total installed capacity reached 1963 MW representing a 48% increase over 2005 records. The total electricity contribution of wind power in 2004 was 1935 GWh representing 0.48% of the total UK electricity demand. And wind power industry turn over for 2006 was well over 500 million Euros (IEA Wind 2006).

Moreover, in Scotland, the SRO has also proved efficient in delivering a high volume of wind power capacity. Evidence from the interviews shows that in 2002, Scotland received 10% of its electricity from renewable energy sources including hydro. In 2006, the rate was given as 15%. While in 2007 two of the respondents interviewed claimed that the percentage contribution of renewable electricity reached 18%. Wind power, principally onshore wind, forms a major part of these percentages. An Executive Director with a trade association claimed that by 2020 it is expected that 50% of the electricity demand will come from renewable energy, out of which 20% will be supported by the SRO. This according to him will be made possible with a combination of the SRO and better planning processes.

Furthermore, when asked about the economic contribution of wind power sector to the national economy, evidence revealed that the RO has contributed to the development of onshore wind power thus, there are few developers and construction companies involved. A senior Manager with one of the big four utility companies said that:

> *"Well the RO has contributed hugely to the development of wind power (onshore) in the UK because without it you would not have any or so much. However, there are a lot of economic benefits generated from it, in terms of its construction activity, but there could have been more as the government made certain moves earlier on to attract turbine manufacturers into the UK, but that wasn't done and it is too late now but even without that, there is still a lot more activities going on in various companies. At least for any particular projects built in the UK, one third of it goes to the contractor and to the huge amount of construction work that comes out of it, so thus creating huge benefit in the market."* (Interview undertaken: 27th November 2006)**.**

To date, there are no large indigenous wind turbine manufacturing companies except for smaller and micro producers with a maximum production capacity of 20kW. Notwithstanding, the UK wind power sector employs about 4000 people and this figure is expected to increase as wind industry grows in the UK hence, from the Round 2 of offshore wind development about 20,000 more jobs are expected to be delivered by the industry (IEA Wind report 2006; Strachan *et al* 2006; BWEA 2004). The Scottish Renewables Forum observed that about 1500 of these jobs are in Scotland (SRA 2007). Onshore wind is now relatively near market in the UK and it is expanding more rapidly than was expected.

Furthermore, according to BWEA (2007)[51], wind power contributes annually to the UK's reduction of Greenhouse Gases (GHG). Table 8.4 below provides an overview of the amount of Carbon dioxide[52] (CO_2), Sulphur di-oxide[53] (SO_2), and Nitrogen Oxide[54] (NO_x) reduced with the current installed wind capacity of the UK.

Table 8.4: Greenhouse Gas Reductions

CO_2 reductions per annum	**SO_2 reductions per annum**	**NOx reductions per annum**
4329408 Tonnes	100684 Tonnes	30205 Tonnes

Source: British Wind Energy Association (BWEA) [Online] 10th October 2009

Overall, there is still room for improvement even though the RO has been able to deliver a record level of onshore wind, there is need to develop the offshore wind potential as well. Illustrating this further an environmental campaigner said that:

> *"......there are a lot of winds out there that are viable, very powerful but we don't really seem to be getting into it at all and*

[51] Accessed 23/10/2007 [Online] at http://www.bwea.com
[52] Created by the combustion of fossil fuel
[53] Sulphur di-oxide is released when coal and petroleum are burnt, thus causing acid rain
[54] Mono Nitrogen oxides are produced during combustion of fossil fuel at high temperature

> *that is frustrating, and there is no good reason for that…so there is still a great opportunity to tap into wind industry in the UK."* (Interview undertaken: 13th June 2006)

8.5 POLICY LESSONS AND OUTCOMES

The historical path of the deployment of wind power deployment in the UK has not been able to combine energy policy, environmental policy, and technological innovation and development. Communities have benefited little from the potential of investing in wind power. Toke *et al* (2008) traced this historically to the traditions of strong institutions promoting the value of landscape at the expense of community of societal participation (Szarka and Blühdorn 2006). This institutional conflict has created a form of top-down approach to the development of wind power. Wind power policy is characterised as not been able to reach a politically fixed target, having relatively high prices and being costly, as such a very limited number of companies and technologies have benefited from the gains of deploying renewables. Mitchell *et al* (2006) argued that long term renewable electricity prices are uncertain, therefore suppliers are very reluctant to sign long-term contracts hence; the volume and price risk is high.

The past seven years have also witnessed a series of amendments and changes to the UK wind power policy instrument. This has introduced further complexities and uncertainties for investors and developers. A carefully thought out design and implementation from the onset would have prevented or minimised these complexities. The introduction of ROC prices and buy-out prices has added to consumer burdens. A very small number of suppliers control the UK renewables market. Consequently, the RO has not been able to balance the power of stakeholders in the market. One party dominates the others in the market. The buy-out price over the years has only been recycled to only few utilities in the UK (Szarka 2007).

The UK operates a very inflexible policy instrument which does not allow other technologies to develop. The original intention of the RO was to ‘pick no winner’ (Szarka 2007; Lipp 2007) among technologies. This has not been achieved as the RO tends to favour mature technologies and fails to provide enough support for emerging technologies. The recent banding is meant to correct this but again, complexities surrounding this cannot be accounted for. Bands for each technology need to be set in clear terms. Having varying scales of ROCs for each technology does not solve the problem alone. Investors still undertake investment and risk analysis as to what type of technology to invest in. In the case where bands are not set correctly, whereby investors makes excessive profit, the Government may interfere again with the market in the future, with the aim of addressing the market conditions.

8.6 CONCLUSION

From the analysis, the principal market driver for promoting wind power to date in the UK is the Renewables Obligation. Although it has changed every single year of its existence, it has helped deliver record levels of onshore wind. The changes made every year have also dented investors’ confidence, hence, investment in wind power is more risky than in countries like Germany.

Unlike Germany and The Netherlands, the RO is not suitable for encouraging local investments in renewable energy. The ownership structure of wind power also differs.

Most of the wind installed capacity is controlled by large corporations and big utility companies. The UK wind power sector is still characterised by planning delays and an inadequate transmission infrastructure, hence, it is likely that the UK will not meet it 10% renewable target by 2010.

Overall, this Chapter concludes that the RO is still more expensive than the German FIT and, as such has underperformed when compared with other policy instruments like the FIT. However, the RO cannot be solely blamed, as there are other issues surrounding the UK's inability to reach the heights of Germany, Spain and Denmark. Notwithstanding, the RO still has a long way to go before catching up with other EU policy instruments like the German and Spanish FITs.

CHAPTER NINE

A CROSS NATIONAL COMPARISON: DISCUSSION AND CRITICAL ANALYSIS OF THE FEED-IN TARIFF, THE MEP, AND THE RENEWABLES OBLIGATION

9.1 INTRODUCTION

The principal objective of this research is to critically compare and contrast the performance of the feed-in tariff and quota system, using the data collected from key stakeholder groups and industry actors. Arising from the critical analysis in Chapters Six, Seven, and Eight, the aim of this Chapter is to attempt to add value to the current cross-national comparisons made about wind power delivery and to present a more rigorous comparative analysis, which teases out different dimensions of policy instrument evaluation. A key focus of this objective is to set this critique in the context of the EU's harmonisation agenda, which is the subject of ongoing debate and conjecture throughout Europe (Soderholm 2008a, 2008b; del Rio 2005, 2004; de Vos 2005; EU 2005a; Fouquet *et al* 2005). New institutional theory has helped in this study to explain the interaction and relationship that exists between various wind power stakeholder groups in the implementation and design of the choice policy instrument in three EU Member States. The understanding of the historical paths of each Member State has helped to explain the consequences of the varying degrees of achievements and successes of policy instruments adopted to promote wind power. To this end, this Chapter would also lend this understanding to explain the impact of EU policy instrument harmonisation on the development of wind power.

The Directive 2001/77/EC leans towards an EU-wide harmonised policy instrument for the promotion of renewable energy electricity in the future. However, with the current situations[55] (Swider *et al* 2008; de Oliver and Tolmasquim 2004) that exist in each Member State, this study argues that harmonisation may not be the best option for the EU wind power market. Considering different approaches to the development and deployment of wind power, this study argues that adopting a single renewable energy policy instrument for the EU is highly detrimental to the wind power industry. Combined with the environment, culture, and market structure of each Member State, harmonisation is not the best way forward. Further discussion of this is presented in a subsequent section of this Chapter.

9.2 EVALUATION FRAMEWORK

The framework utilised in this Chapter is reviewed in detail in Chapter Four. The analysis presented in this Chapter also follows on from the analysis presented in Chapters Six to Eight. A total of fifty-five in-depth semi-structured interviews were conducted, out of which four were at EU level. To compliment the data from the interviews, secondary or published materials are also utilised. This is to ensure consistency, reliability and accuracy of the data presented.

9.3 WIND POWER AND EU POLICY

To recap, the White Paper '*Energy for the future: renewable sources of energy*' (EU 1997), specifically provides a commitment to supply 12% of the EU's energy from renewable energy sources by 2010 and observed that renewables can help reduce the EU's dependence on imports of fossil fuel, reduce CO_2 emissions, and stimulate

[55] Different conditions and costs of grid connections; planning and other regulatory requirements

economic growth (see Chapter Two of this thesis). Thus, the document paved the way for the introduction of strategies for promoting renewables in the EU and brought awareness to the importance of renewables to the entire EU economy. The directive 2001/77/EC was also adopted as a follow up measure for reaching the EU renewable target by 2010. However, as mentioned earlier, the directive sets indicative targets for the share of RES-E for each Member State, with each given the freedom to choose the kind of policy instrument that suits their particular market and legal system and outlined an ambitious target of 21% contribution of RES-E by 2010 (EU 2006a). In addition, the EU based on its Kyoto Protocol obligation to cut down carbon dioxide and other greenhouse gases (GHG) emissions by 8% in 2010, the Council of the EU in March 2007 further reaffirmed the importance of renewables utilisation in the EU and stated that:

> *"The European Council is aware of the growing demand for energy and increasing energy prices as well as of the benefits of strong and early common international action on climate change, is confident that a substantive development of energy efficiency and of renewable energies will enhance energy security, curb the projected rise in energy prices and reduce greenhouse gas emissions in line with the EU's ambitions for the period beyond 2012……"* (EU 2007:20).

9.3.1 Recent Developments

In April 2009, the EU Parliament and the Council signed into law, the Directive 2009/28/EC mandating all Member States to have in place renewable energy policy instruments that will enable them meet future EU targets. As opposed to the previous Directive 2001/77/EC that allowed Member States meet their indicative and ambiguous targets without much monitoring, the new Directive set mandatory targets and also attempt to monitor progress through the National Renewable Energy Action Plan (NREAP). Member States are now mandated to comply with the template of

NREAP commissioned by the EU Commission in June 2009. The template will allow Member States to build renewable energy development plans and also enable them report progress made to the Commission.

This action by the EU is very significant and serves to correct the flaws of Directive 2001/77/EC. When asked if the requirements of the EU before the new Directive would help the EU reach its target by 2010 and beyond, the four respondents interviewed at EU level claimed that reaching the EU target cannot be attained without binding decisions. Findings from the interviews reveal that without additional measures, especially within the EU-25, the target will not be achieved. Evidence reveals that the target can only be reached if Member States, whose policy instruments are not doing well at the moment, change their promoting schemes. A policy Director of a popular European renewable association stated that some Member States' policy instruments are not working so well for example: Greek and Portuguese feed-in tariff, Belgian quota system etc. Some are flawed because of the inherent design issues.

The Green Paper EU (2006a) stated that the EU will only achieve 19% of the 21% overall RES-E target in 2010. Only nine Member States[56] are now on track to reach their national indicative target (EU 2006b). Nonetheless, wind power has been an important part of renewable energy sources in Europe. Wind power has been very successful, and has made significant progress, and with over 40GW installed capacity in Europe it has now exceeded the 2010 targets (EU 2006a). As mentioned in early Chapters, the EU remains the world leader in terms of wind power installed capacity,

[56] Denmark, Germany, Finland, Hungary, Ireland, Luxembourg, Spain, Sweden, and the Netherlands

with 60% world share (Zervos and Kjaer 2009). According to EWEA (2010), 9581MW wind capacity worth 11.5 billion Euros was installed in 2009. This represented a 21% increase compared to 2008 records hence, "*...for the second year running in the EU, more wind power was installed than any other electricity generating technology*" (EWEA 2010:6).

Notwithstanding, this considerable market penetration the EU wind sector still faces huge challenges which need to be addressed. According to EU (2006a, 2006b, 2005a), one third of EU Member States do not give enough support to wind power. Further, wind is still not sufficiently harnessed in half of the EU Member States. This is due to delays in authorisation, grid conditions and slow reinforcement and extension of the electricity grid. During one interview, a Chief Executive Officer from one European wind power association claimed that the EU needs a long term commitment to enable it to reach future targets. He also claimed that for the EU to escape from its current energy and climate change crisis, its needs to re-think the whole way energy demand is being met. Hence, wind power is expected to deliver a record level capacity of energy if the EU rises to tackle the challenges that currently impede on the future growth of the sector without delay. The next section provides a comparative analysis of the policy instruments utilised by the Member States investigated in this study.

9.4 COMPARATIVE ANALYSIS OF POLICY INSTRUMENTS

To recap, the feed-in tariff places an obligation on the utility companies to purchase green electricity from generators at a government fixed price. While the Environmental Quality of Electricity Production (MEP) is a kWh subsidy paid to domestic producers of electricity from renewable sources and CHP who feed into the national grid renewable generated capacity (van Rooijen and van Wees 2007). In contrast the quota/renewables obligation (RO) mandates utility companies to supply a certain percentage of their electricity mix from renewable energy sources, with certificates allocated to ensure compliance in meeting the targets (IEA 2006; Ringel 2006; Fouquet *et al* 2005; Sawin 2004). However, the comparative analysis presented in this Chapter is centred on renewable energy electricity generation and specifically wind power electricity generation of the Member States investigated. The analysis is also based on the criteria and framework outlined and discussed in Chapter Four of this study.

9.4.1 Administration

To recap, the directive 2001/77/EC demands that Member States should implement policy instruments that enable them to reduce regulatory and non-regulatory barriers, so as to increase renewable electricity and ensure that the rules [policy instruments] are objective, transparent and non-discriminatory.

9.4.1.1 Transparency and practicability

Following this principle, the FIT has proved more transparent than the RO. There are several reasons that explain this. Firstly, the FIT is simple and easy to understand. The FIT can be adjusted and monitored as the market develops. This is not the case with the RO. Secondly, the FIT mandates regional and local electricity suppliers to purchase electricity generated in their own locality at a stated price for different technologies. It also offers different prices for onshore wind depending on the location. Less windy sites are paid more than windy sites. In the UK, before the introduction of banding, the RO did not consider this; the RO charges the same price for all technologies. Besides, suppliers can obtain certificates from any generator where ever their location. The RO is viewed as a market based policy instrument which allows the free interplay of demand and supply without any need for Government spending. This makes the RO complicated and volatile.

The FIT and the MEP do not mandate the Government to fix targets and timetables, rather it creates a market for all forms of renewable energy source technology, irrespective of their stage of technological development. This is also consistent with Grotz and Fouquet (2005:19) findings that: "*the demands and requirement for meeting targets are far more challenging under the RO than the FIT and the MEP systems.*" Fouquet *et al* (2005) argued in support of this claim. The authors indicated that the requirements under the RO are far more difficult to meet, because in most cases, the fixing of targets is critical and may push prices up or down if not properly designed.

9.4.1.2 Flexibility

The FIT is also very flexible and accommodates changes without dampening investors' confidence. It is always possible for the Government to change fixed prices to account for new capacity installed (Fouquet *et al* 2005; Sawin 2004). In essence, the FIT brings into the market a wide range of different technologies and does not pick winners as it takes into consideration the developmental stage of each renewable energy technology. Szarka (2007) pointed out that the RO picks winners by rewarding the cheapest technologies over others, as such; meeting targets is difficult. Thus, the RO is very inflexible, once targets are fixed, it is always difficult to make any adjustments. However, because the MEP was not properly designed, it was very inflexible, the process of making changes and adjustments was impossible. This explains the reason why the MEP was abandoned in August 2006 by the Dutch Government.

In terms of managing institutional conflicts, the FIT has survived various criticisms directed against it by electricity suppliers. Almost all parties involved in the design and implementation of the FIT are in favour of its continuous existence in Germany, except for the electricity suppliers who feel that computation and system balancing is more of a problem with the FIT laws. The transactional cost burden on the consumers under the FIT is also less than that in the RO. More of these issues are explored further in subsequent sections of this Chapter.

9.4.2 Stakeholders Support/ Involvement

To recap, the extent to which policy instruments encourage stakeholder groups to participate and be involved in wind power deployment is crucial to successful implementation. It is on this note that this section discusses stakeholders support and involvement under the following subheadings:

9.4.2.1 Policy instrument design and implementation

The FIT and the RO have enjoyed stakeholder (renewable and wind energy associations, project developers etc) support during and after their design. The MEP falls short of this credit. The MEP is decided upon by the Government alone and is imposed on key stakeholders, thus the MEP did not last for more than three years.

Stakeholders are involved through workshops and consultations[57] in Germany while in the UK, stakeholders are involved through various rounds of consultation processes[58]. The German FIT has been credited for involving wind research institutes and renewables association in the calculations and pricing of the FIT. The RO leaves this up to the market to fix prices however this has resulted in price fluctuations and distortions as only a few players dominate the UK electricity market.

9.4.2.2 Planning issues

Planning permission laws and regimes in the UK and The Netherlands are still very complicated (Klessmann *et al* 2008; Eltham *et al* 2008). Developers in the UK attempt to procure the best windy sites for siting wind parks, but in the process they are hit by strong public resistance. For example, the Middlemoor windfarm public inquiry held in November 2007 ended in intense debates and arguments (Northumberland Gazette 2007), but was eventually consented in August 2008 (BWEA 2008). Although with the new planning laws in the UK, things have improved but it can get better by improving on wind farm build-up time. It is required in the German planning law that regional and local municipalities designate areas for wind power development, where this does not happen, Breukers and Wolsink (2007) pointed out that developers are free to develop and site wind power any where, provided they are outside the build up area. With this, institutional conflicts are minimized. Although, there are gradual changes noted in Germany as well, the spatial planning regime is now becoming a bigger issue (Toke *et al* 2008; Breukers 2006).

[57] For example the consultation and workshop on the amendment of the Renewable Energy Sources Act 2004 from January 2006 to May 2008

[58] For example the Statutory Consultation on the Renewables Obligation Order 2009 from June to September 2008; and the Statutory Consultation on Renewable Energy: Reform of the Renewables Obligation from May to September 2007.

Albeit, to date there has not been any established body of anti-wind lobby group as in the UK and The Netherlands (Szarka 2007). Anti-wind lobbies in Germany and The Netherlands are more concerned with the protection of nature than landscape and cultural heritage protectionism (Breukers 2006). In The Netherlands, wind power is not included in planning laws. Breukers and Wolsink (2007) pointed out that wind power schemes require pro-active decisions from municipalities. Decisions are left in the hands of the planning and Spatial Ministry. Thus, wind power development is slower than in Germany as refusals cannot be appealed. For example Breukers and Wolsink (2007) found that 80% of the proposed wind power in The Netherlands are either refused or rejected by planning authorities.

The recent planning review in the UK has also been of some help. Szarka and Blühdorn (2006:28) pointed out that the UK has no spatial planning regime, rather wind power planning and consenting is ‘criteria based’ decision making. Except for large projects which are decided by the central government, planning permission is granted by local authorities. Nevertheless, appeals against any rejected application are allowed in UK; the anti-wind lobby objective is more of landscape and nature protectionism. They use misleading information to gain ground and have been successful in resisting the development and advancement of wind power. Despite the review of the planning laws, their action and activity is very strong and influential. Windfarm sites and constructions are usually outside the community and as such account for the limited public support for wind power received in the UK.

9.4.2.3 Ownership structure

Wind power ownership of the Member States examined in this study can broadly be divided into two types: (i) local co-operatives or small scale ownership; (ii) corporate or large scale ownership. Toke *et al* (2008:1140) defined the former as "*schemes that are participative and locally based or run for non-profit, 'ethical investment' purpose*". The authors described the later as "*a range of non-local types of ownership including utilities, independent power producers, and other hybrids*" (Toke *et al* 2008:1139). These two categories of windfarm ownerships differentiate the German and Dutch wind industry structure from that of the UK. The German and the Dutch wind power markets are characterised by many small local co-operatives, while the RO tends to favour large corporations like utility companies, who tend to dominate the UK market. This is largely responsible for the huge public support usually accorded to the wind industry and the FIT in Germany. This is also consistent with Toke (2006:26) finding that:

> *"Local ownership of wind power schemes has been associated with higher levels of planning acceptance compared with ownerships by remote corporations."*

Thus, the RO is meant to promote the least cost technology option, while the FIT is open to all renewable energy technologies, no matter the stage of development and the costs involved. This is also consistent with the findings of Szarka and Blühdorn (2006), Toke (2006), Fouquet *et al* (2005), Sawin (2004), that the RO tends to promote least cost projects, thereby restricting them to geographical locations, which promote the concentration of large scale projects, in a single centralised location. This was also the case in Germany during the 1990s. Szarka and Blühdorn (2006:25) pointed out that most of the developments in Germany are based in the Northern Coaster Lander. This became a problem when most windy sites in this region were paid the same rate as the less windy areas. Nevertheless, the government became aware of this and the problem was resolved. Hence, Fouquet *et al* (2005) noted that the situation was improved by adjusting the feed-in tariff payments to reflect different costs of production in different regions. Thus, regions and locations with low wind speed are paid more than regions with high wind speed. In the past, this was not the case with the RO. It has also not been proved yet how this would be achieved with the recent banding regime. Furthermore, this may account for the reason why there is very strong negative public acceptance rate for wind power in the UK. Toke *et al* (2008:1140) state that: "*co-operatives involve large numbers of people investing in wind power, hence enlarging the pro-wind power lobby at both local and national level"*.

In the UK, the RO is dominated and controlled largely by only a few utility companies and big organisations, there are only few co-operatives. Individuals cannot afford to go through the process of application, planning and consultation. It takes time and demands a large amount of money with no guarantee of success. So, projects are better left for the big companies that can afford to bear the costs and risks associated with these hurdles. This is also consistent with Szarka and Blühdorn (2006:29) finding that:

> *"In Germany, availability of subsidies for investment in wind farms and guaranteed feed-in tariffs encouraged ownership by farmers and by the general public, leading to large numbers of community ventures called Burgerwindparks (Citizens' wind farms)."*

To summarise this discussion, the FIT and the MEP tend to favour small scale companies and local ownership of windfarms, than the RO. This is why ownership structures in Germany and Netherlands are quite different from the UK. Although stakeholders in the UK are largely involved during the consultation process and in the design stage of the RO, the system is not suitable for co-operatives and local ownerships. Hence, with the regional spatial planning regime in Germany, there seems to be a ‘bottom-up’ approach to the demands and acceptance of wind power (Breukers 2006). While in the UK, because of the well organised anti-lobby groups and a difficult planning regime, there seems to be ‘top-down’ approach to the demands and acceptance of wind farms (Cowell 2007; Strachan and Lal 2004).

9.4.3 Certainty for Industry

To recap, wind power is a near market technology and still requires adequate subsidy to make it compete on a commercial basis with non renewables. It demands that supports are consistent to encourage an enabling environment for industrial and technological development. This section compares the policy instruments based on their stability and investment certainty.

9.4.3.1 Stability and investment certainty

The FIT is a relatively stable policy instrument that has to date been deployed in Germany to deliver a huge capacity of wind power. The FIT provides a very high level of investment certainty and equally guarantees a high return on investment. The FIT has been in existence since 1991 and usually guarantees payments for up to twenty years. As a result, investors are willing to and enthusiastic about investing in wind power. The stability of the FIT also helps to create an enabling market environment to support the development of a domestic wind turbine manufacturing sector. Germany represents one of the biggest wind turbine manufacturing industries in the world (IEA Wind 2007). The FIT also creates market incentives for small scale generators and cooperative developments hence, the German wind power industry is characterised by local ownership schemes.

By contrast, the MEP is an unstable policy instrument and was only in existence for three years before it was abandoned by the Dutch government through the Ministry of Economic Affairs. The risk of investing into wind power is high; there is no guarantee of return on investment. This has been largely responsible for the gradual loss of the Dutch wind turbine manufacturing industry (IEA Wind 2007).

Similarly, the RO has changed every single year since its introduction. Each time the RO has been reviewed, investors have been uncertain of its future and the credibility of the system. To date, the RO is characterised by most investors as being risky and uncertain (Grotz and Fouquet 2005). It is still very much unclear what the future holds for the wind industry when the RO comes to an end in 2027. Furthermore, there is no local or national wind turbine manufacturer in the UK. Investors are faced with the option of importing wind turbines from Germany, Spain and China (IEA Wind 2007). As such, investors are vulnerable to price increases in wind turbines and a scarcity, in some cases. This is a major setback for the RO.

In summary, it can be inferred from this discussion that the FIT is a very strong policy instrument that guarantees a high return on investment. It also creates an enabling business environment with low or no risks (Toke 2007a; Toke and Lauber 2007; Szarka and Blühdorn 2006) when compared to the other policy instrument investigated in this study.

9.4.4 Effectiveness

To recap, the effectiveness of the policy instrument examined in this study has been measured by the quantitative amount of wind power installed capacity added annually over the period 2002 to 2008. When comparing the installed capacity from 2002 to 2008, the German FIT is well ahead of the other two policy instruments.

9.4.4.1 Wind capacity added over time

Table 8.1 shows the countries installed capacity from year 2002 to 2008.

Table 9.1: Wind power installed capacity

Year	Germany	Netherlands	United Kingdom
2002	11994 MW	693 MW	552 MW
2003	14609 MW	912 MW	649 MW
2004	16629 MW	1078 MW	888 MW
2005	18428 MW	1299 MW	1353 MW
2006	20622 MW	1560 MW	1963 MW
2007	22,247 MW	1,746 MW	2,389 MW
2008	23,903 MW	2,225 MW	3241 MW

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

As Table 9.1 shows, the German wind installed capacity had increased from 11994 MW in 2002 to 23,903 MW by the end of 2008. While The Netherlands and the UK capacity only increased from 692 MW and 552 MW to 2,225 MW and 3,241 MW by the end of 2008. This clearly shows that the German FIT is more effective in delivering wind capacity than either the MEP or the RO.

Similarly, Table 9.2 (1-3) provides a breakdown of the annual growth rate of installed capacity of the three Member States. Germany's annual growth rate of installed capacity has decreased significantly. Table 9.2 (1-3) shows that the rate of annual growth (in percentage) for Germany fell from 21.8% in 2003 to 7.4% at the end of 2008. Two main reasons account for this. The first is a result of the saturated market for wind power in Germany. Almost all the good sites for onshore wind power have already been allocated. The second is re-powering, which is slow at the moment, because of changes in spatial and regional laws (Szarka and Blühdorn 2006). Notwithstanding, Germany's total annual additions since 2002 were no lower than 1600MW, as shown in Table 9.2 (1-3). Similarly, in The Netherlands, the rate of installed capacity growth for wind power also fell from 31% in 2003 to 27% in 2008. Total additions to annual installed capacity grew from 219 MW to 479MW. The slow rate of growth may also be due to strict planning permission laws in The Netherlands (Agnolucci 2007a; Agterbosch *et al* 2007).

In comparison with the RO in the UK, the annual installed capacity rose from 97MW in 2002 to 852MW in 2008, showing an increase from 14.9% in 2003 to 35.7% in 2008. This growth rate notwithstanding, The Netherlands and the UK still remain far behind Germany in terms of installed capacity. Like The Netherlands, planning permission laws in the UK are still complex and complicated. It takes a considerable amount of time to get a project up and running in the UK. The current BWEA records shows that of the 2101.75 MW approved in 2008, only 522.80 MW was built. Similarly, records for this year show that about 3113.31 MW has been consented but so far only 895.55 MW is under construction. No doubt, the RO is working, nevertheless, it needs to come a long way to compete with the FIT's records (Toke *et al* 2008).

Table 9.2.1: Germany

Year	Installed capacity (MW)	Annual change in capacity added (MW)	Rate of growth (%)
2002	11994	-	-
2003	14609	2615	21.8
2004	16629	2020	13.8
2005	18428	1799	10.8
2006	20622	2194	11.9
2007	22247	1625	7.9
2008	23903	1656	7.4

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

Table 9.2.2: Netherlands

Year	Installed capacity (MW)	Annual change in capacity added (MW)	Rate of growth (%)
2002	693	-	-
2003	912	219	31%
2004	1078	166	18.2%
2005	1299	141	13%
2006	1560	314	28%
2007	1746	186	11.9
2008	2225	479	27.4

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

Table 9.2.3: United Kingdom

Year	Installed capacity (MW)	Annual change in capacity added (MW)	Rate of growth (%)
2002	552	-	-
2003	649	97	14.9%
2004	888	239	26.9%
2005	1353	465	34.4%
2006	1963	610	31.1%
2007	2389	426	21.7
2008	3241	852	35.7

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

When comparing the three Member States in terms of their contribution to the EU wind installed capacity, Table 9.3 (1-3) shows that at the end of 2008 Germany holds 36.81% of the total EU wind installed capacity, while The Netherlands and the UK account for only 3.43% and 4.99%. Again the shares of Germany and The Netherlands fell from 58% and 3.38% in 2002 to 36.81% and 3.43% in 2008. While, the UK share increased from 2.7% to 4.99%.

Table 9.3.1: Germany's Percentage Share in Total EU Capacity

Year	Total EU Capacity (MW)	Germany Installed Capacity (MW)	Share in Percentage
2002	20447	11994	58.7%
2003	28440	14609	51.4%
2004	34205	16629	48.6%
2005	40584	18428	45.5%
2006	48000	20622	43%
2007	56517	22247	39.36%
2008	64935	23903	36.81%

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

Table 9.3.2: Netherlands' Percentage Share in Total EU Capacity

Year	Total EU Capacity (MW)	Netherlands Installed Capacity (MW)	Share in Percentage
2002	20447	693	3.38%
2003	28440	912	2.15%
2004	34205	1078	3.15%
2005	40584	1219	3.01%
2006	48000	1560	3.25%
2007	56517	1746	3.09%
2008	64935	2225	3.43%

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

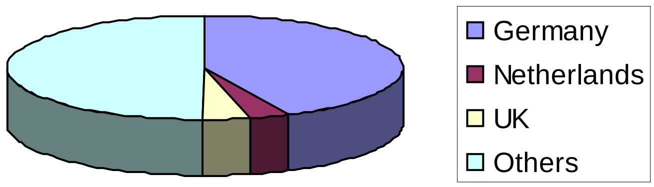
Table 9.3.3: UK's Share in Total EU Capacity

Year	Total EU Capacity (MW)	UK Installed Capacity (MW)	Share in Percentage
2002	20447	552	2.7%
2003	28440	649	2.28%
2004	34205	888	2.60%
2005	40584	1353	3.34%
2006	48000	1963	4.09%
2007	56517	2389	4.23%
2008	64935	3241	4.99%

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

As mentioned earlier, the fall in the German shares may be as a result of the current re-powering ongoing in Germany. This also implies that onshore wind has reached its peak in Germany, while in the UK there is still room for more capacity, but due to the problems and barriers highlighted earlier, percentage changes are too small to affect the capacity delivered by the FIT in Germany. Similarly, comparing the total percentage of Germany with the other EU Member States, it can be concluded that Germany is still very successful. The FIT remains an important element in the development of wind power in Germany. From Table 9.3(1-3), evidence reveal that Germany held 43% of the total EU wind capacity in 2006, while the UK and Netherlands had 4.09% and 3.25% respectively. Comparing these results, Figure 8.1 below indicates that all the other Member States together produced 49.66% installed wind capacity in the same year.

Figure 9.1: The Comparison of Percentage Share of Wind Capacity of the EU Member States



Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

However, it can be seen from Figure 9.1 that, Germany still remains a major player in the EU wind power market and irrespective of the fall in the share percentage of the country, it can be concluded that the German FIT performed better than the MEP and the RO.

Linked to this is the comparison of the Member States in terms of the annual percentage share of the EU installed capacity. The German FIT still leads the other policy instruments. Table 9.4 shows that of the 8484MW installed capacity added to the EU capacity in 2008, Germany's share was 19.63% (1665MW), while The Netherlands and the UK share stood at 5.89% (500 MW) and 9.85% (836 MW). The total added capacity from Germany was 100% more than the added capacity in The Netherlands and the UK.

Table 9.4: Percentage Share of Member States in regards to Annual EU installed Capacity

Year	EU Annual Capacity Added (MW)	Added Capacity from Germany (MW and %)	Added Capacity from Netherlands (MW and %)	Added Capacity from United Kingdom (MW and %)
2002	-	-	-	-
2003	7993	2615 (32.71%)	219 (2.7%)	97 (1.2%)
2004	5765	2020 (35%)	166 (2.9%)	237 (4.1%)
2005	6299	1799 (28.6%)	141 (2.2%)	465 (7.4%)
2006	7496	2194 (29.3%)	293 (4.5%)	610 (8.1%)
2007	8554	1667 (19.49%)	210 (2.45%)	427 (4.99%)
2008	8484	1665 (19.63%)	500 (5.89%)	836 (9.85%)

Source: European Wind Energy Association (EWEA) [Online] 31st July 2009.

9.4.4.2 Ability of policy instrument to reach targets

Furthermore, the success of any policy instrument is not the amount of capacity added to wind power alone, but its ability to achieve renewable energy targets set by the national Government (Butler and Neuhoff 2008; 2004). Unlike the quota system (RO) where targets are fixed and set by the Government, Fouquet *et al* (2005) argued that it is not possible to know in advance how much wind power or renewable energy capacity can be added over a set time with the German feed-in tariff. Nevertheless, EU (2006a, and 2005a) named Germany as one of the Member States that will reach its 12.5% renewable electricity target by 2010. According to the Renewable Energy Source Act Progress Report (BMU 2007a), of the 12.5% RES-E capacity, 6% will come from wind power. The report also claimed that the feed-in tariff has been instrumental in the delivery of wind power installed capacity in Germany.

Similarly, EU (2006a, 2005a) also named The Netherlands among one of the Member States that will reach its renewable electricity target by 2010. One of the reasons the MEP was abandoned by the Dutch Government was because it is believed that with the current approved renewable capacity, the 9% target will be reached by 2010. This is not the case for the UK. So far, the RO has not been able to prove its ability to reach political set targets. Though relatively new when compared to the FIT, renewable energy electricity is still less than 5% in the UK (IEA Wind 2007). Thus, the contribution of wind power to the total 10.4% is less than 4%; hence a shortfall of the target is envisaged by 2010. This is also consistent with the finding of Szarka and Blühdorn (2006:17) that:

> *"Germany is one of the few EU countries capable of reaching its 2010 RES-E target of 12.5%, as set out in the European directive 2001/77/EC. The contrast between Germany having 18427 MW of capacity in January 2006 and the UK 1342 MW is clear-cut. A very high rate of new build in the UK in the near future could reverse this assessment, but it is currently unlikely."*

One reason why it is currently unlikely for the UK to reach the 10.4% target and possibly catch up with Germany is the planning system. It takes too long to get wind power sites consented in the UK. As long as this remains, wind power capacity in the UK will remain low. Marsh and Toke (2006:1) pointed out that: "*high rates of failure of proposed wind power schemes and lengthy planning procedures make this target difficult to achieve"*. In addition to the 'historical' influence of landscape and anti wind organisations, issues like delays in planning approval, local authority and land owners perception, the make-up of local MPs and the way local interest groups can influence decisions all add up to form constraints limiting the deployment of wind power schemes. Furthermore, meeting targets in the UK is impossible as a result of the inherent flaws in the design of the RO. Szarka (2007) attributed this to the fundamental principle of the RO as a 'technology blind' policy instrument. According to the author, this makes targets setting for each technology impossible. Thus, the RO in its original state is not designed to meet quotas or targets. According to the Carbon Trust (2006:2), it is expected that the UK will only reach 7.6 per cent, 9.6 per cent, and 10.1 per cent of generation status by 2010, 2015, and 2020 respectively. The reason to explain this revolves around the fact that the closer the market gets to meet targets, the less value the renewables obligation certificate has. This in itself is regarded as a threat to the market. Similarly, the risk and uncertainties associated with the RO make finance and investments in wind power very difficult for small-medium scale players. Butler and Neuhoff (2008) pointed out NETA places a premium on reliable generation and penalises intermittent generation. This is a particular problem for small scale industry generators, "*since such facilities are unable to balance their supply with alternative source of energy*" (Butler and Neuhoff 2008:1859), thus the RO tends to pass on the market risks to the private sector. Hence, until the Government addresses these issues, investors' confidence will remain low, resulting in a lower contribution of wind power compared to other Member States like Germany, Spain, and Denmark.

To summarise this discussion, the FIT has been more effective in delivering huge mega watt (MW) installed capacity in Germany than the UK renewables obligation. Although the RO is still relatively new, there are many opportunities and room for improvement in order to produce record levels of wind power capacity like the German FIT. It is also too early to assess the impact of the recent RES-T banding on the effectiveness of the RO, empirical evidence will be required in the near future to explain the impact of banding on the RO.

9.4.5 Efficiency

The aim of any wind policy instrument is to make RES-E competitive, whilst cutting costs for the final consumer hence, to make RES-E cheap and affordable to households and individuals. However, contrary to popular argument that the German

FIT and the MEP are more expensive than the RO (EURELECTRIC 2004), both systems have proved to be cheaper and more efficient in reducing costs than the RO or the quota system.

9.4.5.1 Prices and cost reduction

Table 9.5 presents estimates of prices for wind power generated electricity from 2003-2008 as offered by each policy instruments.

Table 9.5: Prices of wind generated electricity, 2003-2008 (in eurocents per kWh)

Year	Germany	Netherlands	UK
2003	6.80-8.80	9.20	9.60
2004	6.50-8.50	9.60-9.90	10.10
2005	6.50-8.53	9.90	10.10
2006	5.28-8.36	9.90	13.00
2007	5.30-8.40	9.90	13.00
2008	5.30-8.40	9.90	14.00

Source: Fouquet and Johansson (2008) Szarka and Blühdorn (2006); BMU (2007); Grotz and Bishoff (2005).
Author Generated

Evidence from Table 9.5 proves that the FIT and the MEP offer lower prices than the RO. Two reasons were suggested by Grotz and Bischof (2005:2) for this:

- *"The unstable and fluctuating green certificate and electricity prices due to developments in the market and meteorological factors lead to high risk surcharges with investors and banks. Consequently, considering higher post-interest equity returns and shorter capital return periods will be sought.*
- *The green certificate price is determined by the marginal costs of the most expensive technology or the least favourable site which have to be used to comply with the quota."*

This is also consistent with the findings of Neuhoff and Butler (2004). The authors concluded in their research that the higher market risks for the wind investment make it difficult to bring about low prices. Therefore, the RO does not deliver wind power electricity generated capacity at a lower rate or cost to the final consumer than the FIT or the MEP systems. Szarka (2007:99) also provides four reasons that explain why the FIT offers lower prices than the RO. These include: "*(i) the FIT prices are predictable and as such gives investor security; (ii) low risks and guaranteed revenues translate into low interest rates on loans; (iii) private investors are often willing to accept lower rates of return on investment than corporate investors; (iv) RES-E generators do not have to pay for balancing services, whilst grid connection costs are relatively favourable.*"

The FIT also achieves cost reductions by "*the regular adjustment to prices [degression] to tariffs for renewable energy in response to changes in technologies and the market places*" (Sawin 2004:12). This is different to the RO. Prices fluctuate without reference to the market place. As a way of explaining this, Szarka (2007:99) found that: "*wind power is a price taker, wholesale price inflation produces wind fall profits.*"

9.4.5.2 Market risks

The FIT reduces costs and prices without affecting investment security. The higher market risks for wind power investors in the UK make it difficult to bring about lower prices of generated capacity in the UK. As result, the RO does not deliver wind power electricity generated capacity at a lower rate or cost to the final consumer than the FIT or the MEP systems. Furthermore, the FIT offers long-term guaranteed prices.

This reduces market risk as investors know what the market can offer and can base investment calculations on this. Also, the degression introduced into the FIT makes it possible for investment to be rewarded adequately, not over what the market can bear or by placing additional burden on the final consumer (Szarka 2007; Mendonca 2007). However, due to the market risks, only a few operators or suppliers control the market in the UK. The market lacks effective competition and as such consumers pay higher prices in the UK than in Germany. Klessman *et al* (2008) also pointed out that the FIT exempt renewable generators from all market and price risks, while the RO possess two risks to electricity generators: the fluctuating electricity price risk; and the certificate price risk. This favours large electricity suppliers who have the ability to manage the market risks. It is not surprising then, that the UK electricity market is controlled by few large suppliers or the 'big six'.

9.4.5.3 Static efficiency

Under the FIT, prices are guaranteed on a long term basis, hence investors can reduce their costs by purchasing equipment, wind power turbines and component parts from a competitive market. Sawin (2004:12) observed that: "*pricing laws (FIT) can drive down costs by driving economics of scale and innovation. Hence manufacturers and developers will compete for the lowest possible costs in order to achieve higher profit margins which promote cost reductions*". Hence, project developers create competition by searching and seeking out least cost equipment from manufacturers, while manufacturers of wind turbines and component parts operate a competitive market. Therefore, Finon and Perez (2007:90) conclude that: "*developers-investors search to increase their profits by looking for the cheapest equipment and minimizing their costs by generating competition between manufacturers*".

On the other hand, the RO is also designed to be a market system as such; it has the potential to make generators compete in the market. Generators can compete when searching for contracts with suppliers. This can drive down the cost of projects developed in response to the increasing demand for certificates from the obligated purchaser (Finon and Perez 2007). Regrettably, this is difficult to achieve with the UK renewables obligation. The reason is that the UK wind industry is characterized by limited domestic supplies of wind turbine.

9.4.5.4 Dynamic efficiency

The FIT has been able to link the promotion of renewables electricity with industrial development. This is currently the case with Germany. The FIT is not 'technologically neutral' as opposed to the RO before the introduction of banding in the UK. Finon and Perez (2007:90) pointed out that the design of the FIT accommodates diversity by "*differentiating technologies in order to respond to long term energy policy aiming diversification*". Therefore the FIT is efficient in this regard.

In comparison with the RO, the FIT encourages the development of local wind turbines and component part manufacturing industries. Eventually, these industries are able to invest in R&D because of the economic of scale they enjoy. It is also very easy to learn more about and to improve turbine and component part development over a period of time [59]. This is absent in the UK wind industry at the moment. However, this is what the banding of the RO seeks to achieve. Banding facilitates the establishment of various ROCs for different renewables technologies, but as

[59] The FIT in Germany is guaranteed for a period of 15 years

mentioned previously, it is early to assess the effect of banding on the UK renewables market.

9.4.6 Market Conformity

To recap, the Directive 2001/77/EC allows Member States to deploy policy instruments that best suit each national market and supporting legal systems. One of the ultimate aims of including this in the Directive is to prepare all the Member States for an EU-wide harmonised system. In this section, policy instruments are compared, based on their compatibility with national and international market rules and regulations.

The FIT and the MEP are similar in this regard. Under the German FIT, wind power generators are exempted from the electricity market. Prices are fixed and as such generators sell at a guaranteed price (Klessman *et al* 2008). The authors also add that generators are free to sell wind generated electricity to end-users or via traders or power exchange. Therefore, the TSOs bear the risk of integrated capacity into the market and are responsible for forecasting, scheduling, and balancing. There has been institutional conflict as a result. The utility companies that bear this burden have consistently criticised the FIT for this. Finon and Perez (2007) on the other hand, argued that the FIT set de facto the RES-E production outside the electricity market, given the obligation to purchase at a fixed price. This implies that about 12.5 per cent or more of German electricity will be set outside the market by 2010 and beyond. Although this is not so much of an issue in the German market, however this is contrary to the expectations of the internal electricity market where the laws of supply and demand fix the price and determine the quantity sold in the market. Hence, the

FIT does not encourage cross border and international boundary trade even within EU Member States surrounding the German borders. This is a significant weakness of the FIT.

In contrast, under the RO, wind power generators deals with the risk and market uncertainties as the value of the wind power generated electricity are directly related to the market price. Finon and Perez (2007), and Szarka (2007) pointed out that part of the costs included in the certificate is used to pay wind power producers. Wind power generators sell electricity directly to the market. No special mechanism is needed to integrate the renewable (wind power) electricity into the market (Klessman *et al* 2008). Therefore, the RO is very much open to competition, and to an extent, the laws of supply and demand fix the price and regulate the market within a well designed quota system. Albeit, the RO like the FIT is not completely compatible with this sort of market. Although the UK operates a liberalised electricity market, the RO still falls short of some requirements that would enable it to fully comply with a free market system. One of the main reasons that explain this revolves around the limited or few players in the market. Evidence arising from interviews with UK utility companies reveals that competition does exist between suppliers of electricity but, it is not evident that there are a large number of suppliers beyond the current ‘big six’ controlling the market. There is also a strong interference from the Government in matters associated with the RO. Over the years the RO has been in existence, it has witnessed many changes, which have undermined its credibility. Furthermore, the RO tends to put a cap on the amount of renewables electricity capacity that can be brought to the market by setting a quota which is binding on all parties concerned. Also, before the introduction of banding, the RO tends to restrict variety and innovations by promoting only the least cost technology (onshore wind) at the expense of others.

To summarise this discussion, it can be inferred that the FIT, MEP and the RO are not fully compatible with a liberalised electricity market but are compatible with their local, regional, and national market systems, and are usable in the market environment (Finon and Perez 2007). Be that as it may, the RO is more compatible and open to competition than the feed-in tariff and the MEP (Elliot 2007; Finon and Perez 2007).

9.4.7 Finance

One key characteristics of a good policy instrument is continuity and stability over a long period of time. The FIT law usually guarantees prices for up to 20 years, bringing about long term certainty to the renewable energy market. Sawin (2004) also found that the FIT guarantees return on investments, therefore companies and large corporations are willing and able to invest in wind power technology, to train staff and to establish other services and resources with a long term perspective.

As a result, banks and other lending institutions find it easier to finance wind power projects in Germany. They are well assured of the return on investment. With the MEP system, although similar to the German FIT, investors are generally not willing to invest in wind power because of the risk and uncertainty that characterize the Dutch market, where a project is not qualified for the MEP subsidy until it is fully operational. In that way, no one is really sure of the projects viability and certainty until the subsidies are available. In fact, as it is at the moment, the MEP was abandoned in August 2006 as such new projects cannot qualify for the MEP subsidy unless they were developed before August 2006. This makes investment and financing issues complicated in The Netherlands. The MEP, in itself, is a good policy instrument for the take-off of a renewable energy market but the 'stop and go' nature and issues with Government policy needs urgent attention.

Likewise, things are not too different with the RO. There are still numerous potential uncertainties and a high level of risk that makes finance difficult and almost impossible for willing investors. This is also consistent with Fouquet *et al* (2005) findings that potential uncertainties exist in the many steps and processes a developer has to go through from the planning stage, up to the point where projects are operational. Different levels of costs are also involved at every stage and until the project completes the planning permission stage successfully, it is not certain whether banks and financial institutions will be willing to commit themselves to funding wind power projects. This issue alone turns willing investors away from the market, making the RO unattractive for small market players. Only large companies are able to withstand the risk, troubles, and uncertainties associated with the RO. A small scale or local ownership structure may not be able to withstand this.

In summary, the FIT at the moment guarantees return on investment compared to the MEP and the RO. As such, the process of obtaining finance or funds from lending institutions is easier with the FIT.

9.4.8 Impact on Development

To recap, the impact on development in this study has been defined as the extent to which policy instruments contribute to economic growth, and environmental and social benefits. This section will examine the positive effects of policy instruments using the following subheadings.

9.4.8.1 Innovation and technology development

The FIT has been very successful in promoting industrial development. It encourages new innovations and technological development especially to the advantage of wind power (Fouquet *et al* 2005; Lauber 2005, 2004; Martinot 2005; Sawin 2004; Menanteau *et al* 2003). The German wind power sector is currently benefiting from a strong industry base in the manufacturing of wind turbines. The German wind turbine manufacturing industry leads the way in the world, alongside their Spanish, Danish, U.S.A., India, and China counterparts, in the supply of wind turbines to other parts of the world including the UK and The Netherlands. Table 9.6 shows the top ten wind turbine suppliers.

Table 9.6: World Wind Turbine Manufacturers

MANUFACTURER	COUNTRY OF EXISTENCE	MARKET SHARE IN PERCENTAGE
Gamesa	Spain	15.4%
GE Wind	U.S.A	16.6%
Vestas	Denmark	22.8%
Enercon	Germany	14%
Suzlon	India	10.5%
Siemens	Denmark	7.5%
Acciona	Spain	4.4%
Goldwind	China	4.2%
Nordex	Germany	3.4%
Sinovel	China	3.4%
Others	Various	10.5%

Source: BTM Consult AsP (2008)
Author Generated

Furthermore, the German wind power sector also benefits in R&D and Demonstration which makes new innovations possible (Klaassen *et al* 2005). For example the development and production of a 5MW wind turbine capacity is underway in Germany and will soon be supplied across the continent (IEA Wind 2007). This is also consistent with the finding of Fouquet *et al* (2005:21) that: "*with the minimum price systems [FIT], technological improvements increases profit thereby encouraging innovation.*" This is made possible because the FIT is guaranteed for a long period of time and as such creates a good investment environment for investors. Producers of wind turbines and component parts are guaranteed of the demand for their products, hence they are bound to make profit. Sawin (2004:9) noted that: "*once producers achieve a certain level of profit, they invest in R&D to lower costs and increase profits…*" This is the case in Germany to date, where innovation and technology development is made possible because of the 'sustained and growing market' provided by the FIT (Sawin 2004). The FIT has also been able to demonstrate its ability to link the political and economic sector through this.

This is not the case with The Netherlands. As a pioneer of wind power development, the Dutch market gradually lost its place as a result of the inconsistencies in policy instruments, and uncertainties surrounding the development of wind power future market. Innovation and technological development is also very difficult under the RO. Sawin (2004:9) pointed out that: "*the surplus may go entirely to consumers, and as a result producers do not receive enough profit (or reliable long term profits) to invest in R&D in order to reduce their costs*". In most cases the RO over compensates investors, although proponents argued against this notion and claimed that the RO only compensates the first technology risk takers or movers. Hence, utility companies, producers, and generators do not have any option other than to opt for turbines produced outside the UK, thus they find it cheaper to buy wind turbines and component parts from abroad rather than at home. There is also no incentive for R&D as such it is practically impossible for domestic industries of wind turbine to thrive in the global turbine manufacturing market. Thus, there are only few small scales or micro-generation turbine manufacturers in the UK at the moment (IEA Wind 2007).

9.4.8.2 Employment and CO_2 reduction

Table 8.1 shows that German wind turbine and components parts manufacturing industry represents 20% of the global turbine manufacturing industry. It is not surprising, therefore, that the level and rate of employment in Germany surpasses the other two countries (Hillebrand *et al* 2006; Ziegelmann *et al* 2000). According to the Renewable Energy Sources Act Progress Report (BMU 2007a) more than 9 billion euros were invested in renewable energy installations in Germany in 2006. According to Lipp (2007) the German renewable energy industry employed more than 150,000 people in 2005, while wind power alone employed over 65, 000 people in same year. This is also expected to increase when offshore projects progress to deployment. The report also indicated that there was a reduction of about 45 million tonnes of CO_2 in 2006. While in the UK and The Netherlands, the wind power industry employs 2000 and 4000 people respectively. A decrease of around 5 million tonnes of CO_2 has been achieved as a result of the deployment of wind power in The Netherlands and the UK (BWEA 2009; IEA Wind 2009). This is also expected to increase when offshore projects progress to deployment.

To summarise this discussion, each of the policy instruments contributes one way or the other to creating employment, and reducing the effect of climate change on the environment, but overall the FIT seems to lead the way in this respect.

9.5 HARMONISATION DEBATE

According to Holzinger and Knill (2005:781-782) "*harmonisation refers to a specific outcome of international co-operation, namely to constellations in which national governments are legally required to adopt similar policies and programmes as part of their obligations as members of international organisations*". In this case, the EU renewable energy policy harmonisation is defined as the application of a single and binding renewable energy policy instrument for all the EU Member States. This will require that renewable energy activities to be monitored at EU level with Member States having limited control. Not surprising then that Howlett (2000:308) pointed out that: "*harmonisation is characterised by highly institutionalised and centralised top-down decision-making procedures in the course of which the co-operating states consent on the international harmonisation of their policies. It involves the conscious and negotiated modification of domestic policies by governments committed to cross-national standards which they have had a hand in drafting*". Once Member States agree to the multilateral decision making process and a deal is reached and legalised, decisions becomes legally binding and must be implemented. Therefore EU renewable energy policy harmonisation implies that Member States would relinquish their present national renewable energy policy autonomy and sovereignty and comply with the EU regulations (Busch and Jorgens 2005). The EU renewable policy plans can be traced back to the Directive 2001/77/EC.

One of the key aspects of the directive 2001/77/EC allows individual Member States to adopt and implement frameworks that best suit their market systems and conditions. Reasons for this are threefold. The first is to attract a large RES-E capacity into the grid in order to meet EU 2010 target. Secondly, it is to allow individual Member States to develop RES-E market, and thirdly to enable Member States to reduce CO_2 emissions. It mandates the European Commission to report the success and progress made by Member States at the end of 2005. Muñoz *et al* (2007) pointed out that the directive entitles the Commission to propose harmonisation of renewable energy electricity policy instrument. The Article 4(2) of the directive. Article 4(2) specifically states that: "……*This report shall, if necessary, be accompanied by a proposal for a community framework with regard to support schemes for electricity produced from renewable energy sources*". According to Article 4, such a proposal should: contribute to the achievement of national targets; be compatible with the principles of internal EU electricity; consider different sources; technologies and geographical characteristics of renewable electricity; be simple, effective and cost-efficient; and include sufficient transitional periods of at least 7 years (Muñoz *et al* 2007). Nevertheless, the directive did not identify any policy instrument that fits perfectly into the above conditions, but these specifications tend to support a harmonised quota system over any other policy instrument implemented in the EU (Soderholm 2008a; Muñoz *et al* 2007; Rowlands 2005; Lauber 2004).

At the end of 2005, the EU Commission reports failed to come up with a proposal for a community wide framework because of the reasons outlined in the communication. The Commission concluded that harmonisation is difficult to achieve in the short term and further experience needs to be gained on more recent policy instruments implemented by some Member States. Firstly, the report shows that the feed-in tariff is more effective than the quota system in terms of the quantitative amount of capacity added annually. Secondly, that the feed-in tariff is more cost-efficient than the quota system (EU 2005). Hence, the Commission concluded that harmonisation is difficult to achieve in the short term and more experience needs to be acquired on more recent policy instruments.

In March 2006, the European Commission published its green paper 'A European Strategy for Sustainable, Competitive and Secure Energy' COM (2006) 105 final. It can be extracted from the 'green paper' that the European Commission seeks a long term commitment to the development and deployment of renewables in the EU. It also pointed towards the 'Renewable Energy Road Map' COM (2006) 848 final which claimed that the EU 12% will not be met by 2010. The reasons why the EU will not meet its renewable energy target revolve around *"the complexity, novelty, and decentralised nature of most renewable energy applications result in numerous administrative problems. These include unclear and discouraging authorisation procedures for planning, building and operating systems, difference in standards and certification and incompatible testing regimes for renewable energy technologies"* (EU 2006a: 4).

In terms of electricity generation, the communication also affirmed that with the current policies, only 19% of the 21% EU target will be achieved by 2010. Therefore, the communication proposed a performance reassessment of the Member States' policy instruments and the need to revisit the EU harmonisation plans in the context of the EU internal electricity market. It therefore concluded that: "*while national schemes for renewable energy in electricity may still be needed for a transitional period until the internal market is fully operational, harmonised support schemes should be a long term objective*" (EU 2006a:12).

Based on this conclusion and others[60], in 2008 the EU Commission issued a proposal for a 'directive on the promotion of the use of energy from renewable sources (EU 2008c). Two main conclusions on the effectiveness and efficiency of current renewables policy instrument can be deduced from the accompanying document[61] to the draft proposal. Firstly, "*the effectiveness of policies promoting wind energy, biogas and photovoltaics technologies has been highest in countries using feed-in tariffs as their main support scheme. However, not all feed-in schemes implemented in Member States have been equally successful. For onshore wind energy, Denmark, Germany, and Spain are showing the highest effectiveness indicators for the period 1998-2006" (EU 2008d: 8).* Secondly, the feed-in tariffs are efficient in terms of the price they offer and in reducing producer profit.

This is also consistent with Muñoz *et al* (2007) arguments that the largest increase in renewables electricity generation occurred in EU Member States with feed-in tariffs. This is so because the feed-in tariff, if well designed and implemented, brings with it a high investment security that is needed to stimulate the growth of a healthy wind power market.

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[60] See EU COM (2006:12) 848 final
[61] SEC (2008) 57

This performance notwithstanding, the accompanying document to the proposal of the directive on renewable energy concludes that the harmonisation of policy instruments is not a short term but a long term goal. Four reasons that explain why the Commission felt that harmonisation is inappropriate include: "(*i) the experience with quantity-based and price-based instruments does not allow picking a "winner", as both kinds of instruments have the same economic efficiency and can be designed in conformity with the rules on the internal market for electricity, the free movement of goods and EC State aid rules; (ii) the introduction of one harmonised system would create a lot of uncertainty and disruption in the market for renewables, as it would abolish well-established national support schemes; (iii) in a harmonised system, it might be difficult to differentiate between different costs for different technologies in different countries. If this is the case, additional support measures would be needed for technologies which are still relatively far from producing renewable electricity at market price; (iv) National support schemes are often designed so that they also promote regional development…harmonisation might oblige Member States to find other ways to promote regional development"* (EU 2008d:14-15).

Respondents from EU level and Member States are also of a similar opinion that harmonisation is currently not the way forward. Given that each Member State has different political, market, and cultural structures, it is practically impossible to come to a conclusion whether harmonisation will be achievable now or in future. Actors in favour of harmonisation, as pointed out by Jacobsson *et al* (2009) are both within and outside the European Commission. These actors have formed a strong coalition in support of a harmonised quota system. Earlier on, Eurelectric (2004) had argued in support of the quota system. This has caused much uproar among those Member States not operating the market based system. Other actors identified by Jacobsson *et al* (2009) include; the Director General (DG) Enterprise and Industry; DG Competition, and DG Environment. Also included in the list are the big power producers and associates e.g. the European Federation of Electricity Traders, *"energy regulators both at the Commission and national levels which maintains a symbolic relationship to the conventional power sector"* (Jacobsson *et al* 2009: 2146).

Reasons outlined by these actors to support a quota system harmonised system include: (i) *"harmonisation framework (combined with the possibility of trade in renewable electricity) facilitates effectiveness and cost efficiency in reaching targets at the EU level"* (del Rio 2005:1240). Thus, it is assumed that meeting the EU targets on climate change and renewable energy electricity goals will be achieved with less spending and capital. Rather than having all Member States meet individual targets, there will just be a single target for the entire EU; (ii) harmonisation of renewables policy instrument is an easy way to open up the internal market, to allow the trading of green electricity between Member States and outside the EU thus, harmonisation would promote cross-border trade among Member States and lead to cost reductions for consumers and households (Jacobsson *et al* 2009); (iii) to enhance co-operation among Member States and coordinate national policies and effectively measure progress. There will be a clearer policy instrument that would help avoid the double counting of green electricity.

However, Member States implementing policy instruments other than the quota system have consistently resisted harmonisation because they feel the quota system has not yet been proved to be successful in the EU. There has not been a system in the EU that has delivered a record level of installed wind capacity like the German FIT, therefore harmonisation based on the quota system would not be supported in Germany because Member States (UK, Italy, and Belgium) with the quota system have not achieved enough to convince other Member States that the quota system is as viable and dependable as the German FIT. Besides, some Member States especially the new ones, are in the process of creating an enduring market for renewables, while the older ones are making considerable progress in meeting the EU target and consolidating their efforts towards having a stable renewable energy market. There are a number of policy instruments just beginning to be effective and if the national government decides to change these systems completely, it could be disruptive for such markets. It might also be very risky for emerging markets like the UK, France, and Portugal etc. This is also consistent with the findings of Elliot (2007), Toke (2006), and del Rio and Gual (2004), who argued that harmonisation is the main source of uncertainty for investors. The authors concluded that harmonisation of renewable policy instruments in Europe is unlikely.

Furthermore, no individual Member State will want to give up its present policy instrument for another. This is because national governments do not want to be seen as incompetent in the design and implementation of a renewable energy policy instrument. Every national government wants to be proud of their commitment to deliver wind power through the choice of their policy instrument. Therefore, Harmonisation for now is viewed as a political issue. Political processes in Europe are always difficult to make and sometimes when decided upon may be impractical. For example a senior government officer of one of the Member States said that:

> *"Harmonisation is unlikely for two reasons (i) more of political reasons because if you look at the track record of harmonisation at all in Europe, it is very difficult process (ii) there is no system which is by all means more successful than other systems, so every system has got its own advantages and disadvantages, and I think the EU Commission has said something about that in 2005 that when you compare all support schemes in Europe, there is no winner and no clear conclusion that one system is an ideal system because it also depends on the market structure that each member states operates."* (Interview undertaken: 28th September 2006)

This implies that all Member States have its own interest in renewables agenda. As long as national interest prevails over common interests and over the sense of direction for the bigger EU Community, there will not be any harmonisation. It is also evident at the moment that the FIT has been more efficient in delivering wind power than the quota system, but it would not really make sense to introduce a harmonised FIT because "*it is difficult to establish an adequate value for an EU-wide tariffs and there is the possibility of over-pricing, which creates windfall profits for producers and undue costs for consumers"* (Muñoz *et al* 2007:3106). Similarly, the German renewable electricity market is different from that of other Member States. This is because the FIT offers long term investment security of all renewables generated, whether on a small or large scale basis. As a result renewable energy is broadly supported by a wide spectrum of stakeholders groups. Muñoz *et al* (2007) also identified three core elements of the FIT law, these include; (i) grid access and priority of renewable electricity; degressive tariff; and nation wide equalization[62]. The FIT has also been able to bring about industrial development in Germany and as such the deployment of renewable energy sources has exceeded the EU target of developing a strong renewable energy industry. Not surprising then, that Germany

[62] For further detail see Munoz *et al* (2007:3106-3107)

leads the way in the EU in terms of wind power turbine and component part manufacture.

Evidence from the interviews also revealed that no one policy instrument suits all Member States, because each has different socio-cultural and natural resource endowment. Some of the Member States e.g. the UK have a strong cultural respect for landscape and nature conservation and believe that renewable energy, such as wind power is harmful to the environment and has great potential to significantly change the UK landscape. This is the reason why there has been much resistance to the deployment of wind power at local level, unlike Germany and The Netherlands where landowners and local co-operatives exist and in most cases the demand for wind power and other renewable energy is from the bottom (from the community) rather than the top down approach as is evident in the UK. Furthermore, there are many fundamental issues[63] which pose a strong threat to harmonisation. Each Member State has different natural resource potential, for example the UK is regarded as one of the windiest countries in Europe. Theoretically, it should be cheaper to generate wind power than other places in Europe where there is less wind but at the moment that is not the case. Similarly, Germany and Spain have a lot of sunshine that can be harnessed to generate electricity more efficiently than in the UK or else where. Nevertheless, solar PV in Germany is still far behind onshore wind power in terms of development and as such, more expensive to support than onshore wind. Thus, harmonisation based on one single policy instrument may discourage investment into renewables. The EU Commission offers no convincing reason to explain how a single policy instrument can ensure the stimulation and deployment of renewable energy

[63] Fundamental issues like the way the different market operates and the way the different countries market are structured.

across its Member States. Therefore, it is reasonable to have different ambitious targets that are legally binding while still allowing individual Member States to develop schemes that best suit their geography and market system.

In addition, there are two main policy instruments in the EU upon which harmonisation can be based: the FIT (Germany or Spain model) or quota system (UK model). Each of these has their merits and demerits[64]. Although during the early days when the debate on harmonisation began, the quota system was the most favoured (Eurelectric 2004). Recently, the quota system has been criticised as being an expensive and ineffective model (Elliot 2007; Toke 2006; EU 2005a). Earlier on, Eurelectric (2004:5) argued in support of the quota system and concluded that:

> *"EURELECTRIC believes that market based system is a better way to ensure increased adoption of power plants based on renewables than feed-in systems or similar support schemes with fixed price elements. Certification of RES origin helps create demand for RES energy and can be developed into a certificate trading market system. Such a market-based approach, implying continuously correct price signals to all economic actors, is preferable as they minimise distortions to the markets."*

However in contrast, the UK renewables obligation, for example, has not provided enough evidence to show how, a quota system works better than the FIT in reality. This is also consistent with the EWEA (2005:18) recommendation that:

> *"These mechanism must be given time to prove their effectiveness before a decision on a common harmonised mechanism is decided. More time and experience are therefore needed to make credible conclusions on the impacts of the full range of options."*

[64] See for example: Fouquet and Johansson (2008); Finon (2007); Eurosolar 2006.

To date it is not yet clear how the renewables obligation is going to meet the 10.4% target for the UK by 2010 hence, the adoption of TGC or quota based system may adversely affect targets if not designed properly.

The FIT systems on the other hand seem to be working well and Member States using them are leading the way in terms of installed capacity for wind power, yet countries with other forms of policy instrument and market systems would not want to abandon their system for any other. This is also consistent with del Rio and Gual (2004:232) findings that: "i*t is highly likely that some member states will strongly reject a common framework and even more likely if this was based on TGCs….a common support framework will be resisted not only by policy makers in certain member states but also by those benefiting from the current domestic support schemes (i.e. receiving generous feed-in tariffs*". For example the German FIT has been successful (Elliot 2007), and has many advantages[65] over the RO but the question is; can Member States like the UK abandon their present market based ideology for a fixed price system? The current application of a FIT model to support a renewables micro-generation project in the UK and the RO banding will provide an answer to this in the near future.

Furthermore, in Member States such as the UK, where local and community wind farm ownership is difficult due to the actions of the anti-wind lobby, it is unlikely that the FIT system will achieve much. Equally, not all the FIT systems have worked successfully in all the Member States operating the FIT. For example the MEP in The Netherlands failed because it was not properly designed and implemented. Therefore,

[65] Guaranteed prices; investment security; degressive tariffs that brings about fall in costs of renewables and also allows the growth of the domestic turbine and component part manufacturing industry. Etc.

it is not guaranteed that the implementation of the FIT system throughout the whole of the EU will bring about success.

Therefore, an EU-wide harmonised policy instrument, for now, may ultimately inhibit the growth of the European wind power market. A harmonised system may bring further uncertainties to the hearts and minds of willing investors, thereby resulting in less investment into the European wind power market. When this happens Europe may also lose its position as the world leader in the wind power market. This is consistent with EWEA (2007a:2) position paper on harmonisation.

> *"The EWEA believes that a hasty move toward a harmonised EU-wide payment mechanism for renewable electricity would put European leadership in wind power technology and other renewables at risk. Changes in frameworks always create uncertainty and have to be based on sound knowledge and well-proven tools."*

National histories demonstrates that Member States have different culture, stakeholder groups, political, and business practices that will influence policy instruments and the likelihood of any policy succeeding. Hence, a harmonised policy instrument may hinder the development of the progress made so far by every Member State in wind power. Member States are, at the moment, working on making individual policy instruments effective. Therefore an attempt to disrupt this process would be a major set back for the EU wind industry in particular. Given the fact that there is no single internal electricity market in Europe, harmonisation is pointless and lacks proper foundation.

To summarise therefore, it is important that the EU does not disrupt the current Member States' progress. Rather it should plan to promote renewable energy than its harmonisation agenda, and the EU Commission should come up with effective ways to deal with the three other key issues identified in the directive 2001. One of which is to remove all the administrative barriers currently hindering any further deployment of wind power in each Member State. The EU Commission should also decide upon a binding legislation and directives that mandate Member States to expand their grid system (Swider *et al* 2008).

9.6 CONCLUSION

The analysis in this Chapter shows that wind power has been promoted in three country cases, each of which having different policy instruments; as such, the performance outcome of the policy instruments differs significantly. One key reason for this is that the German feed-in tariff has demonstrated that with clear objectives and set targets, wind power can contribute significantly to the national electricity sector. In so doing, the FIT has been more stable and effective than other support schemes. Findings from the comparative analysis also demonstrate that the FIT has been able to go beyond the creation of a political market for wind power and has actually brought about industrial development, thus giving wind power deployment economic value. Although the RO and the MEP also contributed to the development of wind power in the UK and in The Netherlands, evidence from the analysis shows that these contributions have been limited because of market uncertainties and the lack of transparency in the support they offer wind power and other renewables. For example, the MEP's path development shows that the Dutch Ministry of Economic Affairs dominates other stakeholder groups in the design and implementation of renewable energy policy instruments, as such, policy instruments introduced over the last two decades have failed in The Netherlands. Although, the RO, receives support from stakeholder groups, it is flawed as it is, inflexible to necessary changes which would enable the UK to meet and exceed its renewable energy targets. In the past, the RO only supported the least expensive renewable technology option, it is still uncertain whether the current introduction of the RO banding will make a difference. A technology blind policy instrument, like the RO, defeats the main purpose of this market based mechanism, because the most developed renewable energy is promoted at the expense of the least developed. It is, therefore important, that the choice of policy instrument be such that promotes all renewable technology and allows competition. It should also create an enabling environment for technologies to evolve, and migrate from R&D to maturity. Nevertheless, as argued by Szarka (2007), it is difficult to have a policy instrument that meets all the necessary requirements for promoting renewable energy technologies, thus, it is important that Member States implement policy instruments that are compatible to their market and regulatory condition at any time.

CHAPTER TEN

THE CONCLUSION

10.1 INTRODUCTION

This research is concerned with evaluating the performance of three wind power policy instruments, namely the feed-in tariff, the MEP, and the renewables obligation, specifically in the context of Directive 2001/77/EC, which called for the harmonisation of the EU wind power policy instruments. Three EU Member States have been selected for detailed investigation: Germany, The Netherlands and the United Kingdom. The rationale behind the selection is that these particular countries have adopted different approaches and policy instruments to the deployment of renewable energy, with varying levels of success (Agnolucci 2008, 2007a, 2007b, 2006; do Valle Costa *et al* 2008; Toke 2007; Jacobsson and Lauber 2006; Mitchell *et al* 2006; Ringel 2006; Sawin 2004; Dinica 2002; Grotz 2002; Reiche 2002). Based on the notion of path dependency of historical institutional theory, this study explored the historical emergence, the architect, and the outcome of the support and implementation of the policy instruments. These parameters were useful to explaining the performance of the policy instruments implemented in the three country cases investigated in this study.

Finally, this Chapter highlights key findings, draws conclusions and offers policy recommendations that national governments could adopt to facilitate the delivery of wind capacity and further advances in the European wind power market.

10.2 SUMMARY OF AIM AND OBJECTIVES

In conceiving this study, assumptions were made that there was a need to carry out research that evaluates the performance policy instruments in the Member States investigated. The purpose was to extend the current literature base and to increase both academic and practitioners' understanding of the lessons learnt from the deployment of policy instruments across the EU. The main aim of this study is to contribute in addressing the challenges of wind power market expansion, by providing an empirical critique of the current policy instruments (i.e. the feed-in tariff, MEP, and renewables obligation) adopted in the three EU Member States investigated and to develop an integrative framework for evaluating the performance of wind power policy instruments, especially in light of the EU proposed harmonisation plans.

Three objectives were pertinent in investigating the research problem. Namely:

1. To critically examine the international and EU renewable energy policy drivers, and the role of wind power especially in the EU energy and climate change debate.
2. To critically appraise the wind power industry structures and the role of stakeholder groups (e.g. NGOs and renewable energy consortiums) in the business environment in each Member State under investigation.
3. To utilise the framework developed to critically compare and contrast the performance of the feed-in tariff and quota system.

In order to address the research problem and deal extensively with the research questions associated with the performance of policy instruments, a qualitative research approach was adopted. In-depth, semi-structured interviews were conducted with key policy makers and a wide range of stakeholder groups involved in the design and implementation of renewable energy policy instruments in the country cases.

10.3 CONCLUSIONS AND LESSONS LEARNT

This thesis found that the approach to wind power deployment in the three country cases varies significantly and this has affected the pattern of each country's wind power policy instrument. Due to the diversity of the wind power industry each Member States has experimented with different policy instruments and has achieved various levels of success. Undoubtedly wind power deployment is crucial to the EU and the national 2020 renewables target, however, this research has shown that it is not the experimentation of policy instruments that matters. What is important, is the operating environment and how precisely the policy instruments are designed and implemented. Thus, the success of wind power deployment does not depend solely on the particular policy instrument option adopted, but also on the political and regulatory environment and the stakeholder groups in the business environment of each Member State. For example, it emerged from the study that the feed-in tariff is the most effective instrument to-date in the EU, for promoting the deployment of wind power. Reasons found in this study to explain this resolved around the fact that the German FIT has successfully brought about a market take-off of wind power in Germany; and secondly it is designed such that the German renewable energy targets and objectives are achieved and surpassed.

The MEP, a form of feed-in tariff system implemented in The Netherlands between 2003 and 2006, was very instrumental to the growth of wind installed capacity in The Netherlands, however, were it not for the design problems it would have lasted longer than it did. Nevertheless, the UK is on it way to see a historic impact of the feed-in tariff on small scale generating systems (REA 2009), future research will be useful in this area to critically examine the impact of the FIT in the UK when some experiences would have been gained.

This research has also shown that a stable and flexible policy instrument is necessary for the national and EU wind power industry. A stable policy instrument would encourage stakeholders to make investments that could bring about industrial development. The researcher noted that the stability of the feed-in tariff has a positive effect on investment and growth of wind power in Germany. It emerged from the study that investors and developers are confident because the fixed prices bring about steady growth in the market. The FIT also witnessed various adjustments, especially through the introduction of degression, but their impact does not affect investors' confidence. With these positive effects, the feed-in tariff has been able to link together economics, politics and technology to achieve industrial development. Thus, the objective of implementing a renewable energy policy instrument goes beyond meeting EU targets to bring about strong and healthy renewable energy manufacturing sector to the German nation. Analysis showed that the MEP and RO have not been able to achieve this. Though path dependency argues that choices made in the past influences subsequent choices, The Netherlands and UK can learn from the German experience by ensuring that wind power policy instruments are stable, and flexible to accommodate changes without hampering on investors confidence. Rather than having to comply with EU and international obligations, renewable energy policy instruments should aim at economic and industrial development.

This thesis also found that technology blind or neutral policy instruments can potentially promote the development of one renewable energy technology option at the expense of others. This research has shown that a technology blind policy instrument may not be successful in supporting renewable energy, as renewable energy technologies do not have an equal opportunity to compete and develop. For example until recently, before the introduction of banding, the UK renewables obligation has only been able to push onshore wind nearer to the market. One lesson that has been ignored is how the current banding would affect the development of other renewable energy technologies without changing the fundamental principles of the RO.

On the other hand, technology differentiation avoids discrimination, thus, it gives all renewable energy technologies the opportunity to get support and compete in the market. It would also enable new technologies to be introduced, grow and mature to the point where they would be close to the market. This will see non-commercial renewables migrating from R&D support to commercial level, which in turn may lead to industry development. For example offshore wind and solar PV are gradually being supported at the moment by the German feed-in tariff and hopefully in the next few years they will be viable and appear on the list of developed renewables. Notably in the UK is the implementation of the FIT to support small scale renewable capacities however, it is too early to comment on the impact this will have on the UK renewable industry.

Evidence from the research also showed that community ownership and involvement could significantly boost wind power acceptance and implementation at national level. Community involvement ensures that the local population enjoys the benefits of the development of renewable energy technologies in their environment and as such institutional conflicts between the community and other stakeholder groups can be minimised. Evidence from this research demonstrates that when conditions are favourable to the local communities, it increases the acceptance of renewable energy development, especially for technologies like onshore wind that involves construction and changes to the landscape.

The country cases showed different patterns in this regard. The deployment of wind power in Germany started from the grassroots, and as such, local ownership and community involvement in wind power brought about a high rate of public acceptance and less opposition. The Netherlands had a similar experience with the implementation of the MEP, nevertheless, planning permits and the policy instrument decision making process still lies in the hands of very few, who exert authority and power to the disadvantage of wind power development. Analysis also showed that in The Netherlands stakeholders are neither well informed nor consulted about the potential benefits of investing into wind power. The feed-in tariff on the other hand has acted as a stimulus that drives community involvement in renewables. It offers minimum risk and investors are guaranteed a return on investment. Energy regulators and suppliers have little power, as they are mandated by law to accept, pay, and feed all the energy generated into the grid. Though there have been some institutional conflicts as a result, the feed-in tariff has survived all criticism. Furthermore, investigation of the UK pattern showed that the presence of a well organised anti-wind lobby has robbed the UK of community ownerships, and therefore the benefits of implementing renewable energy technologies have a limited impact on the grassroots. The vulnerability and complexity of the RO also contribute to this problem. The RO has changed every single year, but its fundamental structure remains the same, leaving wind power development in the hands of big companies who have the means to withstand the market risks and uncertainties. Thanks to the recent plans to implement the feed-in tariff in order to get the local community involved in the renewable energy industry but the impact is yet to felt, may be until sometime in the future when there is enough evidence.

One key lesson learnt in this research is that the involvement of various stakeholder groups in the design and implementation of wind power policy instruments demonstrates how far and how well it would perform. The process of interaction between policy makers and stakeholders reduces conflicts and makes policy goals and objectives clear to all concerned. Historically, the Dutch wind power policy instruments in the past have been characterised as uncertain because they are basically devised and designed by the Ministry of Economic Affairs. Other stakeholder groups are only involved when the choice policy instrument has been concluded hence, they only lasted for a short period. Analysis showed that from the onset, the German feed-in tariff was given transparent targets and goals through consultations and the involvement of stakeholder groups. Research institutes and wind energy associations and institutions are involved in the research and fixing of prices of the FIT. As such, the German feed-in tariff has been able to propel renewable energy industry development. Economic benefits have trickled down to the small local communities because for every one or two people employed by the wind turbine manufacturing industry more than four or five are indirectly employed. Stakeholders are also consulted in the UK renewables obligation but the inherent flaws in the design of a market based system has left the wind power industry in the hands of few big energy suppliers who exert control in the market. A key recommendation here is for both the Dutch and UK policy makers to create a balance in design and implementation of policy instruments.

Concerning the harmonisation of EU renewable energy policy instruments which have received much attention in recent times (Soderholm 2008a; Elliot 2007; Lise *et al* 2007; Szarka 2007; Egenhofer and Jasen 2006; Held and Ragwitz 2006; Toke 2006; de Vos 2005; del Rio 2005; del Rio and Gual 2004; Eurelectric 2004; Lauber 2004), it was established in this research that harmonisation, based on a single policy instrument is not feasible and may, ultimately, inhibit the growth of the European wind power market. A harmonised system may cause uncertainties amongst willing investors, thereby causing a withdrawal of further investment in the wind power market. If this happens, Europe may also lose its position as the world leader in the wind power market. Evidence from this study indicates that each Member State is unique in its own right and consists of different market structures, culture, regulatory environment, and stakeholder groups, thus it is unlikely that what works well for the German market would work efficiently and effectively in other Member States. The factors that are responsible for the success or failure of Member States' policy instruments are not identical. This reason alone makes harmonisation of the EU wind power policy instruments undesirable and meaningless. Furthermore, the adoption of a quota system for this purpose would not be advantageous. Experiences have shown that the renewables obligation lacks security for investment in wind power, due to high risks and fluctuations in prices. The feed-in tariff, on the other hand, has been very successful because it guarantees investment security with minimum risks and market certainty. Nevertheless, a harmonised feed-in tariff is not feasible because it is difficult to establish an adequate value of tariff across the EU. One main disadvantage of the feed-in tariff is that it does not allow trade across the borders. As such, the adoption of the feed-in tariff would mean that Member State would compete with each other on the same platform. As mentioned earlier, because each Member States has different natural conditions of renewable energy, tariffs cannot be the same and customers would opt for cheaper electricity. This makes harmonisation based on the feed-in tariff challenging, regardless of its success. Besides, the success of wind power deployment does not only depend on the policy instrument option adopted, but also on the political and regulatory environment, industry structures, and stakeholder groups at play in the business environment in each Member State. Therefore, there is no one best policy option for EU harmonisation. In general terms, the idea of harmonisation should, at the moment, be less important at EU level, instead Member States should be encouraged to implement flexible and less volatile policy instruments.

Although there is no one best policy option for EU-wide harmonisation, there can be a best option at national level. For example, the German and Spanish feed-in models have been instrumental to the development of wind power in both countries and have led to the emergence of a strong manufacturing industry of wind turbines and its component parts. Nevertheless, as argued by Szarka (2007:103) "*no choice [policy instrument] can be right forever*", therefore, one key policy recommendation that can be made at this level is that national policy instruments adopted at any point in time should be flexible and adjustable to market conditions, without jeopardising investors' confidence. The choice of policy instrument, at any particular time, should also be consistent in the medium and short-term to allow different renewable energy technologies to develop and advance, to the point where they can be competitive with a minimum level of support (See further summary of findings in Appendix 5).

10.4 CONTRIBUTION OF THE STUDY

This study has contributed to the understanding of wind power policy instruments by developing an integrative framework for evaluating the performance of wind power policy instruments implemented in three EU member states namely: Germany, The Netherlands, and UK. The findings from the comparative analysis presented enabled this study to add value to the cross national comparison made about wind power delivery system in the EU. Initial findings demonstrate that policy instrument evaluation is complex and difficult to attain because of the theoretical representations made in the literature about wind power policy instruments. Therefore, going beyond theoretical analysis, this study further appraise the usefulness of the operations of the framework by applying it to evaluate the performance of two prominent policy instruments (the feed-in tariff and the renewables obligation). The framework was also used as a convenient tool for presenting the views of key wind power policy makers and stakeholder groups with vested interest in wind power.

The discussion and analysis on the performance of policy instruments in the literature has been based on theoretical experience. Evaluation criteria have largely been related to effectiveness and efficiency criteria. This study has extended the literature by providing a holistic and non biased framework used to present the views of policy makers and stakeholder groups thus, enhancing the understanding of the performance of wind power policy instruments. It has also demonstrated that the diversity of different approach to wind power delivery in the country cases investigated has affected the outcome of the implementation of policy instruments. The success of wind power deployment does not only depend on the policy instrument option adopted, but also on the political and regulatory environment, industry structures, and stakeholder groups at play in the business environment of the Member States.

As noted in this study, there has been debate regarding harmonisation of the EU wind power policy instruments. This study demonstrates that the different culture and wind power market systems make harmonisation difficult. Besides, the notion of path dependency utilised in this study to explain the diversity of wind power in Member States also help to demonstrate that the choices made in the past influences the subsequent choices hence, the planned harmonisation would discourage investments into wind energy and further inhibit the future of wind power development in Europe. It could also disrupt the focus of Member States from their current efforts towards the 2020 and later targets. This is crucial if the EU wishes to retain its current position as the world leader of wind installed capacity and wind turbine manufacturing and component parts.

By employing a qualitative approach through semi-structured interview, this study has utilised the framework as a convenient tool to present the data collected from senior policy makers and practitioners of the wind power industry thereby providing a holistic explanation of wind power policy instruments in the country cases. Hence, this study's contribution to knowledge can be summarised as follows:

- This study has identified that the analysis presented in the literature about policy instruments evaluation and performance are based on theoretical evidence, and has therefore designed research to address these particularly by adding value to the cross national comparisons made about wind power delivery in the EU.
- It has also developed an integrative framework and went further to appraise the usefulness of the operation of the framework by applying it to evaluate the performance of policy instruments.
- The study also provides a means of presenting the views of senior policy makers and practitioners about policy instruments experiences hence, this study helps to bridge the gap between academics' and practitioners'.
- It has also expanded the debate on the proposed EU harmonisation agenda by using the notion of path dependency to explain the diversity of wind power industry of each Member States, and concluded that harmonisation will further inhibit the development of EU wind power industry.

The research limitations and policy recommendations for policy makers and practitioner are set out in the following sections.

10.5 LIMITATIONS OF THE STUDY

One of the key objectives of this thesis was to compare and contrast the performance of the feed-in tariff, MEP and the quota system, using the evaluation framework presented in Chapter Four. The analysis of this thesis was limited to the views of four stakeholder groups namely; the government (e.g. DTI, BMU), the Utilities (Nuon; RWE; EoN etc), renewable and wind energy associations (BWEA, NWEA, BWE etc), environmental NGOs and consultancy firms involved in the research and development of RES-E policies (e.g. Greenpeace, Ecofys etc.). A three-year period is too short a time to consider and include the views of other stakeholder groups, like the renewable energy sources funding financial institutions, insurance companies, project developers, local community schemes etc. Furthermore, undertaking a cross national research has significant cost implications. This thesis operated within a very tight budget thus, only fifty-five interviews were conducted at EU level and in the Member States investigated. In addition, because this thesis was a cross national study, the researcher had to deal with respondents with different cultures, language, and background. Some of the respondents speak German and Dutch as their first language and therefore, were not fluent in English. A number of the respondents in this group found it difficult to express themselves well and as a consequence the researcher had spend time to probing further, especially during the data collection stage. The evaluation framework utilised in this thesis was developed from first hand knowledge gained from the literature studied. Evidence from the research findings shows that it could be adopted as a tool for evaluating the performance of various policy instruments deployed to promote renewable energy in the EU and in other regions of the world. It is adequate and suitable for examining the views of the stakeholders investigated in this thesis. However, when applied in the examination of other stakeholder groups' views, which were not included in this thesis because of time limits, a few notes were considered relevant. First, when taking the views of the banks and insurance companies involved in financing and covering wind power investments, it is important to understand how they perceive policy instruments and why they lack confidence in any scheme. Compared to Germany (Enzensberger *et al* 2003), wind power project finance in the UK is not easy to procure (Klessmann *et al* 2008; Eltham *et al* 2008; Butler and Nuehoff 2008; Helm 2002a). Most of the UK's wind power projects are owned by large corporations (the Big Six utilities), who finance wind power projects themselves. When they need to obtain loans from the bank, they have the collateral to prove their ability to repay. However, this is not the case for the smaller generators, because they do not have the means to convince the banks of their reliability, they find it difficult to survive. It is not surprising then, that small scale generators in the UK are not as common as in Germany. Banks and insurance companies are principally affected by the level of risks they can bear for any type of renewable investment. They are always interested in being able to pass some level of investment risks on to other parties. Where this is not possible, they tend to avoid such an investment portfolio. So, it is necessary when evaluating the performance of policy instruments, from the banks and insurance companies' point of view, to examine why they lack confidence in any policy instrument. A qualitative or quantitative analysis of this factor can be undertaken.

Secondly, from the point of view of the transmission system operators (TSO), it is important that the 'system balancing and intermittency' factor be integrated into the framework. The transmission operators in Member States where the feed-in tariff is implemented are mandated to feed all renewables generated energy into the grid at any time. Therefore, they always need to balance the supply and demand of electricity generated and if this is not well calculated, it may result in serious technical problems. Also, during intermittencies or when the wind is not blowing, how the policy instrument helps to balance up supply and demand and deals with the uncertainties arising from a shortage or an excess of generated capacity supplies is very important. A qualitative analysis approach can be undertaken to examine this factor.

Thirdly, when taking the view of wind power project developers, it is important that planning and permission issues are integrated into the framework. Planning issues are often seen as a 'problem' in EU Member States. A qualitative or quantitative analysis of this factor can be undertaken.

Overall, the research findings of this thesis provides enough evidence that the framework was very effective and appropriate for analysing the performance of the FIT, MEP, and the RO.

10.6 RECOMMENDATIONS FOR FUTURE RESEARCH

One key contribution of this thesis to the renewable energy literature is the attempt to provide a workable framework for evaluating the performance of two prominent wind power policy instruments; the feed-in tariff, and the quota system. Arising from the research findings, it can be concluded that the feed-in tariff, to-date, leads the way in terms of success rate in the delivery of wind installed capacity. The lack of clarity on the part of The Netherlands government has lead to wind power policy failures witnessed at present. Thus national governments, and wind power policy makers can learn from the experiences of the outcomes of the evaluation of the performance of the German feed-in tariff by the design and implementation of a clear, flexible, and stable policy instruments that allow stakeholders to contribute without much conflict of interest.

Hence, it is important to extend the lessons learnt to evaluate the policy instruments implemented in China, India, and the United States. These countries, in recent times, have emerged as world leaders in terms of wind power development. The implementation of the evaluation framework developed in this study will be very useful in assessing and analysing each country's policy instrument. A comparison of the lessons learnt could be extended to emerging countries like Canada and Portugal.

Furthermore, interest in renewable energy has also been shown in developing countries, especially Africa (CREN 2009). It would be reasonable to undertake further research work focussing on the development of wind power and other renewable energy technologies in Africa. There is need for research into the design and implementation of support for wind power in this region. A key aspect of the research should look into the establishment of the wind power industry with the help of consistent and valid support. It is important to ascertain whether experiences in Europe and other continents of the world can be applicable to Africa.

Furthermore, financial institutions are important to the development of wind power in any continent of the world, as in most cases they finance wind power projects of various capacities. Since they hold the funds and decide whether investment into wind power in any location is viable or not, further research is needed to explore the factors that inhibit the flow of finance from banks and investment houses to the renewables industry.

Moreover, due to current and ongoing criticism against wind power generation capacity, there is the need for future research into how EU citizens can be educated on the benefits of investing into wind power and other renewables. This will offer additional ways of involving the general public in wind power investment and will also go beyond NIMBYism, weakening the activities of anti wind lobbying groups especially in some Member States like the UK, and The Netherlands, etc that are lagging behind in terms of wind installed capacity. In addition, there is a requirement for further research into the level of support and subsidy for the successful take-off of offshore wind, especially in countries like Germany and Denmark, which have reached their peak in terms of onshore installations. It has not yet been proved whether the feed-in tariff would work well with investment offshore because of the huge investment costs involved, neither has it yet been proved whether the current RO banding will be of any significant help. Therefore, research into the potential economic benefits and the appropriate support needed for offshore development is essential to boost investor confidence.

10.7 POLICY RECOMMENDATIONS

The aim of this section is to conclude with a series of recommendations to address identified impediments in the use of existing policy instruments in the promotion of future wind power deployment. These recommendations follow the findings from the analysis presented in Chapters Six to Nine of this study.

1. The need for a flexible, predictable and transparent policy instrument. Evidence from the country analysis shows that wind power is a near market technology and needs stable and consistent support to enable it to compete effectively with other non renewables technology. For wind power to make a significant contribution to the electricity sector of EU Member States, it is required that the choice of policy instrument be predictable and enduring. This also follows that policy instruments should not be too rigid to accommodate any changes necessary for a balanced market and technology growth. Since no policy instrument is suitable forever (Szarka 2007), adjustments would be needed at any point to keep up with Member States' regulatory and market demands. Albeit, such changes should enable the chosen policy instrument to meet set goals and objectives without affecting investors' confidence. This is one of the main reasons why the German FIT is successful. The FIT is transparent, clear, and open to all stakeholder groups who are interested in 'entry' into and 'exit' from the industry. For example, the price of wind power, generated from windy and less windy sites differs and is clearly set out in the feed-in law. The law is also guaranteed for over 10 years. Thus, it is very important that the policy instruments adopted by each Member State should be clearly defined and easily understood by all parties concerned.

2. In order to avoid a 'stop and go' type of policy instrument, it is important that renewable energy stakeholder groups are involved in the design and implementation of policy instruments. The lack of engagement by policy makers with stakeholders could lead to policy failure and uncertainty in the

wind power industry. If this happens investors would rather diversify their energy portfolio to markets where they would be better informed about market conditions and the certainty of their investment. For example, the German wind power sector demonstrates how national governments can successfully engage all stakeholder groups in the design and implementation of policy instruments. Research institutes and renewable associations are involved in the calculations and fixing of the feed-in tariff prices for all types of renewable energy technology generated. Involvement with the right associations would reduce institutional conflicts and allow checks and balances in the market. Also linked to this, is the idea that policy instruments should offer opportunities for small, medium, and large scale ownership. In addition, the engagement of the communities would reduce public resistance to the acceptance of renewable energy technologies.

3. It is also important that Member States move away from creating a political market for wind power to adopting policy instruments that bring about economic benefits and industrial development. This can be achieved when national governments view wind power and other renewable energy technology sources as an opportunity for industrial development, as opposed to just meeting international obligations. Again, this explains why the German wind power industry has been very successful. Wind power deployment in Germany has gone beyond meeting international and regional obligations and has created an opportunity to develop a strong manufacturing base for wind turbines and component parts. Thus, policy instruments should be such that allow technology diversity and enable renewable energy

technologies to evolve and migrate from R&D support to a point where they can survive with minimal support. It requires policy instruments to be consistent, to the point where renewables technology can proceed through the learning curve to maturity.

4. Public Enlightenment. National Governments should initiate education and awareness programmes that would influence its citizens. Thus, it is important that Member States focus on removing barriers currently inhibiting the development of wind power and other renewable resources.

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APPENDIX 1
The Face-to-face, and Telephone Interview Schedule

INTERVIEW SCHEDULE 1: THE MINISTRY OF ENVIRONMENT GERMANY

Research Title: Fostering the delivery of wind power: An evaluation of the performance of policy instruments in three EU Member States

Interview Questionnaire

This interview questionnaire asks about the market drivers of promoting wind energy in the Netherlands and the performance of the Feed-in tariff (FIT). The questionnaire seeks to obtain a view of the operation, administration, and the performance of the FIT. The questionnaire is divided into the following sections

1. The Principal Market Drivers
2. Design of the FIT
3. Implementation of the FIT
4. Performance of the FIT
5. Barriers to Wind Energy Development

Statement of Confidentiality

We would like to emphasise that any information which you supply to us will be treated with the strictest confidence.

Principal Market Drivers

1. What, in your own opinion are the principal market drivers for the promotion of renewable energy in Germany?
2. Which of these, if any, do you think is most crucial, both in the short-to-medium term, and the long-term?
3. To what extent do you feel that these drivers affect the development of support mechanisms to promote the German wind energy market?

Support Mechanism Design

4. What factors are considered before the design of the choice of support scheme?
5. How significant are these factors to the design of support mechanism?
6. What are the principal components of the choice of support mechanism?
7. What is the role of the Ministry of Environment in renewable energy/ wind energy policy design?
8. Why the choice of the FIT?
9. What do you see as the strengths and weaknesses of the FIT?

Implementation of Support Mechanism

10. What principal role does the Ministry of Environment play in the implementation of the FIT?
11. What are the ongoing challenges of implementing the FIT in the Germany?
12. How significant are these challenges to the success of the FIT?

Performance of Support Mechanism

13. To what extent is the choice of support mechanism committed to achieving the politically set target of 12.5% renewable energy by 2010?
14. How commensurate is the benefit of choice of support mechanism to the risk and costs of implementation?
15. To what extent has the choice of support mechanism been supported by other stakeholders? e.g. the wind energy industry, investors etc.
16. To what extent does the choice of support mechanism encourage local and corporate ownership?

17. Is there any administrative procedure to follow in implementing the FIT? If so, what are the features of this procedure?
18. How flexible is this procedure?
19. To what extent is the FIT compatible with the liberalisation of the electricity market?
20. To what extent have the FIT contributed to the development of wind energy market in Germany?

The Future and Barriers to Wind Energy Implementation

21. What system would you favour for an EU-wide support mechanism? Why?
22. How does the FIT match this system?
23. What are the principal problems and challenges facing the renewable energy sources development in Germany?
24. Which of these do you think is more difficult to overcome now and in the future?
25. To what extent do these problems impact on the development of the wind energy market in Germany?
26. What plans do the government have in place to solve these problems?

INTERVIEW SCHEDULE 1a: GERMANY

Research Title: Fostering the delivery of wind power: An evaluation of the performance of policy instruments in three EU Member States

Interview Questionnaire

This interview questionnaire asks about the performance of the Feed-in tariff (FIT). The questionnaire also seeks to obtain a view of the operations, administration, and the performance of the FIT.

Statement of Confidentiality

We would like to emphasise that any information which you supply to us will be treated with the strictest confidence.

1. Is your organisation involved in the design/ formulation of the FIT? (Political and legislative drivers).
2. if so, what role did your organisation play in the design of the FIT
3. To what extent is your organisation committed to strengthen the wind energy market in Germany?
4. What is the relationship of your organisation with the government, and the wind energy industry?
5. To what extent do you feel the choice of support mechanism is committed to achieving the politically set target for renewable energy by 2010?
6. In relation to price, and cost per MW of installed capacity, how would you describe the efficiency of the FIT? (Static and Dynamic Efficiency)
7. To what extent do you feel the FIT encourages small scale generating companies?

8. To what extent do you feel the FIT also encourages local and corporate ownership?
9. How would you describe the FIT in terms of stability and investors confidence?
10. How would you describe the FIT in terms of equity and finance?
11. What about in terms of transparency, practicability, and flexibility?
12. To what extent is the FIT compatible with the liberalisation of the electricity market?
13. To what extent has the FIT contributed to the development of wind energy market in Germany?
14. What about in terms of employment?
15. Does the government involve other stakeholders in the design of the FIT?
16. To what extent do the stakeholders support the FIT?
17. What do you consider are the strengths and weaknesses of the FIT?
18. Which system would you favour for an EU-wide support mechanism? Why?
19. What are the advantages and disadvantages of having a harmonised system?
20. What do you feel are the principal problems and challenges facing the renewable energy sources development in Germany?
21. How do you consider the grid issue?
22. Which of these do you think will be more difficult to overcome now and in the future?
23. To what extent do these problems impact on the development of the wind energy market in Germany?
24. What plans does your organisation have to address these problems?

INTERVIEW SCHEDULE 2: THE MINISTRY OF ECONOMICS AFFAIRS NETHERLANDS

Research Title: Fostering the delivery of wind power: An evaluation of the performance of policy instruments in three EU Member States

Interview Questionnaire

This interview questionnaire asks about the market drivers of promoting wind energy in the Netherlands and the performance of the Electricity Generation Environmental Quality (MEP). The questionnaire seeks to obtain a view of the operation, administration, and the performance of the MEP. The questionnaire is divided into the following sections

1. The Principal Market Drivers
2. Design of the MEP
3. Implementation of the MEP
4. Performance of the MEP
5. Barriers to Wind Energy Development

Statement of Confidentiality

We would like to emphasise that any information which you supply to us will be treated with the strictest confidence.

Principal Market Drivers

1. What, in your own opinion are the principal market drivers for the promotion of renewable energy in the Netherlands?
2. Which of these, if any, do you think is most crucial, both in the short-to-medium term, and the long-term?

3. To what extent do you feel that these drivers affect the development of support mechanisms to promote the Dutch wind energy market?

Support Mechanism Design

4. What factors are considered before the design of the choice of support scheme?
5. How significant are these factors to the design of support mechanism?
6. What are the principal components of the choice of support mechanism?
7. What is the role of the Ministry of Economics Affairs in renewable energy/ wind energy policy design?
8. Why the choice of the MEP?
9. What do you see as the strengths and weaknesses of the MEP?

Implementation of Support Mechanism

10. What principal role does the Ministry of Economics Affairs play in the implementation of the MEP?
11. What are the ongoing challenges of implementing the MEP in the Netherlands?
12. How significant are these challenges to the success of the MEP?

Performance of Support Mechanism

13. To what extent is the choice of support mechanism committed to achieving the politically set target of 9% renewable energy by 2010?
14. How commensurate is the benefit of choice of support mechanism to the risk and costs of implementation?

15. To what extent has the choice of support mechanism been supported by other stakeholders? e.g. the wind energy industry, investors etc.
16. To what extent does the choice of support mechanism encourage local and corporate ownership?
17. Is there any administrative procedure to follow in implementing the MEP? If so, what are the features of this procedure?
18. How flexible is this procedure?
19. To what extent is the MEP compatible with the liberalisation of the electricity market?
20. To what extent have the MEP contributed to the development of wind energy market in the Netherlands?

The Future and Barriers to Wind Energy Implementation

21. What system would you favour for an EU-wide support mechanism? Why?
22. How does the MEP fit into this system?
23. What are the principal problems and challenges facing the renewable energy sources development in the Netherlands?
24. Which of these do you think is more difficult to overcome now and in the future?
25. To what extent do these problems impact on the development of the wind energy market in the Netherlands?
26. What plans do the government have in place to solve these problems?

INTERVIEW SCHEDULE 2a: NETHERLANDS

Research Title: Fostering the delivery of wind power: An evaluation of the performance of policy instruments in three EU Member States.

Interview Questionnaire

This interview questionnaire asks about the performance of the Electricity Generation Environmental Quality (MEP). The questionnaire also seeks to obtain a view of the operations, administration, and the performance of the MEP.

Statement of Confidentiality

We would like to emphasise that any information which you supply to us will be treated with the strictest confidence.

1. Is your organisation involved in the design/ formulation of the MEP? (political and legislative drivers).
2. If so, what role did your organisation play in the design of the MEP?
3. To what extent is your organisation committed to strengthen the wind energy market in the Netherlands?
4. What is the relationship of your organisation with the government, and the wind energy industry?
5. To what extent do you feel the choice of support mechanism is committed to achieving the politically set target for renewable energy by 2010?
6. In relation to price, and cost per MW of installed capacity, how would you describe the efficiency of the MEP? (Static and Dynamic Efficiency)
7. To what extent do you feel the MEP encourages small scale generating companies?

8. To what extent do you feel the MEP also encourages local and corporate ownership?
9. How would you describe the MEP in terms of stability and investors confidence?
10. How would you describe the MEP in terms of equity and finance?
11. What about in terms of transparency, practicability, and flexibility?
12. To what extent is the MEP compatible with the liberalisation of the electricity market?
13. To what extent has the MEP contributed to the development of wind energy market in the Netherlands?
14. What about in terms of employment?
15. Does the government involve other stakeholders in the design of the MEP?
16. To what extent do the stakeholders support the MEP?
17. What do you consider are the strengths and weaknesses of the MEP?
18. Which system would you favour for an EU-wide support mechanism? Why?
19. What are the advantages and disadvantages of having a harmonised system?
20. What do you feel are the principal problems and challenges facing the renewable energy sources development in the Netherlands?
21. How do you consider the grid issue?
22. Which of these do you think will be more difficult to overcome now and in the future?
23. To what extent do these problems impact on the development of the wind energy market in the Netherlands?
24. What plans does your organisation have to address these problems?

INTERVIEW SCHEDULE 3: DEPARTMENT OF TRADE AND INDUSTRY & THE SCOTTISH EXECUTIVE

Research Title: Fostering the delivery of wind power: An evaluation of the performance of policy instruments in three EU Member States.

Interview Questionnaire

This interview questionnaire asks about the market drivers of promoting wind energy in the UK and the performance of the Renewable Obligation. The questionnaire seeks to obtain a view of the operation, administration, and the performance of the Renewable Obligation. The questionnaire is divided into the following sections

1. The Principal Market Drivers
2. Design of the RO
3. Implementation of the RO
4. Performance of the RO
5. Barriers to Wind Energy Development

Statement of Confidentiality

We would like to emphasise that any information which you supply to us will be treated with the strictest confidence.

Principal Market Drivers

1. What, in your own opinion are the principal market drivers for the promotion of renewable energy in the UK?
2. Which of these, if any, do you think is most crucial, both in the short-to-medium term, and the long-term?

3. To what extent do you feel that these drivers affect the development of support mechanisms to promote the UK wind energy market?

Support Mechanism Design

4. What factors are considered before the design of the choice of support scheme?
5. How significant are these factors to the design of support mechanism?
6. What are the principal components of the choice of support mechanism?
7. What is the role of the DTI in renewable energy/ wind energy policy design?
8. Why the choice of the RO?
9. What do you see as the strengths and weaknesses of the RO?

Implementation of Support Mechanism

10. What principal role does the DTI play in the RO implementation?
11. What are the ongoing challenges of implementing the RO in the UK?
12. How significant are these challenges to the success of the RO?

Performance of Support Mechanism

13. To what extent is the choice of support mechanism committed to achieving the politically set target of 10% renewable energy by 2010?
14. How commensurate is the benefit of choice of support mechanism to the risk and costs of implementation?
15. To what extent has the choice of support mechanism been supported by other stakeholders? e.g. the wind energy industry, investors etc.

16. To what extent does the choice of support mechanism encourage local and corporate ownership?
17. Is there any administrative procedure to follow in implementing the RO? If so, what are the features of this procedure?
18. How flexible is this procedure?
19. To what extent is the RO compatible with the liberalisation of the electricity market?
20. To what extent have the RO contributed to the development of wind energy market in the UK?

The Future and Barriers to Wind Energy Implementation

21. What system would you favour for an EU-wide support mechanism? Why?
22. How does the RO fit into this system?
23. What are the principal problems and challenges facing the renewable energy sources development in the UK?
24. Which of these do you think is more difficult to overcome now and in the future?
25. To what extent do these problems impact on the development of the wind energy market in the UK?
26. What plans do the government have in place to solve these problems?

INTERVIEW SCHEDULE 3a: UNITED KINGDOM

Research Title: Fostering the delivery of wind power: An evaluation of the performance of policy instruments in three EU Member States.

Interview Questionnaire

This interview questionnaire asks about the performance of the Renewable Obligation (RO). The questionnaire also seeks to obtain a view of the operations, administration, and the performance of the RO.

Statement of Confidentiality

We would like to emphasise that any information which you supply to us will be treated with the strictest confidence.

1. Is your organisation involved in the design/ formulation of the RO? (Political and legislative drivers).
2. if so, what role did your organisation play in the design of the RO
3. To what extent is your organisation committed to strengthen the wind energy market in UK?
4. What is the relationship of your organisation with the government, and the wind energy industry?
5. To what extent do you feel the choice of support mechanism is committed to achieving the politically set target for renewable energy by 2010?
6. In relation to price, and cost per MW of installed capacity, how would you describe the efficiency of the RO? (Static and Dynamic Efficiency)
7. To what extent do you feel the RO encourages small scale generating companies?
8. To what extent do you feel the RO also encourages local and corporate ownership?

9. How would you describe the RO in terms of stability and investors confidence?
10. How would you describe the RO in terms of equity and finance?
11. What about in terms of transparency, practicability, and flexibility?
12. To what extent is the RO compatible with the liberalisation of the electricity market?
13. To what extent has the RO contributed to the development of wind energy market in UK?
14. What about in terms of employment?
15. Does the government involve other stakeholders in the design of the RO?
16. To what extent do the stakeholders support the RO?
17. What do you consider are the strengths and weaknesses of the RO?
18. Which system would you favour for an EU-wide support mechanism? Why?
19. What are the advantages and disadvantages of having a harmonised system?
20. What do you feel are the principal problems and challenges facing the renewable energy sources development in the UK?
21. How do you consider the grid issue?
22. Which of these do you think will be more difficult to overcome now and in the future?
23. To what extent do these problems impact on the development of the wind energy market in the UK?
24. What plans does your organisation have to address these problems?

APPENDIX 2

Names of Organisation Interviewed

COUNTRY: GERMANY

Type of Organisation	**Position Held**	**Date of Interview and How the Interview was Conducted**	**Total Number of Interview = 17**
Ministry of Environment and Natural Conservation	Deputy Head of Renewable Energy Division and Staff of Renewable Energy Division	30th October2006 **Face-to-face interview**	1
German Energy Agency	Renewable Energy Policy Officer	10th November 2006 **Telephone interview**	1
German Wind Energy Association	Policy Director	1st November 2006 **Face-to-face interview**	1
German Association of Electricity Producers	Policy Director	2nd November 2006 **Face-to-face interview**	1
Greenpeace Germany	National Campaigner Climate Change and Renewable Energy	31st October 2006 **Face-to-face interview**	1
World Wind Energy Association	Secretary General	1st December 2006 **Telephone interview**	1
German Renewable Energy Federation	President of Association	26th October 2006 **Telephone interview**	1
Oko Institute	Policy Officer	25th October 2006 **Telephone interview**	1
German Wind Institute	Policy Officer	9th November 2006 **Telephone interview**	1
Ecofys Germany	Renewable Energy Policy Consultant	1st November 2006 **Face-to-face**	1

		interview	
RWE Germany	Project Manager	30th November 2006 **Telephone interview**	1
Vattenfall Germany	Project Manager	30th November 2006 **Telephone interview**	1
E.ON Germany	Project Manager	1st December 2006 **Telephone interview**	1
EnBW Germany	Project Manager	7th December 2006 **Telephone interview**	1
Franhaufer ISI Germany	Senior Scientist	3rd November 2006 **Face-to-face interview**	1
Environmental Policy Research Centre, Free University, Berlin Germany	Renewable Energy Policy Academic Expert	13th November 2006 **Telephone interview**	1
Environmental Policy Research Centre, Free University, Berlin Germany	Renewable Energy Policy Academic Expert	10th November 2006 **Telephone interview**	1

EUROPEAN UNION

Type of Organisation	**Position Held**	**Date of Interview and How Interview was Conducted**	**Total Number of Interview = 4**
European Commission	Director General Transport and Environment	14th August 2006 **Telephone** interview	1
European Wind Energy Association	Chief Executive Officer	11th September 2006 **Telephone interview**	1
European Association of Electricity Producers (EURELECTRIC)	Policy Director	14th August 2006 **Telephone interview**	1
European Renewable Energy Council	Policy Director	16th August 2006 **Telephone interview**	1

COUNTRY: THE NETHERLANDS

Type of Organisation	Position Held	Date of Interview and How Interview was Conducted	Total Number of Interview = 16
Ministry of Economic Affairs	Senior Renewable Energy Policy Advisor	28th September 2006 **Face-to-face interview**	1
TenneT Netherlands	Senior Manager	25th September 2006 **Face-to-face interview**	1
Energy Research Centre of the Netherlands	Group Leader Renewable Energy	29th September 2006 **Face-to-face interview**	1
The Netherlands Agency for Sustainability and Innovation (SENTER NOVEM)	Senior Renewable Energy Policy Advisor	26th September 2006 **Face-to-face interview**	1
Wind at Sea Energy Research Centre of the Netherlands (ECN)	Group Leader	29th September 2006 **Face-to-face interview**	1
Evelop Netherlands	Renewable Energy Project Manager	27th September 2006 **Face-to-face interview**	1
Netherlands Wind Energy Association (ECN)	Project Manager	27th September 2006	1
Ecofys Netherlands	Renewable Energy Policy Consultant	27th September 2006 **Face-to-face interview**	1
Ecofys Netherlands	Energy Efficiency Consultant	27th September 2006	1

		Face-to-face interview	
The Netherlands Association of Electricity Producers (Energiened)	Policy Director	25th September 2006 **Face-to-face interview**	1
General Energy Council Netherlands (Ger Algemene Energieraad)	Council Secretary	26th September 2006 **Face-to-face interview**	1
ENERQ Netherlands	Manager	4th October 2006 **Telephone interview**	1
Delta Netherlands	Project Manager	1st December 2006 **Telephone** interview	1
University of Amsterdam	Renewable Energy Policy Academic Expert	26th September 2006 **Face-to-face interview**	1
Greenpeace Netherlands	Climate Change and Energy Campaigner	26th September 2006 **Face-to-face interview**	1
Eneco Netherlands	Project Manager	1st December 2006 **Telephone interview**	

COUNTRY: UNITED KINGDOM

Type of Organisation	Position Held	Date of Interview and How Interview was Conducted	Total Number of Interview = 18
Department of Trade and Industry UK	DTI Officer in Charge of the Review of the RO 2005/2006	14th June 2006 **Face-to-face interview**	1
Office of the Gas and Electricity Markets UK	Head of Renewable Obligation	15th August 2006 **Telephone interview**	1
British Wind Energy Association UK	Director of Economics and Markets	14th June 2006 **Face-to-face interview**	1
Association of Electricity Producers UK	Head of Renewables	15th June 2006 **Face-to-face interview**	1
Greenpeace UK	Renewable Energy Policy and Environmental Campaigner	13th June 2006 **Face-to-face interview**	1
Scottish Executive UK	Policy Officer Renewables and Consenting; Deputy Branch Head, Renewables and Consent	05th June 2006 **Face-to-face interview**	1
Scottish Renewables UK	Chief Executive	05th June 2006 **Face-to-face interview**	1
Renewable Energy Association UK	Head of Power	14th August 2006 **Face-to-face interview**	1
Friends of the Earth UK	Environment and Policy Campaigner	14th June 2006 **Face-to-face interview**	1

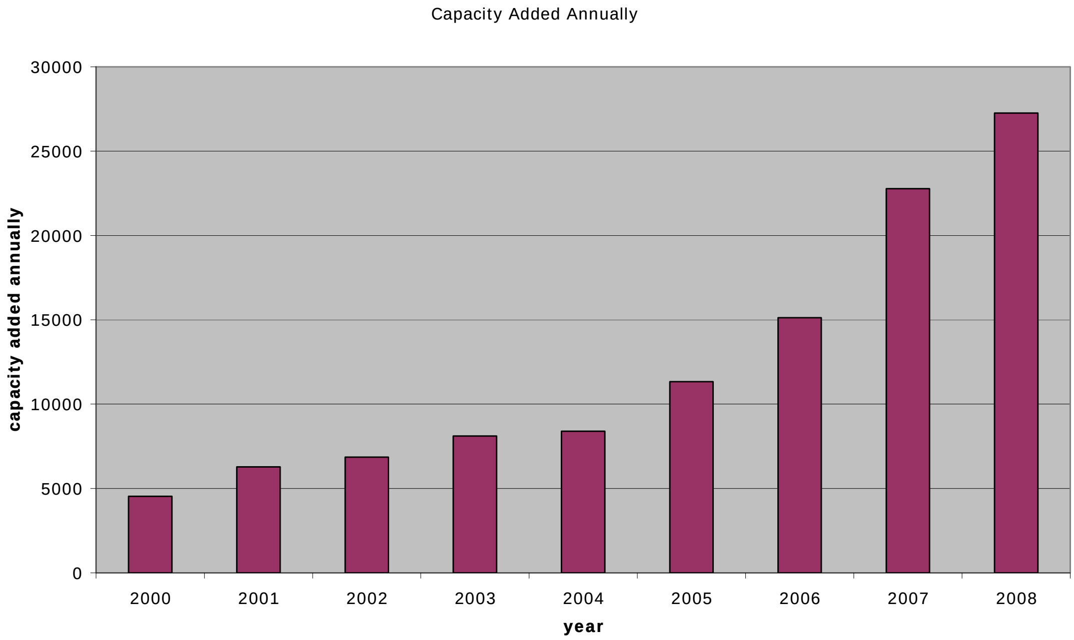
British Institute of Energy Economics UK	Fellow British Institute of Energy Economics, and Renewable Energy Policy Academic Expert	08th September 2006 **Telephone interview**	1
DM Energy Consultants, UK	Director and Renewable Energy Policy Consultant	19th October 2006 **Telephone interview**	1
Ecofys UK	Renewable Energy Policy Consultant	24th November 2006 **Face-to-face interview**	1
Npower UK	Head Strategy and Regulation	12th December 2006 **Telephone interview**	1
E.ON (Powergen) UK	Commercial Manager, Development and Construction	29 November 2006 **Telephone interview**	1
Scottish Power	Managing Director, Renewables and major Projects	27th November 2006 **Telephone interview**	1
Scottish and Southern	Head of Projects Development	15th December 2006 **Face-to-face interview**	1
EDF UK	Carbon Policy Market Manager	28th November 2006 **Telephone interview**	1
Good Energy	Commercial and Renewable Energy Policy Management Staff	13th December 2006 **Telephone interview**	1

APPENDIX 3

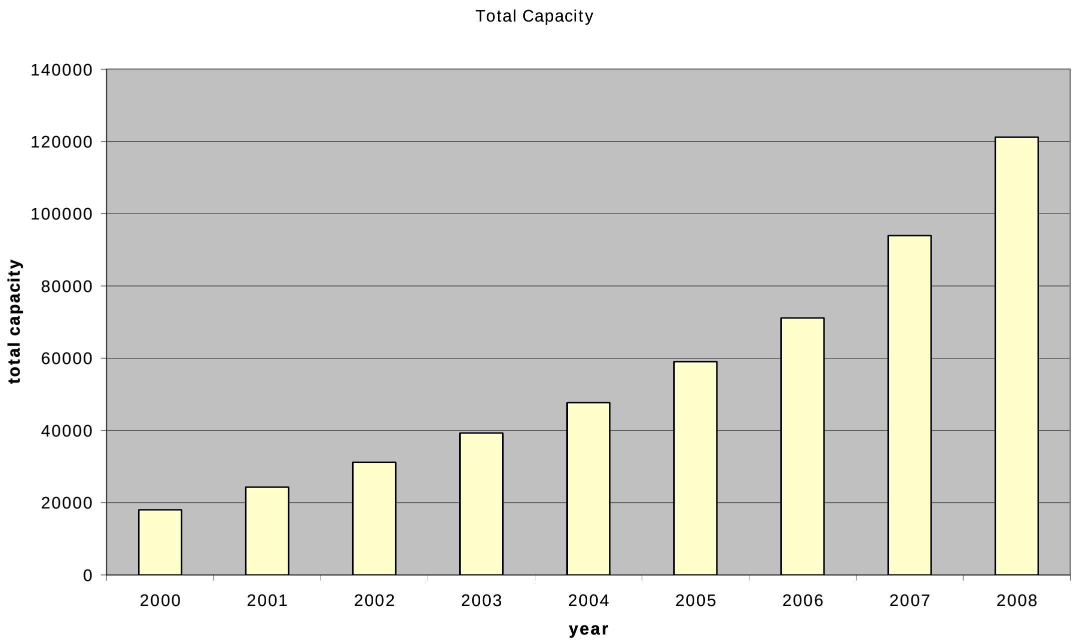
World Wind Power Capacity in Charts

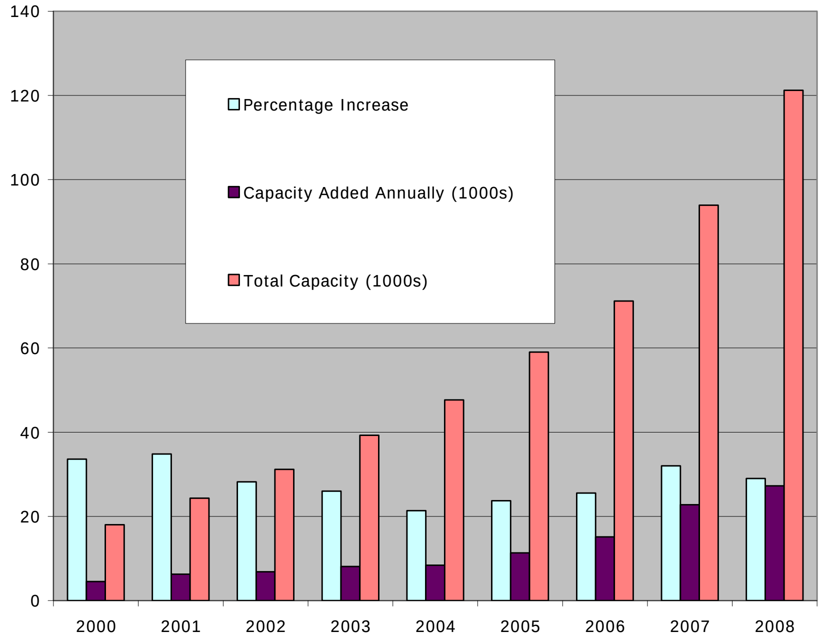
YEAR	CAPACITY ADDED ANNUALLY (MW)	TOTAL CAPACITY (MW)	PERCERNTAGE INCREASE
2000	4539	18039	33.62
2001	6283	24322	34.83
2002	6859	31181	28.20
2003	8114	39295	26.02
2004	8398	47693	21.37
2005	11331	59024	23.75
2006	15127	71151	25.56
2007	22776	93927	32.01
2008	27261	121188	29.02

(1) Capacity Added Annually



(2) World Installed Capacity





APPENDIX 4

Codes and Categories of the Data

Code	Category	codes	Theme
01	**Administration**		
		01a	Practicability
		01b	Simplicity
		01c	Flexibility
		01d	Transparency
		01e	Institutional conflicts

Code	Category	codes	Theme
02	**Stakeholders involvement and support**		
		02a	Actors and institutional relationship
		02b	representations
		02c	Public acceptance and support
		02d	Ownership structure
		02e	Risks

Code	Category	codes	Theme
03	**Certainty for industry**		
		03a	stability
		03b	Investment certainty
		03c	risk
		03d	Nature of wind power manufacturing industry
		03e	Industrial development
		03f	Institutional linkages

Code	Category	codes	Theme
04	**Effectiveness**		
		04a	Target delivery
		04b	Time
		04c	Deployment rate
		04d	Contribution to national target
		04e	Planning and permission laws
		04f	risk

Code	Category	codes	Theme
05	**Efficiency**		
		05a	Price
		05b	Costs
		05c	Fluctuation of prices
		05d	Competition
		05e	Static efficiency
		05f	Dynamic efficiency
		05g	Risk

Code	Category	codes	Theme

06	**Market Conformity**		
		06a	Compatibility with national system
		06b	Liberalisation
		06c	Competition
		06d	Barriers to entry
		06e	Institutional conflicts
		06f	Ownership structure
		06g	Risk

Code	**Category**	**codes**	**Theme**
07	**Finance**		
		07a	Investors confidence
		07b	Ease of obtaining finance
		07c	Investment risk
		07d	Pay back

Code	**Category**	**codes**	**Theme**
08	**Impact on development**		
		08a	Wind turbine industry
		08b	Technology development
		08c	Stimulation for market growth
		08d	Employment
		08e	Environmental impact

APPENDIX 5

Summary of Research Findings

Further Summary of Research Findings

	Dimension 1: Administration	Dimension 2: Stakeholders Support and Involvement; and Certainty of Industry	Dimension 3: Effectiveness; Efficiency; Market Conformity; and Finance	Dimension 4: Impact on Development
Policy Instruments				
Feed-in Tariff (FIT)	Transparent and flexible	Widely enjoys stakeholders' support and involvement. Encourages small scale and generating companies to grow. Shares owned to a large extent by local and corporate farmers. Stable, boost investors' confidence, and comes with little or no risks	Very effective in delivering quantitative targets, has delivered the fastest development of wind energy. Capable of delivering wind energy at a low cost; reduces production risks and investments costs; does not encourage international and cross border trade thus limiting competition among suppliers. Guarantees return of investments, easy to obtain loans.	Encourages local and national development of wind turbine manufacturing companies thus creating employment more than the other systems. Helps contribute to reducing the threat of global warming. Tends to lead the way in this regard more than any other policy instrument.
Electricity Generation Environmental Quality (MEP)	Transparent and flexible	Stakeholders are not involved. Encourages small and local ownerships of wind investments. Lacks continuity, very risky, and lacks good investor confidence quality.	Effective in delivering some capacities of wind power at a low cost as the FIT above; investments risks increases over time; and limits competition among suppliers. Guarantees return on investment but difficult to obtain loan.	Does not encourage local and national wind turbine manufacturing companies thus contributing to a limited number of employments. Helps contribute to reducing the threat of global warming.
Renewable Obligation (RO)	Volatile, Complicated, and not flexible	Widely involves stakeholders. Does not favour small scale and local ownership type of investment. Risky, unstable.	Effective in delivering some capacities of wind power but not as fast as the FIT in delivering wind power capacities. More expensive than the FIT and the MEP thus investment risks	Does not encourage local and national wind power turbine development companies thus contributing less employment opportunities than the FIT. Helps to reduce the threat

			are high; more compatible to liberalised electricity market thus bring about competition in the market than the other systems. May not be too easy to obtain loans to finance investments into wind power because of the risks and uncertainties involved.	of global warming.

Author Generated

APPENDIX 6

Typologies and Policy Instruments

		Direct		Indirect
		Price-driven	Quantity-driven	
Regulatory	Investment focussed	• Investment incentives	• Tendering system	• Environmental taxes
		• Tax incentives		
	Generation based	• Feed-in tariffs	• Tendering system • Quota obligation based on TGCs	
		• Rate-based incentives		
Voluntary	Investment focussed	• Shareholder programmes		• Voluntary agreements
		• Contribution programmes		
	Generation based	• Green tariffs		

Source: Held et al (2006)

SAMPLE OF PUBLICATION

OTITOJU, A. et al (2010) Assessing the

Performance of the UK Renewables Obligation:

Cinderella or an Ugly Sister? In:

Strachan, P.A. et al (2010)

Wind Power and Power Politics: International

Perspectives

London: Routledge

7 Assessing the Performance of the UK Renewables Obligation

Cinderella or an Ugly Sister?

Afolabi Otitoju, Peter A. Strachan, and David Toke

INTRODUCTION

Energy production from renewable energies continues to be somewhat of a hot topic within United Kingdom (UK) policy debates. Indeed, there appear to be increasing concerns over security of supply, and combining this with the growing threats of climate change, these issues have fuelled demands for renewable energies to play a greater role in the UK energy mix.

The UK's commercial renewable energy programme began in 1990, with the inception of the renewables section of the Non-Fossil Fuel Obligation (NFFO). However, as we discuss later, this produced only small amounts of wind power. The election of the Labour Government in 1997 presaged a bigger focus on delivering large volumes of renewable energy, resulting in the Renewables Obligation (RO), which began operation in 2002. This development has paralleled other initiatives, such as the Climate Change Programme, and the 2003 and 2007 Energy White Papers. The RO was established with an obligation on electricity suppliers to supply 10 per cent of their electricity from renewables by 2010. This target was extended in December 2003, toward providing 15 per cent by 2015 (Toke 2005). The UK government has also committed itself to extending this target to 20 per cent by 2020. With this in mind, much of this capacity will come from wind power—with wind having an exalted position in UK energy-policy debates. Additionally, Scotland has played an increasingly important role in onshore wind-power deployment, as it possess a large part of not only the UK's, but also Europe's potential for exploiting wind power. Recognizing this natural advantage, the devolved Scottish government has stipulated a national target of providing 18 per cent of Scottish electricity generation from renewable sources by 2010, and 40 per cent by 2020.

Against this backdrop, however, the UK is not on course to meet its 10 per cent target. Indeed, by the end of 2006, 'new' (i.e., non-large hydro) renewable energy was supplying 4 per cent of electricity when, according to the escalating target, it ought to have been supplying 6 per cent.

An expanding literature has begun to emerge which attempts to explain the situation whereby, given the apparent governmental support for renewable energy and the technical and economic feasibility of wind, why are current deployment rates falling far short of those necessary to meet targets? As was noted in the introduction to this book, the UK remains a member of the second division of deployed wind-power capacity—behind Germany, Spain, the United States, and Denmark, and alongside countries like France, The Netherlands, Italy, and Portugal.

Reasons outlined to explain this phenomenon have revolved around the lack of widespread farmer- and community-owned wind power. However, the truth may be more prosaic in that, in the UK, energy activism at the grassroots level has been limited compared to some other countries on the European continental shelf (Germany and Denmark, in particular), a context which is associated with low levels of interest in developing locally owned wind-power schemes. As noted in Chapter 1, the vast majority of wind capacity is owned by the six major electricity companies, with reportedly limited direct community benefits having been realized as a result. Other reasons given include hostility from some very high-profile landscape protection campaigners and other campaigning organizations, restrictive planning practices (Warren et al. 2005; Cowell 2007), the weak transmission system in Scotland (Strachan and Lal. 2004), and the fact that there is little domestic manufacturing base to support the deployment of wind power in the UK (Strachan et al. 2006). Incentive systems, which have been adopted by the UK for wind-power deployment since the early 1990s, have also been criticized (Toke 2007; Elliott 2005; Grotz and Bischof 2005).

While we recognize the importance of these factors, as well as the fact that they are complexly intertwined, this chapter aims to critically evaluate the performance of the RO—since 2002, the main incentive scheme to be used to promote the expansion of renewable energies in the UK. Meyers (2007) and Grotz and Fouquet (2005) note that the success of achieving politically fixed renewable targets rapidly will not come about without reliable, long-term support schemes which secure investor confidence. Thus, the main research question this chapter aims to address is: To what extent is the RO an appropriate support scheme, and is the RO performing according to governmental and other stakeholder expectations?

Before presenting a critique of the RO, we begin by providing a contextual discussion of UK wind-energy policy and related developments. This will be followed by an overview of the theoretical framework supported by objective criteria, which have been formulated to evaluate the performance of the RO. The development of this framework was based on a comprehensive literature review of existing practitioner and academic frameworks, methods, and criteria, and piloted with a range of organizations operating in the European and UK wind sector. To ensure our framework is fit for purpose, it has also been used to evaluate the performance of support schemes in Germany and The Netherlands, though we do not discuss our research findings from these countries in the current chapter. Furthermore, it is noted that our analysis of the RO was facilitated by in-depth semi-structured interviews with eighteen senior representatives (see Appendix 7.1) drawn from the most important organizations involved in the design and management, operation, and regulation of the RO.

UK RENEWABLE ENERGY POLICY: 1970–2008

Plans to promote renewable energy in the UK can be traced back to the 1970s. At this time, renewable energy was based on research and development, with only very limited electricity produced from renewable energies. During the 1970s and 1980s, renewable energy was both marginalized and shackled by the technocratic corporatism of the then-country-centred nationalized energy industries.

During the 1980s, the UK government began to pursue a wholesale liberalization and privatization programme of the electricity market. Becoming the first European Union member state to open up its market for competition through the adoption of the Electricity Act in 1989 (Meyer 2003), the regulatory framework started to become geared toward promoting competition, promoting lower prices for consumers, and avoiding market distortions. However, electricity production from renewable energy continued to be confined to competitive-market conditions, which appeared to be rolled out to the institutions and rationalities of the then-dominant energy market. While the NFFO, which was introduced in 1990, did kick-start the wind energy sector in the UK, its failings have been well documented. As a consequence, although the NFFO served as an initial financial support mechanism to promote the take-off of renewable energy technologies (which were the most commercially viable), Connor and Mitchell (2004: 136) reveal, however, that the NFFO was set up as a means to subsidize nuclear generation, which had proved extremely difficult to privatize. At that particular time, it was clear that only limited support was provided to renewable energies, and this important issue is alluded to in depth by Szarka and Bluhdorn (2006).

The NFFO was arranged in rounds—as a form of tendering system—which allowed companies to compete for financial support for investing in renewables. In simple terms, the cheapest bid submitted won the contract and the company then received a subsidy. By the year 2000, a total of 1,500 MW of installed capacity of renewable energy sources was proposed, but after all of the rounds of the NFFO, it failed to deliver the required target. Hence, Brennand (2004: 89) noted that:

> the failure of the NFFO to achieve its 1500MW target of new renewable generating capacity in the UK by the year 2000 led the government

in the same year to declare a new target of 10%, therefore the NFFO was put on hold.

Much was said about the planning problems faced by wind-power schemes (Connor and Mitchell 2004), but perhaps a bigger factor contributing to a disappointing rate of installation of wind farms was the competitive bidding system itself. It encouraged low-cost schemes. Unfortunately, however, many seemed to be proposed on the basis of optimism and a desire to win a contract, rather than develop robust, appropriate, or sophisticated schemes, which in reality often proved to be rather more costly than the original bids suggested.

The change in UK government in 1997 brought a sea-change of thinking to the renewables debate and, consequently, the Labour Government's commitment to the ecological modernization of the UK economy brought about significant changes to energy policy. Valle Costa et al. (2007) indicated that the Utility Act, which was introduced in 2000, was intended to further strengthen these changes and to establish a new regulatory framework for gas and electricity markets; thus, the New Electricity Trading Agreement (NETA) came into operation in 2001. However, the uncertainty created by the formation of NETA effectively put a halt to renewable energy developments at that time. On this note, NETA was designed more or less like a community market, meant to bring down the price of bulk electricity. Further, in order to encourage a low-carbon economy and to reduce carbon dioxide emissions, the Carbon Trust was created in 2001. In the same year, the UK climate change programme was published by the government and Strachan and Lal (2004) reported that the climate change programme had pushed forward governmental policies that gave way for renewable energy to further strengthen the government's intention to reach the 10 per cent target by 2010.

In 2002, the RO was introduced to replace the NFFO, and this once again stimulated investor confidence in wind power (the best-developed technology) amongst, in particular, large and integrated utility companies. The RO is a form of renewable portfolio standard (RPS), mandating all utility companies to produce 10 per cent of their electricity mix from renewables by 2010, and 15 per cent by 2015. This was intended to increase annually, beginning with 3 per cent in 2002–2003, and the quotas were to be achieved through the issue of a green certificate for each unit of generation, and the RO will be in force up to 2025–2026. Here, renewable energy generators receive renewable obligation certificates (ROCs) for each megawatt-hour of renewable-energy electricity generated. The ROCs can either be obtained by buying from generators or from the ROC's market. Failure of suppliers or utilities to meet the required ROCs leads to the payment of a "buy-out price", and the funds from the buy-out price are recycled amongst generators that meet their quotas. To date, the RO has helped to deliver the surge in onshore wind-energy investment and installed capacity.

The Energy White Paper, published in 2003 (Department of Trade and Industry 2003), arose from the need to address a series of emerging energy challenges, i.e., meeting UK energy demand, dealing with the threat of climate change, and reducing dependency on fossil fuels, especially from other parts of the world. The 2003 Energy White Paper set out four principal goals which have continued to date:

(i) Putting the UK on a path to cut its carbon dioxide emissions by 60 per cent by 2050.
(ii) Maintaining reliability of energy supplies.
(iii) Promoting competitive markets in the UK and abroad.
(iv) Ensuring that every home is adequately and affordably heated.

Renewable energy—particularly wind power—is expected to play an important role in making this become a reality (Department of Trade and Industry 2003; Foxon and Pearson 2007).

Since being elected, the Labour Government has also sought to improve the planning environment for wind farms. This has featured the adoption of the Planning Policy Statement 22 (PPS22) guidelines for local authorities in England. These guidelines introduced 'criteria based' assessment of wind farms and undermined efforts by local authorities to declare 'no-go' areas for wind farms. However, the Westminster government no longer has control over wind-power planning in Wales (except for schemes over 50 MW) and Scotland (not at all). The Welsh and Scottish Executives have both maintained pro-wind-power planning policies, albeit, in the case of Wales under TAN-8, through limiting wind-power development mostly to a few small wind-power development zones.

Scotland is more important than England toward reaching the renewables target in onshore planning terms. However, the previously high proportion of wind-power planning approvals has been falling in Scotland. The most recent planning policy statement (SPP6) allows local authorities to earmark some areas for 'significant protection' (against wind farms). The emergence of an SNP Scottish Executive in May 2007 has further dampened the possibilities for high approval rates. Nevertheless, the Scottish Executive's attitude toward onshore wind farms, while more cautious than the Labour Party, is still moderately supportive. It is thus still likely that half or more of wind farms will be approved on top of the many that have already received planning consent, and the goal of achieving 50 per cent of Scottish electricity from renewable energy by 2020 is still realistic. There is no shortage of schemes in the planning pipeline. A large backlog of wind-farm schemes given planning approval but which are waiting for transmission upgrades before they can be constructed already exists. The 'Beauly-Denny line'

(North–South Scotland) transmission line has been subject to a lengthy planning enquiry and, while it seems likely to be approved, it will not be operational before 2010.

Other different sorts of delays have afflicted the offshore programme, although some of these can indeed be attributed to the operation of the RO. Because the RO favoured the cheapest projects, offshore schemes have sometimes been put on the 'back burner'. This problem has been exacerbated by the increase in wind-turbine prices since 2005, a consequence of the burgeoning global demand for wind turbines and increases in the cost of energy, steel, and concrete. In addition, the British government and its regulator, Office of the Gas and Electricity Market (OFGEM), have been relatively slow to organize an agreement that would allow the bulk of the charges for grid connection of offshore wind farms to be passed on to electricity consumers through the transmission change element of bills. Even so, it has to be said that Britain is now (end of 2007) roughly equal with Denmark, having around 400 MWe of offshore wind capacity, and is therefore the joint world leader in this particular subtechnology.

According to the first annual report on implementation of the Energy White Paper (Department of Trade and Industry 2004: 5), of the 112 key milestones set as a first step toward achieving the White Paper's long-term commitments, 56 of them had been completed by the end of March 2004. In the context of renewable energy sources, 1.6 GW was consented, with 2 GW capacities under way. While 2004 mainly set in place long-term strategies for achieving the targets set out in the 2003 White Paper (Department of Trade and Industry 2005), one important development were the changes made to the RO order 2004. This increased the level of the obligation to 15.4 per cent by 2015–2016, which was meant to "provide investors with additional confidence" (Department of Trade and Industry 2005: 5). During 2005, the UK became one of only eight countries to reach over 1,000 MW installed wind capacity (Department of Trade and Industry 2006).

Following the Energy Review, the 2007 Energy White Paper (2007) was published and a "banding" system was introduced to the RO.[1] This reform was introduced in response to criticisms that the RO was allowing development of only the cheapest technologies (including onshore wind), rather than more expensive renewables, such as offshore wind and wave power. The aim of the banding system is to allocate more or less than one ROC for each megawatt of electricity produced from renewable energy sources, depending on the stage of technological development and associated costs (Department of Trade and Industry 2007: 150). Therefore, enabling the increase of the deployment of emerging marine (wave, tidal, etc.) renewable technologies, and improve overall cost-effectiveness of the RO (Department of Trade and Industry 2007). Interestingly, this involved a reversal of policy that had been established earlier by the Department of Trade and

Table 7.1 An Overview of UK Renewable Energy Policies 1970–2008

Policies and Programmes	Period	Focus
Development initiatives	1970–1988	Research, Development and Demonstration (R&D&D) limited renewables
Liberalization and privatisation of electricity market	1989	Opening up market for competition
NFFO nuclear and renewables	1990–2002	Nuclear subsidy
Utility Act	2000	Gas and electricity market
NETA	2001	Reducing prices for bulk electricity
Carbon Trust	2001	Carbon dioxide emissions reduction 12.5% Kyoto target achievement
United Kingdom Climate Change Programme	2001	Kyoto target and renewable energy sources targets
Renewables Obligation	2002	Renewable energy sources
Energy White Paper	2003	Meeting energy demand and climate change, and reducing dependency on fossil fuels from other parts of the world.
Energy White Paper	2007	Meeting energy demand and climate change, and creating an enabling environment for all renewable energy sources to grow through the introduction of 'banding'

Source: Author generated.

Industry (DTI). This is an issue which we pick up later when discussing our research findings. The new Energy White Paper just came into operation in May 2007; therefore, it is too early to comment further on its progress and success.

Table 7.1 summarizes the development of UK renewable energy policies discussed in this section.

ASSESSING PERFORMANCE: AN EVALUATION FRAMEWORK

Having provided the background to UK renewable energy policy, this section presents our theoretical framework, supporting evaluation methods, and criteria developed from a review of the literature on international support schemes, and piloted with a range of EU and UK organizations. The section begins by providing an insight into EU framework conditions that support schemes should meet. The evaluation criteria and questions which guide our research are then outlined, and these are summarized in Table 7.2 before our theoretical and integrative framework is presented, which is used to assess the performance of the RO.

Framework Conditions

The available evidence clearly identifies that the implementation of support schemes are crucial to the delivery of renewable energies. As such, the EU Directive 2001/77/EC indicates that support schemes should satisfy the following strategic conditions:

- Contribute to achievement of national indicative targets.
- Be compatible with the principle of the internal electricity market.
- Take into account the characteristics of different sources of renewable energy, together with the different technologies and geographical differences.
- Promote the use of renewable energy sources in an effective way; be simple and, at the same time, as efficient as possible, particularly in terms of costs.
- Include sufficient transitional periods for national support systems of at least seven years and maintain investor confidence.

Morthorst et al. (2005: 8) reveal, however, that support schemes are not by themselves sufficient for the deployment of renewable sources; other issues need to be in place. It is clear that such schemes must be well designed, but electricity-producing companies should also have good access to the grid. Administrative barriers should be removed, application processes streamlined, and public participation and acceptance widely encouraged. Thus, support schemes should receive wide-ranging support from stakeholders and interest groups. Support schemes should further provide incentives for both small and large investors alike, such that a level playing field of competition is created without discrimination occurring in the market place; hence, support schemes need to be designed to conform to the legal and market regulations, especially the internal electricity market or electricity market liberalization pursued by the EU. Further, support schemes must be capable of reaching politically fixed targets within the time frame stipulated at minimum or least cost possible, with little or no risk of uncertainties to investors.

Evaluation Criteria

Various frameworks and approaches have been developed to evaluate the performance of support schemes. Drawing on the international wind-power literature—including, for example, del Rio and Gual (2007), Dinica (2006), Harmelink et al. (2006), Mitchell et al. (2006), Toke (2006), Connor (2005), Elliot (2005), van der Linde (2005), Lauber (2004), Sawin (2004), van Dijk et al. (2003), Menanteau et al. (2003), Sijm (2002), Wiser et al. (2002), Haas et al. (2004), Enzensberger et al. (2002), and Hvelplund 2001—we have identified the following criteria that seem to permeate existing debates. These criteria will be subsequently applied to assess the performance of the RO.

Administration

Any support scheme needs to reduce regulatory and nonregulatory barriers; streamline and expedite administrative procedures; ensure that guiding principles and rules are objective, transparent, and nondiscriminatory; and fully take into account the particularities of the various renewable energy technologies. Support schemes should also be cost-effective and simple to implement. Transparency is defined here as the ease of access to information on investment and financial data from governmental regulatory bodies. Under this criterion, questions we explored included:

- To what extent is the support scheme transparent and easy to understand?
- Is the support scheme flexible and practicle?
- Is the administrative and transactional cost low compared to other support schemes?

Stakeholder Support/Involvement

Stakeholders in this context are defined broadly to include parties or groups that are affected by policy choices and facilitating support schemes. Stakeholders can react differently—they can facilitate or, indeed, inhibit the deployment of wind power. The extent to which the support scheme encourages stakeholder groups to participate and be involved in wind-power deployment is crucial to successful implementation. Under this criterion, questions we explored included:

- Does the scheme involve stakeholder groups in the design and implementation of the support scheme?
- Do stakeholders largely favour the scheme?
- Ultimately, to what extent does the support scheme encourage corporate ownership and/or community ownership of wind power?

Certainty for Industry

The willingness of investors to enter the wind-power market is crucial to the expansion of wind-power capacity. A support scheme must be capable of attracting a wide range of new investors to the market, and it must be stable over the longer term, such that investor confidence can be guaranteed. Support schemes are high risk when they are not stable and are unpredictable, with investors usually being put off when this happens. Under this criterion, questions we explored included:

- Does the scheme possess characteristics that ensure investor confidence?
- To what extent is the RO scheme perceived by investors and stakeholders as stable or unstable both in the short-to-medium term and in the long term?
- To what extent does the support scheme mitigate investment risks?

Effectiveness

Effectiveness can be simply measured by the extent to which the support mechanism has performed in terms of how fast and in what quantity wind power has added to new installed capacity in meeting politically fixed targets. For renewable energy campaigners, this is the key measure of effectiveness. Under this criterion, questions we explored included:

- To what extent has the support scheme performed in achieving politically fixed targets?
- How much and in what quantity has the support scheme delivered over time?
- How does this compare with other support mechanisms?

Efficiency

One of the main means used to assess the performance of support schemes has been to focus on the cost of their operation. Efficiency can be measured in terms of the costs of operating the scheme to ensure a reasonable market and competitive price for investors when compared with other forms of energy. This concern has been prioritized by the regulators, OFGEM. Efficiency also needs to take into consideration the risk factor over time. For investors, assessing risk is essential in terms of price, volume, and for system balancing. Under this criterion, questions we explored included:

- Is the support scheme capable of delivering wind energy at a low cost to consumers?
- Is the support scheme efficient in reducing production risks and investment costs?

- Does the support scheme provide a reasonable market and competitive price for wind energy?

Market Conformity

Support schemes need to be designed in a way that they fit into the existing market and legal systems. Directive 2001/77/EC, Article Four, subsection 2(b) also states that support schemes implemented by member states should be compatible with the principles of the internal electricity market. Morthorst et al. (2005) advocates that, through the adoption of the EU Electricity Directive, the EU member states are in the process of liberalizing their power markets and new policies, such as emission trading, and other Kyoto instruments are being introduced in the EU. Some countries already have fully liberalized power markets, including power exchanges, while others are still in transition. Thus, it becomes increasingly important how well a support scheme fits into a liberalized power market. However, it is perhaps interesting to note that the electricity companies that are keenest on advocating the creation of green electricity certificate trading markets for renewable energy—especially utilities in Germany, such as E.On and RWE—are themselves trading in an electricity market that is only slowly moving toward electricity market liberalization. Market conformity aims to examine the extent to which support schemes are compatible with the legal and market system of the internal electricity market, hence, liberalization of the electricity market, international and crossboundary trade (Wiser et al. 2002; Sijm 2002). Under this criterion, questions we explored included:

- Is the support scheme compatible with the legal and market conditions of the internal electricity market?
- Does the scheme encourage competition among suppliers and generators of electricity?

Finance

Financial security examines the extent to which a support scheme is able to guarantee security and return on investment with low or no risk over a long period of time. Sawin (2004) argued that long-term certainty results from guaranteed prices that facilitate the willingness of investors to invest in wind-energy projects. A further dimension is also to assess the ease with which wind-energy projects are able to secure financing from banks and other lending institutions. Under this criterion, questions we explored included:

- Does the scheme guarantee a return on investment?
- Is it easy to obtain financing for investment in wind energy with the scheme?

Table 7.2 Evaluation Criteria and Questions Guiding the Research

Evaluation Criteria	Questions Guiding the Research
Administration	• To what extent is the support scheme transparent and easy to understand? • Is the support scheme flexible and practicle? • Is the administrative and transactional cost low compared to other support schemes?
Stakeholder Support/ involvement	• Does the scheme involve stakeholder groups in the design and implementation of the support scheme? • Do stakeholders largely favour the scheme? • Ultimately, to what extent does the support scheme encourage corporate ownership and/or community ownership of wind power?
Certainty for Industry	• Does the scheme possess characteristics that ensure investor confidence? • To what extent is the RO scheme perceived by investors and stakeholders as stable or unstable, both in the short-to-medium term and in the long term? • To what extent does the support scheme mitigate investment risks?
Effectiveness	• To what extent has the support scheme performed in achieving politically fixed targets? • How much and in what quantity has the support scheme delivered over time? • How does this compare with other support mechanisms?
Efficiency	• Is the support scheme capable of delivering wind energy at a low cost to consumers? • Is the support scheme efficient in reducing production risks and investment costs? • Does the support scheme provide a reasonable market and competitive price for wind energy?
Market Conformity	• Is the support scheme compatible with the legal and market conditions of the internal electricity market? • Does the scheme encourage competition among suppliers and generators of electricity?
Finance	• Does the scheme guarantee a return on investment? • Is it easy to obtain financing for investment in wind energy with the scheme? • Does the scheme possess a high or low risk to encourage or discourage support from financial institutions?
Impact on Economic Development	• Does the support scheme encourage local and economic development? • Does the support scheme contribute to environmental objectives, including the reduction of greenhouse gas emissions?

Source: Author generated.

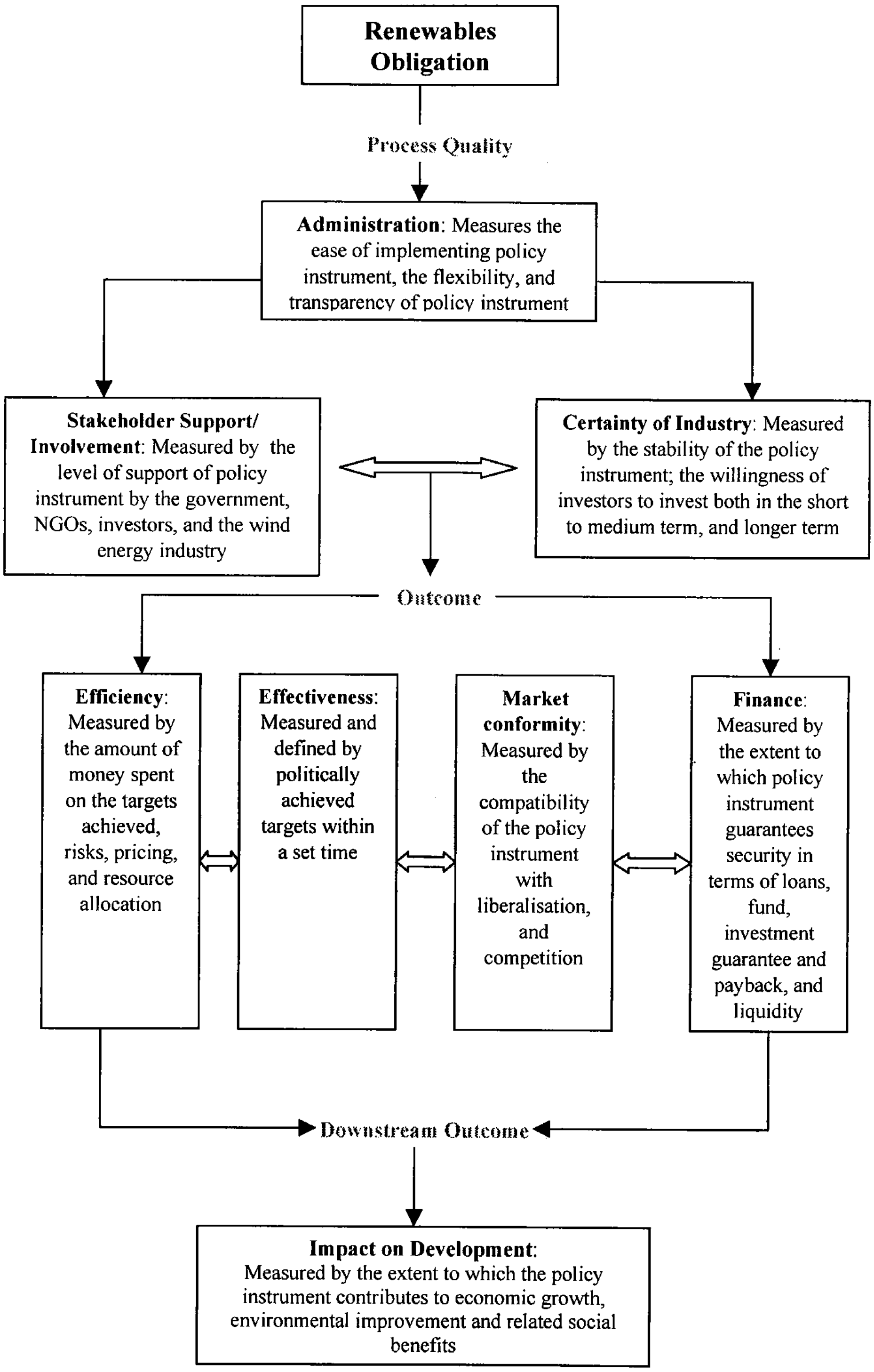


Figure 7.1 An integrative framework for evaluating wind-power policy instruments. Source: Author generated.

- Does the scheme possess a high or low risk to encourage or discourage support from financial institutions?

Impact on Economic Development and Environmental Responsibility

This aims to assess the impact of support schemes in contributing to economic development (e.g., employment) and environmental responsibility (e.g., reducations of greenhouse gasses). Morthorst et al. (2005) have also identified that positive local effects need to be considered, including enhanced public support for renewable energies. Under this criterion, questions we explored included:

- Does the support scheme encourage local and economic development?
- Does the support scheme contribute to environmental objectives, including the reduction of greenhouse gas emissions?

Integrating the Evaluation Criteria

To enable us to assess the performance of the RO, the criteria discussed previously were integrated to produce a theoretical but pragmatic framework. Figure 7.1 outlines the framework and identifies four possible dimensions of support scheme performance evaluation.

Dimension One describes the process conditions where the administration of the support scheme are examined. It is assumed that support schemes need to be transparent and flexible enough to understand and bring about a positive investment environment for investors.

Dimension Two describes the stakeholder interests and the certainty for industry. In this case, the support from stakeholder groups and the perception of the support scheme varies from one stakeholder to another. If conditions are favourable enough, stakeholder support is likely to be higher than when conditions are not favourable, or when the risk is high. This implies that a favourable scheme and conditions encourage investment in the wind-energy industry. As such risks and uncertainties are reduced and averted completely. The transparency and flexibility of the support scheme will have a strong impact on the commitment of the stakeholders and their support. Hence, a strong wind-energy industry should emerge.

Dimension Three describes the possible outcomes of the interaction of the process and the variables. Four key parameters are utilized in this stage to access the support schemes, namely effectiveness, efficiency, market conformity, and finance.

Dimension Four describes the downstream outcome of the implementation of the support scheme. The impact of the support scheme and its contribution to economic and environmental development is important. This might include the contribution of support schemes to the economy in terms of employment opportunities created, and the contribution to the overall reduction of greenhouse gas emissions.

THE RESEARCH FINDINGS AND DISCUSSION

Administration

When asked about transparency, practicability, and flexibility, fourteen of the eighteen respondents interviewed said that the RO is transparent in its design. However, it is very complex when it comes to administration. In addition, with the RO being relatively new—having been in operation for only four to five years—there have been a number of teething problems. This is consistent with the observations of van Dijk et al. (2003: 21) that:

> The targets of the RO themselves may be very transparent, the administrative rules of the Tradable Green Certificate (TGC) trading system are often a bit more complicated.

In terms of the flexibility, fifteen of the eighteen respondents said that the RO was not flexible in its operation. A senior manager from one well-known renewable energy company said that:

> I think the RO is transparent and practical but I am not sure about flexibility. It is a market based mechanism so in that sense I would say certainly on the first two issues it is good but again I am not so sure of its flexibility. (Interview, 13 December 2006)

This is also consistent with Sawin's (2004: 16) findings that the quota system is inflexible:

> Once targets and timetables are established, they are difficult to adjust. Even as markets change and technologies advance, experiencing major breakthroughs in efficiency and or cost, it is highly unlikely that targets or timetables can be altered. . . .

This inflexibility, however, is not seen to be a bad thing from the perspective of most respondents. The certainty of the RO makes it desirable to investors. A senior government official interviewed said that:

> We just want to know what exactly is going to happen and how that is set out in the law, so the RO cannot just be changed in a window of anyway, it is there and it is concrete, it is something we can make financial decisions on. But if it is made vague and flexible that would dilute market confidence and make it hard for stakeholders to be able to make financial decisions on the basis of it. (Interview, 14 June 2006)

One problem is that RO personnel at the DTI have changed on a regular basis, with some respondents saying that this has been detrimental to the scheme. Illustrating this, a senior manager of one utility company said that:

> The personnel that manage it (the RO) have changed every 16–18 months, so there is inconsistency on the government side which is an issue. (Interview, 28 November 2006)

From the perspective of this respondent, the high turnover affected the performance and credibility of the scheme.

To summarize this discussion, the RO seems to be a transparent scheme, but one which is complex and inflexible in its operation. Once targets are fixed, it is usually not easy to reverse, though this was actually seen as a strength of the scheme by those interviewed in this study.

Stakeholder Support/Involvement

The DTI is the dominant player in the design of the RO, while OFGEM is charged with the administrative responsibilities. When asked about the role and the involvement of stakeholders in the operations of the RO, all the respondents said that they were involved—one way or the other—in the consultation process, design, and operation of the RO. A senior manager from one major utility company said that:

> Stakeholders are involved; there are consultation processes. And personally I think the RO is working at the moment, and it is doing what it is set out to do, so I think at the moment, it is operating effectively. (Interview, 13 December 2006)

A director of a renewable company also said that:

> Well the RO involves us and other bodies. There are plenty of opportunities to get involved in the consultation forum and I think the finance community gives a lot of support to the RO because it is an attractive mechanism. (Interview, 27 November 2006)

When asked about the extent to which the RO supports small-scale generating companies, it was clear that the scheme seemed to favour larger integrated utility companies. Respondents from the renewable energy associations interviewed said that the RO does not provide opportunities for small-scale generating companies. The nature of the scheme makes it difficult for small-scale investors to get money. One of the respondents from a popular renewable energy association said that: "the system is designed to attract a larger scale build and therefore it attracts large scale developers" (Interview, 14th August 2006). This is, perhaps, one of the key reasons that helps explain why so little community ownership has developed in the UK.

Certainty for Industry

When asked about certainty for the wind industry, fifteen of the eighteen respondents said that the RO had been surrounded by uncertainty, and this has had a detrimental effect on industry confidence. This was due partly to the early stages of RO implementation, but also to later changes made through consultations and amendments. This finding is consistent with van Dijk et al. (2003) and van der Linde et al. (2005), who reported that revisions to support schemes from annual renewals can easily lead to uncertainty amongst producers. The head of power in one popular renewable energy association said that:

> I think the RO is remarkably unstable. From the investors perspective it has changed every single year since it's been in existence and it is going to change very fundamentally in 2009/2010. So right from the beginning it is being subjected to a kind of political interference. And the fact that there have been a lot of investment going on doesn't matter, investments in renewable energy is probably because the value of the certificate is so high . . . that is why it has been attractive. . . . there is just a lot of money in it, so that is why it is attractive. (Interview, 14 June 2006)

However, ten of the eighteen respondents interviewed, particularly those from the utility companies, said that the recent energy review had created further uncertainty in the market place, especially with the banding that had been introduced into the RO by the 2007 Energy White Paper (Department of Trade and Industry 2007). Most of the utility companies would have preferred for the RO to have remained largely unchanged. Prior to the recent Energy White Paper, a senior manager of one utility company said that:

> The RO is rapidly moving to a phase of no confidence and no stability, and potentially could disintegrate into a heap with the review that is going on at the moment and the potential introduction of banding which fundamentally undermines the concept of the RO which was technology blind. Banding here means technology specific, fundamental change will just undermine the whole thing. (Interview, 15 December 2006)

The RO may introduce yet another element of uncertainty which may potentially hurt investors' confidence. It makes it difficult for investors to fully understand the fundamental components of the RO so they can manage and mitigate associated risks. A senior manager of one utility company confirmed this, and said that:

> If the mechanism (RO) keeps changing there is a premium that we need to factor in for unknown risk, and that is not the most efficient way of developing projects . . . (Interview, 28 November 2006)

When asked if the changes to the RO had affected investments in wind energy in the UK, almost all the respondents indicated that it had, and that it also had an impact on their decisions to invest further. Trade association respondents indicated that, from the interaction with investors, any changes on the RO affects project finance. Investors dislike change and prefer stable market conditions in the long term, which allows them to forecast a definite return on investment. A manager in one utility company said that:

> The change to the RO does affect investment absolutely, what it basically says is that the government will come and interfere as it wants and when it wants. . . . (Interview, 15 December 2006)

But on the government side, the changes are necessary to create an atmosphere for a convenient investment that is stable and attractive. A senior government official said that:

> There is no doubt at the moment that the ROC does not provide absolute certainty; I mean there is the rise of obligation up to 2015–2016 and platoon there up to 2027. So we need to think very correctly as to whether or not that should be extended to get guaranteed higher returns for a little longer period or whether or not the licence of the obligation in 2027 will or not need to be extended. We also do need to balance the desire to create a more stable and attractive scheme for investors against the cost the obligation imposes on all the consumers . . . (Interview, 5 June 2006)

Effectiveness

Foxon and Pearson (2007: 1541) reported that: "the RO has succeeded in creating a niche for renewable generation in the electricity supply market". However, when asked about the effectiveness of the RO in delivering the 10.4 per cent politically fixed target by 2010, all of the respondents indicated that the RO will not meet this target. The respondents, therefore, argued against the effectiveness of the RO. There is no doubt that the RO has been very successful in delivering much onshore capacity, yet there is a long way to go in reaching the 10.4 per cent target.

Eight out of the eighteen respondents claimed that the inability of the UK to reach its target is not the fault of the RO. A senior manager in charge of the RO in one utility company said that:

> The RO has made a viable and valuable contribution in moving the UK towards the 10% goal, but realistically, it is not going to hit the target. And you could argue actually that the RO is a market mechanism and it does not intend to achieve set target. But what it has helped to do is to stimulate onshore wind in particular. . . . (Interview, 29 November 2006)

Two main reasons seem to account for why the RO will not meet the 10.4 per cent target by 2010. The first is attached to a design flaw which means that the closer one gets to the target, the less value a ROC is worth. To keep the market moving and to attract new investments, ambitious rather than realistic targets have to be set. During one interview, a senior deputy head of renewable energy policy in a government organization said that:

> . . . the closer you get to actually hitting that target, then the less valuable the ROCs become. And there is a kind of phenomenon known as 'CLIFF EDGE' which suggests that if the whole renewable criteria is actually met in a given year, ROC prices will plunge down . . . (Interview, 5 June 2006)

Second is the issue of planning permission and connection to the grid. In England and Wales, only around 60 per cent of planning applications have been approved (Toke 2005), and, as was discussed earlier, there are still a lot of projects in the queue waiting for connection to the grid, especially in Scotland. However, planning difficulties are not usually attributed to the RO. Sixteen of the eighteen respondents interviewed argued that the problem is not with the RO; the scheme has done exactly what it said it was going to do when it was set up. The failure of the UK to meet its target can be attributed to other factors, such as planning and consenting regimes. A senior manager of one utility company said that:

> The RO has performed exemplarily. . . . what has failed arguably are the delivery channels: the consenting regimes and other aspects. But as an economic instrument it has been a whole heartedly 100% success. We have just witnessed a number of planning applications and a number of grid applications; what has failed is the delivery channel. (Interview, 15 December 2006)

In summary, the effectiveness of the RO is still subject to a great deal of conjecture and debate, and it remains to be seen whether or not 2010 targets will be met, but this looks increasingly very unlikely.

Efficiency

The RO is often heralded as an efficient mechanism for supporting renewable energy sources. However, when asked about the efficiency of the RO, ten of the eighteen respondents disputed this. This is also consistent with Szarka and Bluhdorn (2006), who argued that the efficiency of the RO is lower than argued. The EU Paper (COM 2005) also reported that the RO offers higher levels of support when compared to other systems operating in other member states, including Germany. One senior policy officer in a renewable energy association said that:

> The RO is not very efficient as a means of bringing renewable energy generating capacity for the reason set out in the carbon trust report. One of the reasons is the fact that the RO always cost the consumers at large the same amount irrespective of the degree of success of the ROC recycling or buy-out mechanism. So that means that it isn't very

> efficient. It's more of a problem when planning permission and grid access is holding back deployment. If those weren't there at all, then the efficiency of the RO would be improved but because of these factors are present and the cost being the same for all consumers, it becomes less efficient. I mean for example with NFFO contracts and with the FIT, consumers only pay for the actual renewable electricity generated whereas with the RO consumers pay a buy out price for the stuff that is not generated. (Interview, 14 June 2006)

Contrary to this view, the utility companies interviewed argued that the RO is not expensive, and that it is the operation and the perception of people that is voiced regularly that makes the RO look expensive. They also argue that the RO is a level of support that is valid to make projects compete in the market, and without it, projects are not economical. Therefore, the general consensus of the utilities is that the RO—if allowed to work—is very efficient because it becomes a self-correcting mechanism in terms of the money it pays out to the parties involved. One senior manager of a company further confirmed this, and said:

> The problem is that . . . the RO looks expensive because if you compare the cost of the RO to the MW been built, the RO is absolutely expensive compared to the FIT, but that again is not the fault of the RO, that is because there are less MW being built; this has nothing to do with the RO, it is the planning system. So if all the stuff that is currently in the planning system is allowed to come through and fed through the grid system, then the RO will be highly competitive and highly effective when compared to any FIT system. (Interview, 27 November 2006)

Looking at other available evidence, Szarka and Bluhdorn (2006: 13) have reported that:

> The outcome during 2002–2006 indicated not only that the RO is failing to provide a more cost-effective system than continental fit, but worse-the RO is making wind power progressively more expensive to the UK consumer at a time when digressive FIT rates are making it cheaper in Germany.

Market Conformity

When compared to feed-in tariffs, many commentators (e.g., Wiser et al. 2002; Sawin 2004) argue that the RO works better in an open and liberalized market. When asked about the compatibility of the RO with liberalization of the electricity market, fifteen of the eighteen respondents interviewed claimed that the RO is a market-based system and, in that sense, it is compatible.

Amongst other things, the aim of liberalization is to foster competition among suppliers and give consumers the opportunity to choose their own suppliers. It is argued that this is what the RO does for the renewable market because it does not, in theory, discriminate between small and large suppliers. A senior manager of a utility company said that:

> The RO is compatible because it affects all suppliers. All suppliers have the same obligation to meet a percentage of total demand via RES, so there is no discrimination between the suppliers, they work towards the same obligation, and they have been able to provide electricity to a great number of customers in absolute and percentage terms. Also, it is designed to be a market based mechanism to enable investors to make the most and efficient decisions. We do operate a liberalised market in the UK and customers have the right to change suppliers and so no one has a monopoly over a customer whatsoever, and we all compete within that market place . . . (Interview, 29 November 2006)

A senior manager in one of the organizations interviewed also confirmed this, and said:

> The RO is compatible with liberalisation because its fundamental principle is market based, and it is an economic incentive which leaves it up to the firm to decide how to meet its obligation. I mean you have the authorisation, you choose, you make the most rationale efficient economic decisions, and that is the heart of the RO, so it is wholly compatible with liberalisation. (Interview, 15 December 2006)

The main argument in support of this is twofold. The first is that the RO does create an incentive for renewable-generated electricity to trade in the British Electricity Trading and Transmission Agreement and compete with other forms of energy. Secondly, the RO is also a form of quota that provides financial benefits to both customers and suppliers, especially from the supplier perspective; it helps provide a way of recovering money from customers as a whole. It drives the development of the lowest-cost technologies and best resources captured by market mechanism.

On the contrary, one of the main arguments against the compatibility of the RO with market liberalization is that it does not allow market entry. A senior policy officer of a popular renewable association said that:

> . . . it does not allow or encourage new entrants in the market all action at the moment is tied up within the BIG 6. (Interview, 14 June 2006)

Another respondent from a nongovernmental organization said that:

> I personally think that the kind of competitive market we would like to see is the one that does allow new entrants but the government does not perceive it this way, therefore, clearly the RO is not good in terms of allowing new entrants. (Interview, 8 September 2006)

The other argument in support of this is that the RO has worked well as an obligation, and not in terms of competition. A senior policy officer of a renewable consultancy firm said that:

> The RO is there to speed up competition and does that without looking at the supply side or a large number of people who dominate the market . . . and in as much as it is an imposed market mechanism; it is not a sort of a role model of a perfect part of a liberalised electricity market. It is not completely compatible and the two are quite separate. Though it accepts that RES do receive the value of the base local electricity to which the ROC prices or value is added on, yet, I wouldn't agree they are completely compatible . . . (Interview, 19 October 2006)

Finance

As noted elsewhere, respondents highlighted that the RO is characterized by many uncertainties, which has had the effect, at times, of undermining project ownership and investments, especially for smaller players in the market. For larger players that do not need equity and finance from financial institutions, this is not such an issue. This perhaps explains why the RO generates windfall profits to large utility companies who take up the risk to invest in wind energy. A senior policy officer of a popular renewable energy association said that:

> The RO is very poor at guaranteeing investment certainty . . . therefore you cannot get finance unless you have your own corporate assets, and that is why there are so few new entrants because new entrants find it impossible to get finance based on the contract, based on the RO contract. (Interview, 8 September 2006)

Impact on Development

When asked about the contribution of the RO to the development of wind energy and the UK national economy, seventeen of the eighteen respondents said that that the RO has been important in pushing onshore wind energy since 2002. The UK wind sector now employs approximately 4,000 people. It has been further estimated that with Round 2 of offshore wind deployment, approximately 20,000 more jobs will be created. However, there remains no large indigenous wind-turbine manufacturing industry, except for smaller and microproducers with maximum production capacities of 20 kW, and this should be of concern.

Also, according to the British Wind Energy Association (2007),[2] wind energy contributes annually to the reduction of greenhouse gasses in the UK. Table 7.3 provides an overview of the amounts of carbon dioxide[3] (CO_2), sulphur dioxide[4] (SO_2), and nitrogen oxide[5] (NO_x) reduced with the current installed wind capacity of the UK.

Table 7.3 Greenhouse Gas Reductions

CO_2 reductions per annum	SO_2 reductions per annum	NO_x reductions per annum
4940275 Tonnes	57445 Tonnes	17234 Tonnes

Source: British Wind Energy Association. Online. (accessed 23 October 2007).

CONCLUSION

Renewable energy policies in the UK over the last two to three decades have addressed three key issues: cost reduction and competitiveness; security of energy supply; and, more recently, environmental responsibility, particularly climate change. Prior to the introduction of the RO, UK renewable energy policies had not been effective, with little installed capacity having been deployed; this has been well studied by other commentators. The RO has now been in place for a period of five years, but the scheme has changed each year, and this has dented investor confidence. Nevertheless, the RO has helped to deliver record levels of installed onshore wind power to date, with wind proving to be the cheapest renewable technology in the UK. From the analysis provided in this chapter, the RO appears to be an expensive system, and in looking beyond the UK, it appears more expensive when compared to other support schemes in the EU, including the German Feed-in Tariff (FIT) system. Until, at least, the reforms suggested in 2007, it also failed to offer sufficient financing to more expensive renewables, including offshore (as opposed to onshore) wind farms. In addition, it is opaque in its operation and, thus, is likely to be relatively unsuitable for encouraging local investments in renewable energy.

On the other hand, it is also the case that cultural reasons mean that the interest in locally owned wind farms in the UK is likely to be smaller than in other countries, such as Denmark, Germany, and The Netherlands. It is also possible to put too much blame on the RO for the failure to keep up with the RO targets. Other issues, including planning delays and delays in developing the necessary transmission infrastructure, have provided most of the reasons for the failure to meet the targets. However, it is certainly the case that the RO has been marked with significant government interference, and this has undermined the rhetoric of being a truly market-based scheme.

Overall, we must conclude that the RO has underperformed and still has a long way to go to before catching up with other EU support schemes, like the German FIT system, and the level of installed capacity in countries such as Spain, Germany, and Denmark. However, we must also add that this state of affairs cannot solely be blamed on the RO, which is certainly a lot better than having no renewable support scheme at all, and also better in promoting renewable volume than the previous 'NFFO-SRO' policy.

APPENDIX 7.1 INTERVIEWED ORGANIZATIONS

Type of Organization	Position Held	Date of Interview	Total Number of Interviews (18)
Department of Trade and Industry (DTI)	DTI Officer in Charge of the Review of the Renewable Obligation (RO) 2005/2006	14 June 2006	1
Office of Gas and Electricity Markets	Head of RO	15 August 2006	1
British Wind Energy Association	Director of Economics and Markets	14 June 2006	1
Association of Electricity Producers	Head of Renewables	15 June 2006	1
Greenpeace UK	Renewable Energy Policy and Environmental Campaigner	13 June 2006	1
Scottish Executive	Policy Officer, Renewables and Consenting; Deputy Branch Head, Renewables and Consent	5 June 2006	1
Scottish Renewable Forum	Chief Executive	5 June 2006	1
Renewable Energy Association	Head of Power	14 June 2006	1
Friends of the Earth UK	Environment and Policy Campaigner	14 June 2006	1
British Institute of Energy Economics	Fellow British Institute of Energy Economics, and Renewable Energy Policy Academic Expert	8 September 2006	1
DM Energy Consultants, UK	Director and Renewable Energy Policy Consultant	19 October 2006	1
Ecofys UK	Renewable Energy Policy Consultant	24 November 2006	1
Npower Renewables UK	Head Strategy and Regulation	12 December 2006	1
E.ON (Powergen) UK	Commercial Manager, Development and Construction	29 November 2006	1

(continued)

APPENDIX 7.1 INTERVIEWED ORGANIZATIONS ***(continued)***

Type of Organization	Position Held	Date of Interview	Total Number of Interviews (18)
Scottish Power	Managing Director, Renewables and Major Projects	27 November 2006	1
Scottish and Southern Energy	Head of Projects Development	15 December 2006	1
EDF UK	Carbon Policy Market Manager	28 November 2006	1
Good Energy	Commercial and Renewable Energy Policy Management Staff	13 December 2006	1

Source: Author generated.

NOTES

1. The breakdown of the proposed banding regime is further found in p. 151 of the Energy White Paper (2007).
2. Accessed 22 October 2007, Online at http://www.bwea.com.
3. Created by the combustion of fossil fuel.
4. Sulphur oxide is released when coal and petroleum are burnt, thus causing acid rain.
5. Mono Nitrogen oxides are produced during combustion of fossil fuel at high temperatures.

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