

BORD NA MONA – A CASE STUDY:

**The challenges of embedding an
eco-entrepreneurial ethos**

Dissertation completed by

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Dedicated to Lilly and Dan Mullan

ABSTRACT

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Title: **Bord na Mona – A Case Study: The challenges of embedding an eco-entrepreneurial culture**

Abstract

This study is concerned with the emerging concept of ecological entrepreneurship, whereby a business is operated in an economically, environmentally and socially sustainable fashion. This research explores the relevance of this concept to Irish state-owned peat harvesting company Bord na Mona, with particular attention paid to its use of its cutaway bogs.

International and European Union legislation which inform ecopreneurial activities are explored, and two models of best practice from Belarus and Canada for the after-use of post-industrially harvested peatlands are critically examined. This study explores current Irish cutaway bogland after-use and asks whether Bord na Mona's present use of its post-industrially harvested peatlands is sustainable from economic, environmental and social perspectives. In order to answer this research question, an appropriate methodology was devised using a qualitative case study approach, supplemented by a series of semi-structured interviews with key stakeholders. Conclusions are drawn and a number of recommendations are made.

This research recommends inter alia that Bord na Mona work with national and international partners to develop sustainable sphagnum-based paludiculture regimes on its cutaway bogs. This research also recommends that Bord na Mona produces a business plan concerned with developing a carbon credit funded restoration and rehabilitation strategy for its cutaway bogs.

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Chapter 1: Introduction and context

1.1 Introduction

This chapter introduces the topic of this study. It outlines the aims and objectives of this research and briefly explores the background of Bord na Mona. The broader international legislative context, which impacts on the company's peatland after-use strategy, is then examined.

1.2 Aims and objectives

This research is concerned with Bord na Mona's present-day drive towards eco-friendly, innovative enterprise. Particular attention is paid to its cutaway peatland after-use strategy.

Two main aims of this research are:

1. To critically review the emerging concept of ecopreneurship and the international literature on the use of cutaway bogs.
2. To critically examine the case of Bord na Mona, as it makes a structural and cultural shift towards a sustainable business model, with particular attention paid to the company's present day cutaway bog strategy.

The objective of this study is to explore the key issues involved in the development and use of Bord na Mona-owned cutaway bogs, before concluding with recommendations for improving the economic, environmental and social outcomes of the company's policies and practices. The methodological approach taken in this study is outlined in Chapter 4.

This research is a response to the ongoing need to develop a sustainable after-use strategy for Bord na Mona's former industrially-harvested peatlands, otherwise known as "cutaway bogs". Clarke (2010: 386) defines a cutaway bog as:

"A peatland from which all the milled peat that can be economically extracted has been removed".

As of 2015, Bord na Mona (2015c) owns 80,000 hectares of land, most of which is located in the midlands of Ireland. This landmass is fragmented into 130 individual bogs (Bord na Mona, 2015c). It was originally envisaged that Irish cutaway bogs would be utilised for forestry (Clarke, 2010:103-4). As Chapter 5 outlines, this is not the most appropriate use in many cases.

The next part of this chapter introduces Bord na Mona by examining its background.

1.3 Background of Bord na Mona

The utilisation of Irish peatlands in a commercial fashion began in 1933, when C. S. Andrews started working at the Department of Industry and Commerce (Gill-Cummins, 2006). Andrews began by developing co-operative peat harvesting societies across the country, promoting the exploitation of peat and facilitated its sale (Gill-Cummins, 2006). This was known as the “turf scheme”. The Turf Development Board Limited, which would later be renamed “Bord na Mona”, was an Irish state-owned company established in 1934 in order to manage the turf scheme (Clarke, 2010:27). The aim of the scheme was to develop the turf industry and set standards so as to make turf acceptable as a commercial fuel (Clarke, 2010:25-6).

In the financial year 1934/35, the Turf Development Board Limited had a turnover of just a few thousand pounds (Clarke, 2010: 1). In the financial year 2008/09, its successor Bord na Mona, would turnover €402 million (Clarke, 2010: 1). At its inception, the Turf Development Board Limited’s income was derived from the sale of hand-won turf alone (Clarke, 2010: 1). As of 2015, Bord na Mona (2015a) is concerned a number of different business sectors, including power generation from peat, biomass and wind, resource recovery through its AES business and the selling of solid fuels into the Irish heating market.

In the recent past, Bord na Mona committed to moving in a sustainable direction from economic, environmental, and social perspectives (Bord na Mona, 2014i). No longer will the company merely free-ride (Isaak, 1998) unsustainably off the peat found in its bogs. As part of this change in strategy, Bord na Mona aims to refrain from opening any further bogs for peat extraction, will focus on supporting biodiversity initiatives and will endeavor to protect and conserve

peatlands in the future (Bord na Mona, 2014i). This indicates a cultural shift towards sustainability. However, the continued extraction of peat from established industrial sites remains a concern for environmentalists. This is because the burning of peat for domestic energy consumption, and as a medium for the generation of electricity, results in the release of greenhouse gases into the atmosphere (An Taisce, 2014). The degradation of the peatlands themselves releases further greenhouse gases (Clarke and Rieley, 2010:20). Nevertheless, Bord na Mona's activities are in line with recommendations from the International Peat Society (Bord na Mona, 2014i), whose Strategy for Responsible Peatland Management offers a guide for peatland managers on how best to utilise their resource in a reasonable way (Clarke and Rieley, 2010).

European Union legislation during the late twentieth century to the present day has had an effect on business across its nation states. Directives concerned with the environment are outlined in detail in Appendix A. European Union legislation is informed by United Nations agreements. This international legislative context, which is outlined in the next part of this chapter, in turn informs Bord na Mona's cutaway bog after-use strategy.

1.4 Legislative overview

In 1992, the United Nations held the Conference on Environment and Development (UNCED), commonly known as the "Earth Summit", in Rio de Janeiro, Brazil (United Nations, 1997). The aim of the conference was to help governments rethink pollution and their unsustainable destruction and plundering of non-renewable natural resources (United Nations, 1997). The result of the conference was that governments and businesses would begin to place emphasis on eco-efficiency (United Nations, 1997).

The Earth Summit was the climax of a journey which began in 1989 (United Nations, 1997). It had been a process of education, planning and negotiations among member states, which would eventually lead to Agenda 21 (United Nations, 1997). Agenda 21 was a "wide-ranging blueprint for action to achieve sustainable development worldwide" (United Nations, 1997).

The Kyoto Protocol was adopted in Kyoto, Japan in December 1997 and came into force in February 2005 (United Nations, 2013a). It is an international agreement between countries which commits them to emission reduction targets (United Nations, 2013a). The Kyoto Protocol is linked to the United Nations Framework Convention on Climate Change (United Nations, 2013a). The protocol recognises that developed countries are largely responsible for the present high level of greenhouse gases in the earth's atmosphere which have led to climate change (United Nations, 2013a).

Emissions targets are expressed as "assigned amount units" (United Nations, 2013b). Under Article 17 of the Kyoto Protocol (1998:15), participants in the agreement can trade unused units with countries which exceed their given targets. The ability to sell and buy these units created a "carbon market", named as such because carbon dioxide is the principle greenhouse gas emission (United Nations, 2013b).

Other forms of reduction practices can be traded under the Kyoto Protocol (United Nations, 2013b). "Removal Units" (RMUs), based on land use, land use change and forestry (LULUCF) can be produced and sold on the market (United Nations, 2013b). Under this initiative, forestry can be planted and its calculated removal units of carbon sequestration can be sold (United Nations, 2013b). In Ireland for example, this could incentivise peatland owners to take action to reduce the emissions from their lands.

With the "Joint Implementation" (JI) mechanism, defined in Article 6 of the Kyoto Protocol (1998), participants of the protocol can earn "Emission Reduction Units" (ERUs) from an emission reduction or emission removal project in another Kyoto Protocol participating country, which can be counted towards meeting its overall emissions target (United Nations, 2013c).

The "Clean Development Mechanism" (CDM), defined in Article 12 of the Kyoto Protocol (1998) allows a participating country to initiate an emission-reducing project in a developing country (United Nations, 2013d). These projects will earn the Kyoto-participant saleable "Certified Emission Reduction Credits" (CERs), which will count towards meeting the Kyoto-participant's emission targets laid out in the protocol (United Nations, 2013d). This mechanism stimulates sustainable development and emissions reductions, and gives the

Kyoto-participating country flexibility in how they meet their emissions targets (United Nations, 2013d).

The Kyoto Protocol was ratified by European Union member states in 2002, and came into force in February 2005 in the Union (European Commission, 2011a; Europa, 2002). Industrial nations were, on average, legally obliged to reduce their emissions, in comparison to emissions in 1990, by 5% over the five year period from 2008-2012 (European Commission, 2011a).

For the period 2008-2012, the European Union-15 went beyond this target, and agreed an 8% reduction within this period against 1990's emissions (European Commission, 2014b). This was carried out as part of a "burden-sharing" scheme (European Commission, 2014b). However, Ireland was able to negotiate an increase of 13% in its emissions above its 1990 levels, owing to the fact that its industry and populations' needs had increased significantly during the 1990s (European Commission, 2014b).

Around 11% of greenhouse gases are emitted by countries within the European Union (European Commission, 2012g). European Union leaders are committed to transforming the Union into an energy-efficient, low carbon-emitting economy (European Commission, 2013b). To achieve this, the EU has set itself reduction targets up to 2050 (European Commission, 2013b). This will be initiated through cost-effective initiatives (European Commission, 2012h)

By 2020, the European Union aims to reduce its emissions by 20% compared to emissions in 1990 (European Commission, 2013b). By 2030, reductions will stand at 40% and will be at 60% by 2040, compared with 1990 (European Commission, 2012h). For 2050, European Union leaders aim to reduce emissions by 80-95% of emissions in 1990 (European Commission, 2013b). This is known as the European Union's Energy Roadmap to 2050.

The Energy Roadmap to 2050 will see greenhouse gas emissions at 5% to 20% of the emissions of 1990 (European Commission, 2014a). This drastic reduction is necessary to combat climate change. Some believe that more is required; Friends of the Earth Europe (2014) support a 100% energy from renewable sources strategy for 2050.

It is argued that the transition to a low-carbon European Union will boost the region's economy (European Commission, 2012h). This will arise as a result of investment into green and

innovative technologies, and through increased demand for green products and services, such as renewable energy, electric and hybrid cars, and energy-efficient building materials (European Commission, 2012h). To make the transition to a greener economy a reality, the EU has to invest €270 billion, or 1.5% of GDP annually on average, over the next four decades (European Commission, 2012h). A number of Directives and initiatives will support this drive towards sustainability.

In June 2000, the European Commission established the European Climate Change Programme (ECCP) (European Commission, 2012i). Its goal was to “identify and develop all the necessary elements of an EU strategy to implement the Kyoto Protocol” (European Commission, 2012i). The first stage of the programme involved various stakeholders working together, including the Commission, member states, environment groups and industry (European Commission, 2012i). The co-operation of these stakeholders brought high levels of expertise together, and enabled a consensus to be agreed upon, which made it easier thereafter to enact the resulting agreed measures and policies (European Commission, 2010).

The Environmental Liabilities Directive establishes a framework whereby those who damage the environment are held liable for their actions (Europa, 2014a). It aims to prevent and remedy damage to the environment through a mechanism which ensures that the “polluter pays” (Europa, 2014a).

Under the Directive 2001/77/EC, the European Union is setting electricity suppliers with a target of 21% renewable contribution to electricity generation (Europa, 2011b). Renewable power includes electricity sourced from wind, solar radiation, tidal, hydroelectric, bio gas, sewage treatment and landfill gas energies (Europa, 2007).

In 2007, the European Union laid out its plans to bind member states to an agreement whereby 20% of their energy was sourced from renewables (Europa, 2007). There have been difficulties initiating this strategy however. Renewable energy can be expensive, owing to the cost of initial investment, and there may be issues such as the difficulty of connecting wind farms to electricity grids (Europa, 2007). General energy reductions of 20% will also be included in the “20-20-20” goal (Europa, 2009). Greenhouse gas emissions are also to be reduced by 20% under this

agreement (Government of Ireland, 2010:4).

The Lisbon Treaty came into force in December 2009 (Europa, 2014b). This treaty provides the European Union with optimised working methods so that it can tackle contemporary challenges in an effective and efficient manner (Europa, 2014b). The protection of the European Union's natural habitat and resources have been reinforced by the Lisbon Treaty (European Commission, 2011a). This treaty further defines the Union's objectives on the environment (European Commission, 2011a). Prior to the enactment of the Treaty of Lisbon (otherwise known as the Lisbon Treaty), the founding treaties of the European Union did not include a specific provision regarding the Union's intervention in the field of energy (Europa, 2010c).

Directive 2001/77/EC was repealed by Directive 2009/28/EC in 2009 (Europa, 2010b). Part of this Directive states that 10% of transport energy must come from renewables (Europa, 2010b). Directive 2009/28/EC is concerned with the "promotion of the use of energy from renewable sources" (European Union, 2009). This Directive sets out the basis for the achievement of the European Union's 20% renewable energy target by 2020 (Government of Ireland, 2010). Under this Directive, Ireland must achieve a goal of 16% of its energy from renewable sources by 2020 (Government of Ireland, 2010). Article 4 of the Directive stresses the necessity for policy makers to consider the employment opportunities, social cohesion, regional and local development opportunities and export prospects resulting from renewable energy projects (European Union, 2009).

In 2010, the Irish Government introduced the National Renewable Energy Action Plan (Department for Communications, Energy and Natural Resources, 2014b), which was submitted under Article 4 of European Union Directive 2009/28/EC (Government of Ireland, 2010). The National Renewable Energy Action Plan sets out Ireland's strategic approach to deliver this 16% energy from renewables goal (Government of Ireland, 2010).

The international legislative context and the resulting national policies therefore informs the strategy of state-owned Bord na Mona. The requirement to develop renewable energy, as outlined later in this study, has led to Bord na Mona constructing wind farms on its land base. Based on the legislative context outlined in this chapter, it is envisaged that the requirement to

reduce greenhouse gas emissions will also play a key role in the development of a sustainable cutaway peatland after-use strategy in the future.

1.5 Conclusion

This chapter outlined the aims and objects of this study. It introduced the sustainable direction Bord na Mona wishes to move in, as well as the requirement for the development of an appropriate after-use strategy for former industrially-harvested Irish peat bogs.

The inter-governmental and European Union agreements and legislation outlined in this chapter informs Bord na Mona's peatland after-use strategy. This international environmental legislative context is effecting businesses across the world. The next chapter will critically examine the literature which is concerned with the resulting drive towards sustainability in business.

Chapter 2: Ecopreneurship: An Introduction

2.1 Introduction

The aim of this chapter is to critically examine the various definitions of entrepreneurship, as well as the emerging concept of the “ecopreneur”, so as to provide a context and an informed approach when exploring ecopreneurial use of cutaway peatlands.

Particular attention is paid in this chapter to the entrepreneur as a free-rider and as an innovator. Elkington’s Triple Bottom Line theory is critically explored as it informs a prevailing business sustainability model. Robert Isaak’s “ecopreneur” is identified and explained, before alternative green business typologies are explored. The chapter begins by examining the broader green economy.

2.2 Context and background: The green economy

Over the last four decades, there has been increasing recognition of the importance of the environment (Schaper, 2005:5). This has given rise to the green economy and green enterprise. Prior to this, there was an under-valuation of the natural resources of the planet, which resulted in unsustainable exploitation (Pastakia, 2002:94). Mankind’s activities have had a significant impact on the planet, for example, reducing the habitat of other species, clearing trees for agriculture and consuming natural resources such as coal, oil and gas at an unsustainable level (Schaper, 2005:5). These activities have been found to contribute to global warming, by releasing greenhouse gases into the atmosphere, resulting in climate change (Coford, 2012; Schaper, 2005:5). Environmentalism can be viewed as a reaction to the excesses of modern industrialism (Anderson, 1998:136). By employing “green thinking”, which is the logic of long-term, risk-reducing environmentalism (Isaak, 1998:9), mankind’s impact on the earth and its climate can be reduced.

According to the OECD (2005:2), the green economy is concerned with limiting, measuring,

preventing, minimising and/or correcting environmental damage to water, air, soil and eco-systems. In addition, it provides “green-collar” jobs, it increases green energy production, it increases energy efficiency, it reduces greenhouses gas emissions, waste and pollution, and it conserves water and other natural resources (Pew Charitable Trusts, 2010:13). It also reduces an economy’s dependency on non-renewable and carbon-emitting energy sources such as oil and coal as well as improving the security of future energy supply, according to the Government of Ireland’s (2010) National Renewable Energy Action Plan.

The goal of the green economy is to reduce environmental risk, produce cleaner technologies, products and services, minimise resource use, noise, pollution and waste (OECD, 2005:2). To achieve these goals, green business activities include the generation and storage of renewable energy, the collection and/or processing of recyclable materials, the manufacturing, distribution, construction, installation and maintenance of energy efficient products, and/or the manufacturing of natural and sustainable products (Labour Market Information Division, 2010:11). Research into California’s green economy found that green businesses may also provide services such as environmental consultation, education, and promotion of regulation compliance (Labour Market Information Division, 2010:11).

Research by InterTradeIreland and Forfas (2008:3) suggest that the global Environmental Goods and Services sector is steadily growing. The key finding of the report (InterTradeIreland and Forfas, 2008) is that the Irish green economy was worth at least €3.6 billion at the time of publication. The green economy is expected to continue to grow because established green businesses increase the demand for green products, thereby increasing the demand for further green enterprise (Labour Market Information Division, 2010:25). The demand for green products and services is also driven by consumers, who desire the preservation, rather than the consumption, of their environment (de Bruin and Lewis, 2010:98).

Other factors lead to the growth and development of the green economy. Stricter government regulation and international protocols such as the Kyoto Protocol have raised global awareness of green issues and the need for a more sustainable economy. Local communities, shareholders and employees, who have concerns about the environment, are now applying pressure to corporations (Pastakia, 2002:94).

Not all businesses operating in the green economy are doing so in order to achieve positive environmental outcomes. Some green businesses make a conscious decision to become “green” based on a perceived market opportunity (Walley and Taylor, 2002:31). As such, the motivations of green businesses may be driven by financial gain as well as concerns for the environment. Some green firms may also have become green businesses ‘accidentally’ (Walley and Taylor, 2002:31). However, Isaak’s (1998) ‘ecopreneurs’ make a decision to start up a green enterprise based on their personal sustainability values. It is these businesses which have the environment as a main concern.

According to Walley and Taylor (2002:32) the establishment of new “green” entrepreneurial businesses will be a significant part of the paradigm-shift to a sustainable future; one where the activities of people do not impact on the environment and the climate. It should be noted however, this does not diminish the positive impact that traditional business owners, who are not innovation-focused or entrepreneurial by definition, can have on the environment and the drive towards sustainability, when they employ environmentally-sound practices to their activities (Walley and Taylor, 2002:34).

The next section of this chapter identifies the ecopreneur and alternative green entrepreneur concepts. Prior to this, idea of the “traditional” entrepreneur is critically explored.

2.3 Towards a definition of entrepreneurship

The term ‘entrepreneur’ comes from the French word *entreprendre*, which means ‘to take into one’s own hands’ (Schaper, 2005:5). It is used globally in a variety of different contexts by scholars, governments, business people, financial institutions, community activists, minority groups and the public at large (Cooney and Hill, 2002). Successful and well known entrepreneurs include Bill Gates of Microsoft, James Dyson, inventor of the popular vacuum cleaner range which bears his name, and Virgin Group’s Richard Branson.

In the last five decades, there has been much academic consideration on what entrepreneurship *is*, and who entrepreneurs *are* (Cooney and Hill, 2002:6). This chapter critically examines some

of this research. Traditionally, an entrepreneur has been viewed as an individual who starts up and manages their own small business (Schaper, 2005:5), growing it to be successful, competitive, innovative and profitable (Tilley and Young, 2009:84). Drucker (2008:69) agrees, stating that some observers apply the term “entrepreneurship” to all new businesses and all small businesses. However, this prevailing perspective is inadequate in the context of business practice in the 21st century.

Defining the term ‘entrepreneurship’ is challenging (Coulter, 2003:3, Wickham, 1998:5), and there is much confusion about its definition (Drucker, 2008:69). According to Tilley and Young (2009:80) there is no universally accepted definition of the term ‘entrepreneurship’. Similarly, Kirkwood and Walton (2009:205) state that no consensus has yet been reached on the definition of “entrepreneurship”. Nevertheless, there are common themes which occur throughout the entrepreneurship literature.

Many different definitions have been offered by researchers (Coulter, 2003:3, Kirkwood and Walton, 2009:205), some of which are critically explored in this chapter. What is clear however, is that entrepreneurship *is* what the entrepreneur *does* (Wickham, 1998:4). Problems arise thereafter however, from the fact that some terms commonly associated with entrepreneurship, are not applicable in all circumstances (Wickham, 1998:5). To explore the term, several definitions are critically examined.

According to Timmons and Spinelli (2004:47, cited by Stokes and Wilson, 2010:33), entrepreneurship is a way of thinking, reasoning and acting. It is a process of creating something which is new and of value, following the entrepreneur’s hard work and effort (Stokes and Wilson, 2010:33 citing Hisrich and Peters, 2002). An entrepreneur “thinks outside the box”, and examines issues in a fundamentally different manner to more conventional approaches (Schaper, 2002:26). The process often arises when an individual identifies an unsolved problem, or unmet wants or needs, to which they proceed to satisfy (Schaper, 2002:26).

Schaper (2002:26, 2005:5) describes the entrepreneur as an individual who conceives or identifies new business opportunities and converts these ideas into reality, whilst assuming the financial, psychological and social risks involved (Stokes and Wilson, 2010:33 citing Hisrich and

Peters, 2002). Research by Tilley and Young (2009:83) finds entrepreneurs to be competitive, innovative, creative, wealth-generating, risk-taking change agents. Madden (2014) describes Irish entrepreneur Eddie O'Connor as a "change agent", following his transformation of Bord na Mona in the late 1980s. Entrepreneurs may be motivated by the prospect of money, power, curiosity or the desire for fame and recognition (Drucker, 2010:31).

Wennekers and Thurik (1999, cited by Stokes and Wilson, 2010:33) suggest that individuals, either on their own, or in teams, within or outside an existing organisation, can engage in entrepreneurial activity. Walley and Taylor (2002:33) refer to entrepreneurship within an existing organisation as "intrapreneurship". According to Drucker (2008:69), "many well-established businesses engage in highly successful entrepreneurship. The entrepreneur, either inside or outside a firm, will assemble the necessary resources, such as capital, employees and technology, so as to launch and grow their entrepreneurial venture (Schapes, 2002:26).

Entrepreneurship involves the creation of new economic opportunities, new products, new production systems and new ideas into the market (Stokes and Wilson, 2010:33 citing Wennekers and Thurik, 1999). It is a process concerned with innovation, creativity and risk-taking (Coulter, 2003:3). The risky process of starting one's own business offers the unique incentive of having control and being one's own boss (Isaak, 1998:124). The wisest entrepreneurs, according to Isaak (1998:29), do not risk their own wealth, but specialise in risking the wealth and resources of others. The entrepreneur will carefully evaluate their profit-making capacity, before assembling the necessary resources so as to exploit this opportunity (Schaper, 2005:5). These resources will often include the money of investors. Isaak (2002:82) states that all entrepreneurs live off risking other people's money and resources, with a view to acquiring materials as cheaply as possible, so as to allow the business to continue for as long as possible.

Successful entrepreneurs will be rewarded in financial terms, but will also enjoy a sense of personal satisfaction and independence (Stokes and Wilson, 2010:33 citing Hisrich and Peters, 2002). Successful enterprises can create employment, new products for consumers, and add competition to the marketplace (Schapers, 2005:5). They are one of the main drivers of the modern economy (Schaper, 2005:5). The entrepreneur is key to the process of entrepreneurship

(Coulter, 2003:4), and the qualities therein will greatly impact the success of the enterprise.

The success of the entrepreneur cannot be guaranteed; business can fail for a multitude of reasons, and the entrepreneur's personal assets can be at risk (Schaper, 2005:5). There are also barriers that can inhibit an individual's entrepreneurial nature. Society's collective learning and its cultural patterns can affect the probability or the likelihood of an individual starting up an entrepreneurial business. For example, the Japanese entrepreneur knows that in his or her cultural context, 'the nail that sticks up gets hit' (Isaak, 1998:33). As such, would-be Japanese entrepreneurs may be dissuaded from establishing their own business as they do not wish to draw attention to themselves. Likewise, the German culture based on order will likely see young people seek employment in an established firm, as opposed to starting their own business (Isaak, 1998:33). In a more liberal economy such as that of the United States, where the schema focuses on 'individual freedom' (Isaak, 1998:26), entrepreneurship is encouraged.

A free-rider is one who enjoys the beneficial actions of others (Hardin, 2003). Entrepreneurs can be considered a "creative version of the free-rider", according to Isaak (1998:28). To succeed in any society, the entrepreneur must "free-ride" off of any available resource, whether cultural, financial or circumstantial. Humans are rationally motivated to be free-riders (Isaak, 1998:111). Entrepreneurs create new business ventures by free-riding off of resources owned or lent by stakeholders, whether that is from a bank, the state or even friends and family (Isaak, 1998:29). Without the potential to free-ride, Isaak (1998:29) argues that entrepreneurs would be less likely to risk starting up what could turn out to be a very successful business, which will in turn benefit wider society in due course. Thus the ability to free-ride means the entrepreneur has the opportunity to produce economic growth and prosperity for themselves, as well as their stakeholders (Isaak, 1998:112).

However, the free-riding entrepreneur must be incentivised to act ethically; morally-sound, sustainable entrepreneurship can only grow and develop if economic and political incentives are put in place to support the ethical free-rider, and to deter the free-rider who is tempted by short-term rewards available as a result of the accumulation and selling of destructive products and services (Isaak, 1998:112). This can be achieved by government intervention, which entails, for example, offering subsidies to encourage eco-enterprises, and through the application of

appropriate taxation measures (Isaak, 1998:117).

Traditional free-riding off of the planet's finite resources is not sustainable. An example of this is oil production, which is finite in nature and will run out in due course (MacKenzie, 1998). Isaak (1998:38-9) argues one should treat the planet as one's own home; people would not leave rubbish around their own home after all. With this logic in practice, one would not dispose of rubbish on an adjacent property, as that is 'home' too (Isaak, 1998:39). Following on from this way of thinking, one should recycle what can be recycled, re-use what can be re-used, and that which cannot be recycled or re-used should be disposed of in such a way as to not be harmful to the environment, so as to ensure that the 'home', the earth, is clean, aesthetically pleasing, healthy and in ecological balance (Isaak, 1998:39). This perspective can influence entrepreneurs to develop an enterprise which is sustainable in its business practices.

Of the terms outlined so far, perhaps the single most significant one used in discussing entrepreneurship is "innovation". Innovation is a term which is particularly important with regards to this research study because in Isaak's (1998:89) definition of the 'ecopreneur' he states that green-green businesses must be innovative.

Drucker (2008:69) believed that innovation is at the heart of entrepreneurial activity. Innovations such as motor vehicles, computers and the internet can change the world, can alter the economy and fundamentally change society (Schaltegger, 2002:46). Wickham (1998:5) suggests that creating value through innovation has been offered as a defining characteristic of entrepreneurship. Coulter (2003:4) states that "entrepreneurship involves changing, revolutionising, transforming and introducing new approaches". To be innovative, argues Schaltegger (2002:46), an enterprise or entrepreneur must provide organisational and technical improvements that can be successfully sold into a given marketplace. However, the first mover, particularly if their idea is 'radical', in other words, highly innovative in nature, may have to face and overcome many teething problems if it is to be successful, before leading the way for other enterprises to follow (Volery, 2002:115).

Peter Drucker has written extensively on innovation in an entrepreneurial context. Some of Drucker's remarks include the following: "Innovation is the specific instrument of

entrepreneurship” (2010:27), “[Innovation] is the act that endows resources with a new capacity to create wealth” (2010:27) and “[Innovation] is the means by which the entrepreneur either creates new wealth-producing resources or endows existing resources with enhanced potential for creating wealth” (2008:69). However, Wickham (1998:5) argues that the practice of innovation, whilst essential to entrepreneurship, is also important in the management of all businesses.

A common theme relating to entrepreneurship is the establishment of organisations which will facilitate the creation of value and enable opportunities for innovative activities (Coulter, 2003:4). Wickham (1998:5) disputes this perspective however; whilst many entrepreneurs found their businesses, many others revitalise existing organisations, such as Eddie O’Connor’s renewal of Bord na Mona in the late 1980s (Clarke, 2010:279). O’Connor’s intrapreneurial activities in Bord na Mona are critically examined in Chapter 5.

There can be challenges in the innovation process however. Volery (2002) finds in his research into Earth Sanctuaries Ltd. that highly innovative business models can have difficulty being ‘taken seriously’ by investment houses and other traditional sources of capital. Volery (2002:114) also found that an idea which is highly innovative can be difficult to communicate to potential stakeholders.

The next part of this chapter will critically explore the concept of sustainable business, beginning with an outline of Elkington’s (1999) “Triple Bottom Line” model.

2.4 The Triple Bottom Line: Elkington’s three “Ps”

According to the Economist (2009), the term “triple bottom line” was first coined in 1994 by businessman John Elkington. The triple bottom line consists of three “Ps”: Profit, Planet and People (Economist, 2009). It is a measurement of a firm’s financial, environmental and social position at a given point in time (Economist, 2009). The first line concerns the company’s traditional “bottom line” at the end of its profit and loss account; otherwise referred to as its corporate profits (Economist, 2009). The second line refers to the firm’s “planet account”

(Economist, 2009). This line is a measure of how environmentally responsible the business is (Economist, 2009). Lastly, the third line refers to the firm's "people account" (Economist, 2009), or its contribution towards social justice (Elkington, 1999:2).

Elkington (1999:20) argues that the triple bottom line is *the* emerging 21st century business paradigm. Sustainable development, or development which does not impact on the opportunities of future generations, is proposed by governments and business leaders as a solution to a wide range of problems within the world today (Elkington, 1999:20).

Through assessing its triple bottom line, a company understands the full cost of conducting its business (Economist, 2009). Through realising its impact in a social and environmental context, the company will be able to become a more socially and environmentally responsible business (Economist, 2009).

However, some concerns have been raised regarding the triple bottom line concept. The Economist (2009) argues that it may not be as easy to measure a firm's social or environmental impact, as it is to measure cash, which is quantifiable. Dixon and Clifford (2009:327) question whether a green-green business, a business which is sustainable from its inception (Isaak, 1998:87), can retain its core environmental and social concerns whilst they strive to be economically successful. The triple bottom line is an important feature of a green enterprise, as acknowledged by Volery (2002:115), but the financial bottom line is still the most important aspect; this is made apparent when analysing the case of collapsed Australian green enterprise Earth Sanctuaries Ltd. (see Appendix D). Tilley and Young (2009:88) disagree however, arguing that by combining and balancing economic, environmental and social enterprise goals, a sustainable enterprise can be successful. Majid and Koe (2012) argue that a fourth dimension should be added to the triple bottom line paradigm. In this perspective, a cultural aspect is added and treated as being equally important as the other three (Majid and Koe, 2012:306). However, it should be noted that the cultural aspect, which Majid and Koe (2012:305) acknowledge is based on the work of just "a handful of researchers", requires further research.

The concept of the triple bottom line is referred to throughout the present study.

2.5 Green business and ecopreneurship

Sustainable development, according to the United Nations (1987) is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Elkington (1999:20) states that sustainable development is proposed by governments and business leaders as a solution to a wide range of problems facing the planet and its inhabitants, including global warming, ozone depletion, and the collapse of ocean fish stocks. However, Crals and Vereeck (2004:2) make the point that as sustainability is a concept orientated towards the long term and future generations, it is in conflict with the present fast-consuming, short-term orientated society.

Green business promotes the concept of sustainability. A green business is one which is sustainable from economic, environmental and social perspectives. As outlined earlier in this chapter, the sustainability of a given business can be measured at its “triple bottom line”.

Through ‘green’ business practices, a firm can reduce its impact on the environment (Labor Market Information Division, 2010:25). Green entrepreneurs contribute to a greener, more sustainable society (Walley and Taylor, 2002:37). Businesses adopting green thinking use less resources, and the knock-on effect of this means they become more competitive as a result of their sustainable impetus (Isaak, 1998:95). However, this concept is not understood by the majority of consumers; they believe that restrictions imposed by environmentalists are a barrier to profit (Isaak, 1998:120).

In addition, “green business” can refer to those which are set up as “green” from the outset, or those which have become “greener” over time (Walley and Taylor, 2002:36). “Green” is shorthand for environmental or ecological sustainability according to Walley and Taylor (2002:36). “Greenness” can refer to the sustainable production process of a given product, or a sustainable product itself (Walley and Taylor, 2002:36).

Whilst a green business holds a unique advantage in its sustainable, and thus low-cost business model, eco-enterprise projects face common risks associated with more traditional enterprises (Volery, 2002:116). For example, a green business which is overly ambitious, as in the case of Earth Sanctuaries Ltd., could fail if it runs out of the capital required, for example, to finance an

expansion (Volery, 2002:116). Nevertheless, it can pay to go green: research by Chen (2008) found that investment in green intellectual capital can lead to a competitive advantage for sustainability-focused firms.

The European Union provides supports for green business. These supports are outlined in Appendix B. The Irish government also supports green enterprise. These supports are described in Appendix C.

The idea that successful business and environmentally-friendly practices are mutually exclusive has seen traction in the past (Anderson, 1998:135). Beverage and Guy (2005:667) argue there is a perceived incompatibility between environmental concerns and enterprise, owing to the fact that entrepreneurship is ‘exploitative’ in nature, unlike ecology, which is concerned with the “greater good”. However, this perspective has been dismissed in recent times arising from the development of ecopreneurship, and the acceptance of ecological modernisation theory, which states that environmental concerns represent entrepreneurship opportunity (Tilley and Young, 2009:82).

A strong environmental focus is at the core of any eco-enterprise (Schaltegger, 2002:50). The goal of the eco-enterprise is to realise market success through environmental innovations (Schaltegger, 2002:47). The eco-entrepreneur, or “ecopreneur”, strives to influence others to take a more sustainable approach to business going forward (Schaltegger, 2002:48). The success of ecopreneurs, according to de Bruin and Lewis (2010:105), is difficult to ascertain as it requires measurement by both financial, and non-financial criteria. Nevertheless, it is broadly accepted that ecopreneurship can bring positive change to wider society.

Like most start-up businesses, the eco-enterprise will initially require a not insignificant amount of time and effort on the part of the ecopreneur (Isaak, 1998:89). Isaak (1998:88) argues that the green-green business, an enterprise which is sustainable from its outset, will involve the ecopreneur up to 24 hours per day; it will become a mode of living, and the life of the business owner will be “wholly dedicated to the socially symbolic business”.

One differentiating factor between traditional entrepreneurship and green entrepreneurship is that the latter can enjoy free publicity (Isaak, 1998:124). Businesses with a green-green focus will

attract the interest of the media, and will be able to free-ride on this attention for inexpensive public exposure (Isaak, 1998:89). This can be viewed as a competitive advantage. Seeking this competitive advantage can be one of many motivations to “go green”.

Beverage and Guy (2005:667) have identified the demand from the consumer for more environmentally sound products and services. Entrepreneurs who face pressure from stakeholders to become more sustainable can view the “greening” of their business as an opportunity to innovate (Pastakia, 2002:94). The adoption of environmentally responsible business initiatives can then open up new business opportunities for entrepreneurs (Schaper, 2002:27).

The market is also being fueled by more stringent regulations from governments (Beverage and Guy, 2005). The zeitgeist has changed – large “gas-guzzling” vehicles are no longer as popular with drivers owing to high oil prices, major retailers like Tesco and Marks & Spencer are assessing carbon neutrality, and widespread recycling of household waste and electronics indicate that environmental issues are now mainstream concerns (Gibbs, 2009:64).

In a recent study by Ndubisi and Nair (2009) the ‘Green Added Value’ (GVA) framework is identified. This model shows how a green entrepreneur builds an organisation to be green in nature (Ndubisi and Nair, 2009:24). Using the Value Chain model, established by Michael Porter (2004:45), the entrepreneur can make each of the parts of the chain more eco-friendly. Examples in Ndubisi and Nair’s (2009) research include using greener methods of transportation in both inbound and outbound logistics within the primary activities of the firm (24-26) and green human resource management, which ensures that employees of the business are made aware of the green impetus of the business (28). A move to a sustainable business model will provide access to various market niches which the business can serve once identified (Schaper, 2002:27).

A prevailing concern in society is that ‘going green’ could be prohibitively expensive. Schaper (2005:5) argues that in many cases, a more environmentally friendly approach can lead to better business outcomes. First, the firm’s reduced use of materials, in an attempt to reduce pollution, will result in a reduction of its expenditure on resources (Schaper, 2005:5). Second, a firm which is based on sustainability will survive longer owing to its long-term outlook (Schaper, 2005:5).

Third, the firm will foster greater customer loyalty as there is a growing demand for eco-friendly goods (Schaper, 2005:5). Finally, as green businesses are more desirable places to work in, employees will be better motivated, employee retention will be higher, and more skilled workers will be attracted to the business (Schaper, 2005:5).

However, green enterprises face significant challenges and pressures as a result of their encroachment into established business sectors. Changes in long-established areas such as transport and energy, threaten livelihoods in these sectors (Hargadon, 2008). The scale and importance of sectors such as energy mean that interruptions in their operations as a result of change could be extremely costly (Hargadon, 2008). To offset these risks, green entrepreneurs require their innovations to be proven and reliable (Hargadon, 2008). Anderson (1998:141) argues there is no perfect 'recipe' for entrepreneurial success, even if green entrepreneurs are prepared for challenges to their businesses. However, the convergence of the internal value system of a green entrepreneur, and the wider collective concerns of society offer the distinct potential for success for a sustainability-focused start-up business (Anderson, 1998:141-2).

Entrepreneurs who focus on green business practices are now commonly referred to as "ecopreneurs". However, this term may be a misnomer if used in the incorrect context. "Ecopreneur" is an amalgamation of "ecological" and "entrepreneur" (Beverage and Guy, 2005:667; Schaltegger, 2002:47). The term ecopreneur was originally described by Isaak in the late 1990s, and has evolved and become somewhat broader in its meaning. In light of this evolution of the term, Isaak (2002:81) now refers to the original definition, whereby an ecopreneur's green business was sustainable from its establishment, as the 'ideal type' of ecopreneur.

Despite an evolution in its meaning over time, some aspects of ecopreneurship remain unchanged. For example, ecopreneurs are those who pursue social and ecological goals through business (Isaak, 1998:88) and ecopreneurs have "strong green values" (Kirkwood and Walton, 2009:204). Also, Isaak's ecopreneur definition is based around "green logic", a concept concerned with saving, innovating and investing (Isaak, 1998:9). Products and services offered by the ecopreneurial business for sale are eco-sensitive with respect to resource-use and distribution (Isaak, 1998:88).

In his original definition of the ecopreneur, Isaak (1998:87) made the clear distinction between a “green business”, which he defined as an established firm which becomes increasingly environmentally-concerned at a given point after its founding, and a “green-green” business, which, from its initially conception, is focused on achieving positive environmental outcomes. Walley and Taylor (2002:37) interpreted this definition to mean that a green-green business is one “founded on the principle of sustainability”. The green-green business, according to Isaak (1998:87) is founded by the ecopreneur. The ecopreneur starts up the green-green business as a sustainable enterprise in an effort to transform the sector in which it operates, whilst striving for social and ethical transformation within its sector (Isaak, 1998:82; Isaak, 1998:87).

The term “ecopreneur” has become broader in its definition since the late 1990s. As such, the term is no longer limited to Isaak’s “ideal type” definition, as described above. For example, a simple definition of the term, offered by Schaltegger (2002:47), is [Ecopreneurship is] “entrepreneurship through an environmental lens”. This definition does not stipulate that the eco-enterprise was founded as, or evolved, to become a sustainable business. However, like Isaak (1998:89), Schaltegger (2002:48) offers the view that an ecopreneurial enterprise is one which is highly innovative, and supplies ecologically sound products, services or both. Another view on the definition of the term “ecopreneurship”, offered by Gibbs (2009:65 citing Dean and McMullan, 2007), is that ecopreneurs are entrepreneurs who combine environmental awareness with their business activities in a drive to shift the basis of economic development to a more environmentally-friendly basis. This definition does not state that the business must be green from the start, unlike Isaak’s “ideal type”. Dixon and Clifford (2007:327) interpret Isaak’s (1998) term “ecopreneurship” to represent the environmental, social and economic concerns of a firm.

Isaak further developed the term in a 2002 paper entitled “The Making of the Ecopreneur”; the “green entrepreneur”, or “ecopreneur”, is those in business who attempt to transform a given sector of the economy towards ecological sustainability (Isaak, 2002:82). According to Isaak (2002:82), an ecopreneurial enterprise is achieved by running a business that is ‘green’ in its design, with green processes and a long term commitment to sustainability. It could be argued that this is tacit acknowledgement by Isaak of the evolution of the term he had developed

initially.

Walley and Taylor (2002:38) interpret Isaak's (1998) ecopreneur definition as "Ecopreneurs pursue social and ecological goals by means of a profit-orientated business". This interpretation stresses the importance of a social or environmental goal over the need to create wealth. Walley and Taylor (2002:38) differentiate a green entrepreneur as one who pursues profit goals by means of an ecologically or socially orientated business. Walley and Taylor's (2002:38) model of "green entrepreneur" is similar to a traditional entrepreneur who is focused on the creation of wealth. As such, the green entrepreneur seeks to make a profit from the green business sector, while the ecopreneur seeks to achieve positive environmental and social outcomes through the means of running a successful business. Both are likely to achieve similar economic, environmental and social outcomes, but the motivation of each entrepreneur type is different.

There are a number of differing interpretations and perspectives of the concept of ecopreneurship in the literature. Schaltegger (2002:48) suggests that the ecopreneur's long-term business goal is to bring environmental solutions to the mass market. This can be achieved by identifying sales potential in inventions which solve environmental problems, and subsequently bringing them to market (Schaltegger, 2002:51). Dixon and Clifford (2007:327) interpret the term 'ecopreneur', based on Robert Isaak's definition, as an individual who has environmental, social and economic drivers. Kirkwood and Walton (2009:205) omit the social element. Their definition states that ecopreneurs are entrepreneurs with strong underlying green values, who enter eco-friendly markets to make profit, through selling green products or services in a sustainable fashion (Kirkwood and Walton, 2009:204-5).

Based on a review of the international literature, and taking into account the above perspectives, this research argues that an ecopreneur is:

- a visionary entrepreneur,
- who starts up a green business (based on Isaak's (1998) view), or changes a previously unsustainable business, and manages that enterprise in an environmentally, socially and economically sustainable fashion,

- with a goal to either make profits or to achieve environmental goals by means of a sustainable, profit-making enterprise, or both.

This perspective is a holistic definition of ecopreneurship, broad in its interpretation. The literature also shows that social issues are of great importance to the green enterprise. However, the position taken in this research study is the same as that taken throughout the literature, which implies, when taken as a whole, that social outcomes are not as important as environmental and economic outcomes within the ecopreneurship model.

For the purpose of the present study, the definition of an ecopreneur includes businesses which are sustainable from their establishment, and ones which become sustainable over time; this study argues that both are of equal value. It is acknowledged that some businesses which become sustainable in nature can arrive at that point entirely by accident (Walley and Taylor, 2002:31). In conclusion, this research in line with contemporary research, applies the term “ecopreneur” in a broader sense than Isaak’s (1998) “ideal type”.

This chapter has critically explored the concept of green business; a transformative traditional enterprise, and the green-green business, an eco-enterprise founded with sustainability in mind from the outset by an ecopreneur: otherwise referred to as Isaak’s (1998) “ideal type”. There are other forms of environment-focused businesses identified in the literature, outside of the ecopreneurship typology. However, in his review of green business research, Gibbs (2009:73) argues that the perspectives within are “heavy on speculation” and “extremely light on empirical evidence”. This implies that further research may be required in this emerging branch of entrepreneurship. For the sake of completion, these typologies are identified and outlined below.

Research by Walley and Taylor (2002:33) identifies four types of green entrepreneurs. They believe that Isaak’s (1998) “ecopreneur” definition was too narrow to be appropriate as a flagship green entrepreneur type, and that other green-orientated business types should be acknowledged.

“Hard” and “soft” factors shape the four green entrepreneur types identified by Walley and Taylor (2002:40). Beverage and Guy (2005:669) state that hard factors include economic incentives, government regulation and the demands of consumers. Soft influences include friends

and family, education, and past employment experiences (Beverage and Guy, 2005:669). Walley and Taylor's (2002:39-41) four identified types are found below:

Innovative opportunists: entrepreneurs who identify a green niche and exploit it for economic gain. This type of green entrepreneur is influenced by hard structural drivers, such as government regulation.

Visionary champions: cheerleaders for sustainability whose aim is the change the world through business based on a sustainability model. Hard structural influences are associated with this type. It has similarities with Isaak's (1998) "ecopreneur" as the entrepreneur's business is founded on the principle of sustainability. This type embraces transformation.

Ethical mavericks: entrepreneurs who are influenced by soft drivers, such as friends of family, past experience or networks, and with a sustainability orientation. They lack a clear vision of changing the world, unlike the visionary champion. Their businesses tend to be set up on the fringes of society, rather than focusing on the mainstream. As such, the ethical maverick's enterprise may be considered "alternative" in its nature.

Ad hoc enviropreneurs: financially driven entrepreneurs, who are influenced by soft structural factors that lead them to green enterprise. Could be considered 'accidental' green entrepreneurs. Like the ethical mavericks, ad hoc enviropreneurs are influenced by soft factors, and are motivated by making money.

As noted earlier, caution must be used when examining these typologies. Gibbs (2009:73) is critical of Walley and Taylor's (2002) typology examples because they are based on anecdotal evidence. Walley and Taylor (2002:41) themselves accept that green entrepreneurs may "reinvent" themselves from time to time, and that the green business may be transformed and changed from one of the types to another. Based on this logic, a green-green business (Isaak, 1998) may become unsustainable in the future, perhaps as a result of market forces or because the founding ecopreneur sells the firm to a third party who plans to run the enterprise in a less sustainability-orientated fashion.

The "bioneer" is another typology emerging in the green business literature. Schaltegger

(2002:49) develops Isaak's (1998) "ecopreneur" by postulating that to be an ecopreneur, one must target the mass market with environmental concerns at the core of the enterprise, owing to the fact that the business's economic success is strongly linked to its environmental performance. This is in contrast to the "bioneers"; individuals or businesses which target attractive market niches with "customer-focused eco-products" (Schaltegger (2002:50). Bioneers play an important role in the development of the green economy. Bioneers, by their nature, "pioneer", by "opening new paths of environmental development in markets" (Schaltegger, 2002:52). Ecopreneurs often work with these eco-inventors to bring ecologically-focused products and services to the mass market (Schaltegger, 2002:51). As such, green enterprises can focus their efforts on a small scale, or become large-scale international businesses.

Crals and Vereeck (2004:1) argue that "sustainable entrepreneurship" is a spin-off concept from the practice of sustainable development. They define sustainable entrepreneurship as "the continuing commitment by businesses to behave ethically and contribute to economic development while improving the quality of life of the workforce, their families, local communities, the society and the world at large as well as future generations" (Crals and Vereeck, 2004:1). However, Tilley and Young (2009:85) note that this concept is only applicable to existing businesses, and is of no use, as a model, to individuals seeking to start up a sustainability-orientated enterprise. Tilley and Young (2009:86) take the position that to be a sustainable entrepreneur, one should focus on environmental, social and economic factors together and in equal measure. Thus a sustainable enterprise will have a balanced positive outcome at its "triple bottom line". However, everyone can contribute to a sustainable economy. Tilley and Young (2009:87) acknowledge that economic, environmental and social-focused entrepreneurs can play a part in contributing to overall sustainability goals of wider society. Nevertheless, green entrepreneurship plays a key role in promoting a more sustainable business structure industry-wide by leading and setting an example to others in their sector, through demonstrating the economic benefits from "going green" (Schaper, 2002:27). Successful green entrepreneurial businesses act as a pull factor to other firms to become more sustainable, in contrast to the push factors of government regulation, stakeholders and lobby-groups (Schaper, 2002:27).

In summary, ecopreneurs can be seen as key drivers of environmental innovation (Beveridge and Guy, 2005:666). Ecopreneurs differ from conventional entrepreneurs in that they are motivated by the values they hold as individuals, and not solely by commercial gain (Beveridge and Guy, 2005:668). The ecopreneur possesses an ideal of what sustainability should be, and acts using their social conscience in an attempt to bring change to the business environment (Isaak, 1998:113, Isaak, 2002:82). Several examples of green businesses are included in Appendix D.

2.6 Conclusion

This chapter critically explored the various definitions of the entrepreneur, including concepts of the entrepreneur as a free-rider and as an innovator.

Ecopreneurs are worthy of much greater attention in the world of business, according to Kirkwood and Walton (2009:204), than they have been given to date. This chapter highlighted the sustainable credentials of the ecopreneur and critically appraised the concept. A number of alternative perspectives were outlined and other green business typologies were critically explored.

Innovative approaches for the sustainable utilisation of former industrially harvested peatlands are critically explored in the next chapter.

Chapter 3: Sustainable Use of Cutaway Peatlands: Models of Best Practice

3.1 Introduction

The after-use of former industrially-harvested peatlands presents challenges for a number of stakeholders including its owners, the government, environment groups and communities. However, these land banks represent opportunities for ecopreneurs to develop sustainable businesses. This chapter critically examines some of these challenges and opportunities identified in the international literature.

Two international examples of best practice for the use of post-industrially harvested peatlands are critically explored. The first example is a paludiculture regime with reeds in Belarus, and the second is a paludiculture regime with sphagnum moss in Canada. The second part of the chapter critically examines the present favoured Irish after-use of siting wind farms in cutaway bogs.

The chapter begins by examining the emerging model of “paludiculture”.

3.2 Paludiculture

An untouched, natural bog is a long term sink for atmospheric carbon dioxide (CO₂) (Waddington, Rochefort and Campeau, 2003:85). Industrial peatlands which have been drained of their water, or abandoned after mining, emit carbon dioxide into the atmosphere (Waddington, Rochefort and Campeau, 2003:85). Emissions from cutaway and drained peatlands can be managed by rewetting them. A paludiculture regime can then be initiated at the rewetted site.

Paludiculture presents a potentially sustainable management option for cutaway and cutover peatland (Renou-Wilson, et al. 2011:75). Paludiculture also restores and maintains habitats for rare and endangered flora and fauna (Wichtmann, et al. 2010:51). Paludiculture presents a distinct opportunity for ecopreneurs owing to its sustainable nature and its prospects for wealth generation. In line with the ecopreneur’s green values, the production of the biomass in a cutaway bog should contribute to new peat formation in the long term as a result of new

accumulation of suitable organic material (Wichtmann, et al 2010:49, Wichtman and Joosten, 2007:24).

The term 'paludiculture' is derived from Latin, where the word 'palus' means 'swamp' (Wichtmann, et al. 2010). According to the University of Greifswald (2012:6), paludiculture involves the productive use of a cutaway bog, whereby the remaining peat, following industrial harvesting, is rewetted and preserved. Once sufficient rewetting has occurred, a number of different types of biomass can be grown and harvested on the substrate (Renou-Wilson, 2011:xi). Thus paludiculture is defined as the sustainable growing and harvesting of organic materials on rewetted peatlands for use as clean biomass (University of Greifswald, 2012:6; Wichtmann, et al. 2010:48, Wichtmann and Joosten, 2007:24). It is essential to the practice of paludiculture that the water level is constantly close to the soil surface (Wichtmann, Haberl and Tanneberger, 2012:87).

The benefits of paludiculture are that it reduces green-house gas emissions, provides an income from land owners, and represents an opportunity for ecopreneurship. Paludiculture reduces carbon emissions by stopping the further degradation of peat soils, and initiates net sequestration of carbon (Wichtmann, Tanneberger and Barisch, 2009:101). In addition to this benefit, emissions are reduced further as clean biomass is used as a replacement for fossil fuels (Wichtmann, Tanneberger and Barisch, 2009:101).

Biomass is organic matter which can be converted into energy (Bracmort, 2012:ii). However, production of biomass must be sustainable according to Wichtmann and Wichmann (2011:77). Reeds are sustainable owing to their perennial nature (Lewandowski, et al. 2003:340), and can grow and reproduce successfully in peatland. Plants used in a paludiculture regime must be able to thrive under wet conditions in order to be a viable crop (Wichtmann, et al. 2010:49).

Some biomass, such as reeds, can be used to make biofuels. Biofuels are a substitute for fossil fuels, the replacement of which reduces greenhouse gas emissions (University of Greifswald, 2012:10). In recent times there has been an increase in the demand for biofuels (Wichtmann and Joosten, 2007:24). As such, there is an opportunity for ecopreneurs to develop innovative solutions to meet this need. Government regulation, such as the Act of Granting Priority to

Renewable Energy Sources (2000) in Germany, has formed part of this increased demand (Barz, et al. 2008:48). It is expected that demand will continue to increase in the future (Barz, et al 2008:48). However, the growing of biofuels on arable land competes with the growth of crops intended for food production (Wichtmann and Joosten, 2007:24). The shortage of land for biofuels has seen producers move toward utilising unused land resources, abandoned fields, wilderness and low productivity areas for its production (Wichtmann, 2007:24). One of the land types that has become of interest is the peatland, on which paludiculture techniques for the growing of biofuels can be utilised.

The suitability of a site for a paludiculture initiative is strongly related to its trophic conditions (Wichtmann, Tanneberger and Barisch, 2009:101): the greater the degradation, and the higher the nutrient content of a peatland, the greater the reduction in green-house gas emissions and the higher the biomass productivity potential (Wichtmann, Tanneberger and Barisch, 2009:101).

The species of plant chosen for any paludiculture initiative should be deemed the most effective at accumulating peat within the given ecosystem context (Graf and Rochefort, 2008:399). Yields of biomass should be of sufficient quantity and quality (Wichtmann and Joosten, 2007:24). Alder wood can also be grown, harvested and subsequently used for energy production and used to make furniture (University of Greifswald, 2012:13). Peat moss can be grown, harvested and used as a form of biomass for horticultural purposes (University of Greifswald, 2012:14). Reeds grown on peatland can be used in the construction of buildings, such as for roof thatch, and insulation (University of Greifswald, 2012:12). Paludiculture biomass can also be used to make silage, furniture, construction materials and in horticulture substrates (University of Greifswald, 2012:10). Reeds can be processed into biomass briquettes: this source of fuel has lower ash content than peat briquettes, and a slightly higher heating value (Wichtmann, Tanneberger and Barisch, 2009). Each of these uses can form the basis of a sustainable business.

Paludiculture, according to Wichtman and Joosten (2007:27), has additional benefits to the local, rural economy, such as jobs in processing the biomass. They also present opportunities for eco-tourism, as rewetted peatlands are more attractive to than ones which are degraded (Wichtman and Joosten, 2007:27). Paludiculture regimes also contain higher biodiversity and often rare and endangered species (Wichtman and Joosten, 2007:27), further enhancing their

attractiveness for would-be eco-tourists. Paludiculture also has the potential to promote a greater acceptance of peatland conservation and restoration amongst the public (Wichtmann, Tanneberger and Barisch, 2009:101).

An example of a paludiculture initiative with reeds can be found in Belarus, which is examined below.

3.3 Reed-based paludiculture in Belarus

In Belarus, more than half (1,505,000 ha) of a total of 2,939,000 ha of peatland has been drained (Wichtmann, Haberl and Tanneberger, 2012:89 citing Tanovitskaya and Bambalov, 2009). 1,085,200 ha, or 70% of this land is currently used for agriculture. A recent assessment by Tanovitskaya (2011, cited in Wichtmann, Haberl and Tanneberger, 2012:89) indicates that in total, 530,120 ha of drained Belarusian peatlands have the potential for rewetting, including 255,600 ha of mined peatland, 24,000 ha of degraded peatlands ineffectively used for forestry, and 250,520 ha of degraded peatlands ineffectively used for agriculture. Using its prior experience with the rewetting of peatlands, the Michael Succow Foundation (2012) is working at a pilot site for the cultivation of biomass from wet peatlands in Belarus. Through co-operation with local stakeholders, such as peat factories and energy providers, the Foundation aims to transform the present use of peatlands, which is not socially, economically or ecologically sustainable, into a land use system which is (Michael Succow Foundation, 2012).

The Sporava peatland is located in the vast, largely unmodified flood plain of the Yaselda River (Wichtmann, Tanneberger and Barisch, 2009:70). The site was selected because research suggests that it requires vegetation management for biodiversity conservation, and it has potential producers and consumers for biomass in the nearby surroundings (Wichtmann, Tanneberger and Barisch, 2009:71).

The Dokudovskoe peatland is located in the Grodno region, in the Lida district of Belarus (Wichtmann, Tanneberger and Barisch, 2009:96). Peat fires occur in the area frequently, an issue that would be significantly reduced by the presence of the water typically found in paludiculture

projects. A nearby factory processes peat into briquettes, after which they are exported to Poland, Sweden and Lithuania (Wichtmann, Tanneberger and Barisch, 2009:96). This factory has expressed an interest in manufacturing biomass briquettes, and could conceivably produce biomass briquettes on a full-time basis in the future (Wichtmann, Tanneberger and Barisch, 2009:96).

Paludiculture regimes aim to provide new economic opportunities in rural areas where there are vast areas of abandoned, cultivated and greenhouse gas emitting peatlands (Michael Succow Foundation, 2012, Wichtmann, Haberl and Tanneberger, 2012:86). The new system may even benefit the local climate and biodiversity, including the preservation of breeding grounds for the endangered Aquatic Warbler, and the protection of the hunting grounds of the Greater Spotted Eagle (Michael Succow Foundation, 2012). The overall aim of the project will be to reduce greenhouse gas emissions from the drained and abandoned peatlands, as well as to restore the lands to a state where they can be of appropriate agricultural use, thus providing positive social outcomes in the local area by providing potential income opportunities for farmers and land owners (Wichtmann, Haberl and Tanneberger, 2012:86).

Several organisations participate in and provide resources to the project. These include the International Sacharov Environmental University (ISEU), the Institute for Nature Management (IfNM) of the Academy of Sciences in Belarus, the University of Greifswald and the Centre for Agricultural Research (ZALF) in Muncheberg, Germany. Financial support is provided by the European Union Commission under EuropeAid for “Environmental protection and sustainable cultivation of natural resources, including energy” (Michael Succow Foundation, 2012). It is envisaged that a peat factory in western Belarus will co-operate with the project by allowing its facilities to be used to make sustainable biomass briquettes (Michael Succow Foundation, 2012). These biomass briquettes are intended to replace peat briquettes (Wichtmann, Haberl and Tanneberger, 2012:88). Through this co-operation, the project hopes to become an example to other peat factories in the country (Michael Succow Foundation, 2012).

A similar peatland rehabilitation initiative is underway in North America. Set out below is the sphagnum moss paludiculture project in Canada.

3.4 Sphagnum-based paludiculture in Canada

The establishment of sphagnum mosses on abandoned peatlands is an after-use initiative which is becoming more and more sought after (Landy and Rochefort, 2009:43). Mined peatlands do not rehabilitate well naturally; action needs to be taken by people in order to restore their natural state (Rochefort, et al. 2003:3).

As well as being used for the production of reeds for biomass, paludiculture techniques can be used to farm sphagnum moss (Renou-Wilson, et al. 2011:98). The establishment of sphagnum mosses in a cutaway or cutover peatland is of interest to those who wish to cultivate and harvest a sustainable product from this land resource; this presents opportunities for ecopreneurs to develop a sustainable business. The harvested sphagnum moss can be used as a growing medium by the horticulture sector (Landy and Rochefort, 2009:1).

Rewetting is an essential factor in sphagnum production and peat accumulation (Thompson and Waddington, 2008:299). However, this is just the first step in establishing a successful paludiculture regime. Early restoration techniques in Canada were basic; rewetting alone proved inadequate in ensuring good sphagnum establishment (Bugon, Rochefort and Price, 1997:513). Further initiatives such as the scattering of sphagnum fragments, or diaspores, on bare peat surfaces, before sheltering them, were developed (Bugon, Rochefort and Price, 1997:513).

Sphagnum moss farming provides an opportunity for peatland owners to produce a high-quality, sustainable alternative to 'white' peat cultivation (Gahlert, et al. 2012:1; Renou-Wilson, et al. 2011:98). White peat, or peat moss, is a raw material often used as a horticultural growing medium (Gahlert, et al. 2012:1). It is a finite, non-renewable resource (Gahlert, et al. 2012:1).

Extraction of peat progressively destroys the ecosystem services, such as carbon storage, that are provided by bogs (Gahlert, et al. 2012:1). Replacing peat production with climate-friendly sphagnum moss farming provides for a sustainable use of cut-over peatland or degraded bog grassland into the future (Gahlert, et al. 2012:1). Peatlands are becoming a valuable resource in economic terms: as they store significant amounts of carbon, the opportunity to trade carbon

credits internationally becomes possible (Renou-Wilson and Farrell, 2010:8).

However, sphagnum farming in Canada has one major drawback. Galhert, et al. (2012:5) state that sphagnum farming is, at present unable to compete successfully with low-priced white peat within the horticulture marketplace. Nevertheless, sphagnum biomass is profitable for niche markets (Galhert, et al. 2012:5). It is also versatile. As well as cultivation on rewetted peatlands, sphagnum moss can be farmed in deep water on floating cultivation mats (Galhert, et al. 2012:5). This could potentially be of use in disused peatlands which have rewetted naturally, and which are of otherwise of little economic use.

Whilst most of Canada's peatlands occur in the northern boreal region, degradation and commercial exploitation occurs primarily in the south of the country (Rochefort, 2000:503). Here, peatlands are flooded during reservoir construction, drained for agriculture and silviculture purposes, mined for their peat resource, or disappear under industrial and urban development (Rochefort, 2000:503). This is also the location of an innovative new research project, which offers potential new business opportunities to ecopreneurs.

The 'Experimental Sphagnum Farming Station' is situated at Shipaggan, New Brunswick, in the south-east of the country. This facility is an abandoned harvested peatland. The Peatland Ecology Research Group (PERG), along with its partners from the peat industry, have established a sphagnum growing project at this location. The goal of this project is to promote sphagnum biomass production, and more specifically to contribute to the production of new high quality growing substrates, to produce sphagnum fibre, and serve as a supply site for sphagnum diaspores for use in peatland restoration projects located elsewhere (Landy and Rochefort, 2009:1). The site also produces floral moss (Landy and Rochefort, 2009:1), which is live sphagnum moss collected from a peatland and used as a growing medium for orchids (Rochefort, 2000:503).

The topography of the facility has been deemed to be suitable for the production of sphagnum biomass, owing to the fact that the trenches present are ideal for rapid sphagnum growth (Landy and Rochefort, 2009:1); this means that intensive modifications to the site were not necessary (Landy and Rochefort, 2009:1). The hydrological conditions of the trenches are favourable to

rewetting, and also create humid microclimatic conditions naturally, which is conducive to sphagnum growth (Landy and Rochefort, 2009:1).

There is limited research primarily focused on sphagnum farming underway at present (Landy and Rochefort, 2009:43). As such, the Shippagan project represents a distinct opportunity to develop an expertise in this field (Landy and Rochefort, 2009:43). Through the knowledge gained from the development, a comprehension of an optimal and renewable sphagnum production cycle should result, which will benefit the various stakeholders of the Canadian peat industry (Landy and Rochefort, 2009:43) and present green business opportunities to ecopreneurs.

Both the paludiculture projects presented in this chapter show the potential for establishing sustainable businesses in former industrial peatlands. At present, the predominant after-use option for cutaway Irish bogs is wind farming for renewable energy. This is a significantly different approach than what has been taken in Belarus and Canada. The next part of this chapter will critically appraise this model.

3.5 Wind energy from Irish peatlands

The next part of this chapter critically explores Ireland's present-day favoured use of its cutaway bogs: wind farming. This section critically explores the harnessing of wind energy in a broader sense, before exploring the concept's suitability for cutaway bogs.

According to the Sustainable Energy Authority of Ireland (2014c), wind energy is a clean, sustainable and renewable source of power. Other renewables include bioenergy, solar power, hydro, tidal and wave energy (Friends of the Earth Europe, 2014). Wind energy can be used as a replacement for greenhouse gas-emitting fossil fuels such as peat, as a medium for the generation of electricity (Sustainable Energy Authority of Ireland, 2014c). According to Friends of the Earth Europe (2014), wind is a safe, inexhaustible, technologically viable source of energy. It can play a major role in the battle against climate change and can form part of the required transformation of the energy economy towards sustainability (Gurria, 2014). As such, wind energy may be

attractive for ecopreneurs as it would appear to be “green” in nature.

Europe is the world’s leading producer of wind power, generating 75% of the world’s wind energy output (Sustainable Energy Authority of Ireland, 2014e). Within Europe, Germany is the largest producer of wind energy and operates one third of the continent’s wind power (Sustainable Energy Authority of Ireland, 2014e). Spain and Denmark also produce a significant proportion of Europe’s wind energy (Sustainable Energy Authority of Ireland, 2014e). According to the Irish Wind Energy Association (2013), 27% of Denmark’s and 11% of Germany’s electricity consumption in 2012 was derived from wind power. It is argued that Ireland’s windy climate is ideal for the generation of wind energy from wind farms (Renou-Wilson and Farrell, 2010:1). Ireland’s wind resource is among the best in Europe according to the Sustainable Energy Authority of Ireland (SEAI) (2014b). Winds come from the Atlantic Ocean and hit the island of Ireland, the first landmass to the west of continental Europe, very hard (Renou-Wilson and Farrell, 2010:2). Stewart (2012) describes Ireland as the Saudi Arabia of the world for wind and wave energy, though the nation is more reliant than ever on imported fossil fuels such as coal, gas and oil. Wind energy presents a distinct opportunity for Irish ecopreneurs; according to the Irish Wind Energy Association (IWEA) (2012) wind energy is the world’s fastest growing renewable energy resource; this trend is expected to continue as the costs associated with wind energy decrease.

During the early 1980s, several wind turbines were installed in Ireland for demonstration purposes (IRENA and GWEC, 2012:94). This was the beginning of the development of green business in Ireland (see Appendix E for a discussion on the origins of the environmental movement in Ireland). The first commercial Irish wind farm began operating in 1992 in a cutaway bog at Bellacorick, County Mayo (Bord na Mona, 2014a). This development was as a result of Bord na Mona’s drive to create new initiatives as part of the firm’s efforts to foster innovation and entrepreneurship internally (Clarke, 2010:240-241).

Wind farms steadily grew in number across the country. By the end of 2011, 1,630 mega-watts (MW) of wind capacity was in place in Ireland across 148 separate wind farms, with 5,500-6,000 mega-watts required by 2020 to meet European Union renewable energy targets (Sustainable Energy Authority of Ireland, 2014d). In 2009, wind energy displaced 1.28 million metric tonnes

of CO₂ emissions (Sustainable Energy Authority of Ireland, 2014d). As of January 2014, there were 205 wind farms on the island of Ireland, producing 2,542 mega-watts of power; 2,011 MW of which was produced in the Republic of Ireland, with the remaining 531 MW being produced in Northern Ireland (Irish Wind Energy Association, 2014a).

Wind energy is predominantly harnessed on land-based (i.e. onshore) wind farms in Ireland. Britain and Denmark are Europe's leading offshore wind energy producers (Schaps, 2014). As an island, offshore wind development is an opportunity for Ireland to increase its production of renewable energy. Offshore wind production has significant differences to onshore operations (Irish Wind Energy Association, 2008). Offshore wind farms require more capital to establish (Irish Wind Energy Association, 2008). It can cost twice as much to construct and maintain a wind farm offshore than a comparable one onshore (Renou-Wilson and Farrell, 2010:2). Bord na Mona (2014f) believes on-shore wind generation is more cost-effective than offshore generation. The high cost of offshore wind is offset by the fact that energy yields are higher offshore as wind speeds are faster, with another benefit being that planning restrictions are less obstructive (Irish Wind Energy Association, 2008), and yields from offshore wind farms can be as much as 30% higher than comparable onshore developments (Renou-Wilson and Farrell, 2010:2).

The Irish wind industry continues to expand, with potential for further growth. The largest wind farm in Ireland is an 84 megawatt installation (Meentycat Wind Farm) in County Donegal (Airtricity, 2014a). According to Sanders (2012), Ireland should be 100% self-sufficient for its energy needs. According to the Department for Communications, Energy and Natural Resources (2012b) wind and wave energy will provide significantly greater volumes of energy than the domestic market needs, which will present an opportunity for Irish ecopreneurs to become renewable energy exporters.

Several wind energy-focused companies operate in Ireland. A number of these firms, as well as other key Irish wind energy stakeholders, are identified in Appendix F. The development of renewable energy, such as that generated from wind farms, is central to the Irish government's energy policy (Government of Ireland, 2010:5). However, public reaction to wind farms in Ireland so far has been mixed. This is in spite of the fact that the generation of electricity from clean renewables such as the wind reduces carbon emissions, thus mitigating against climate

change (Renou-Wilson and Farrell, 2010:2). The issues surrounding these concerns are discussed later in this study.

A significant proportion of wind farms in Ireland in recent times have been located in peatlands (Renou-Wilson and Farrell, 2010:1). This may be as a result of the fact that peatlands and wind are often found together at the same location (Renou-Wilson and Farrell, 2010:3). For example, the winds are strongest in the west of Ireland, which tend to be where peatlands are located (Renou-Wilson and Farrell, 2010:3).

The first wind farm in Ireland is located in a post-industrially harvested peatland at Oweninny, Co. Mayo (Clarke, 2010:138). More recently there has been development of wind farms in cutaway bogs in the midlands. In 2013 Bord na Mona unveiled a €1 billion plan for its “energy hub” project in its bogs in Offaly and Kildare (Ryan and Carty, 2013).

Concerns have been expressed that using intact peatlands for wind farms could have a negative impact on the environment. Wind farm development which involves drainage or fragmentation of peatlands can have irreversible effects on these ecosystems (Renou-Wilson and Farrell, 2010:1). There is a danger that because wind farms have a “green profile” they may be viewed in a different light than other industrial developments (Renou-Wilson and Farrell, 2010:1). As such, Renou-Wilson and Farrell (2010:1) propose that any developments on peatland resources in Ireland should undergo rigorous examination and environmental impact assessment. Furthermore, Renou-Wilson and Farrell (2010:1) argue that cutaway peatlands, which have arisen from industrial peat extraction, should be selected as locations for wind farms.

Upland bogs are also attractive locations for wind farm developers because remote areas where peatlands are commonly found tend to have fewer owners (Renou-Wilson and Farrell, 2010:3). As wind farms tend to be large scale projects, developers would ideally wish to work with as few landowners as possible (Renou-Wilson and Farrell, 2010:3). Lowland peat-extracted bogs are also suitable as they tend to be owned by one party: the state peat harvester Bord na Mona (Renou-Wilson and Farrell, 2010:3). Peatlands also have the advantage of low-levels of vegetation cover which does not get in the way of wind making contact with the turbines (Renou-Wilson and Farrell, 2010:3). However, landslides are a concern in these areas. In

October 2003 two major bogslides occurred at Derrybrien in County Galway during the construction of a wind farm (Renou-Wilson and Farrell, 2010:6). Lessons learned from this landslide resulted in the development of comprehensive guidelines for wind farm development in Ireland (Renou-Wilson, 2010:6).

The suitability of peatlands for use as locations for the perceived “green” wind farms is putting pressure on these vulnerable and often legally protected ecosystems (Renou-Wilson and Farrell, 2010:3). Thus the government’s policy of promoting and supporting renewable energy projects is coming into conflict with European Union legislation which aims to protect areas identified as requiring conservation (Renou-Wilson and Farrell, 2010:3-5). If wind farms are allowed to be developed in sensitive areas then it is likely that there will be drainage of bogs, there will be a loss of habitat for animals, and soil erosion will occur (Renou-Wilson and Farrell, 2010:5).

One significant advantage for wind farms situated on cutaway bogland is that they can co-exist alongside other projects. Bord na Mona (2014d) argues that owing to the small footprint of a wind turbine, the surrounding land can be used for other purposes, and suggests that these uses could include amenity projects and biodiversity initiatives. This is an important factor when exploring business opportunities that may arise in a cutaway bog because it may be possible to initiate more than one use at a cutaway bog. It may be possible to apply the examples of paludiculture critically explored earlier in this chapter to an Irish cutaway bog-based wind farm.

3.6 Conclusion

Renou-Wilson and Farrell (2010:5) recommend that wind farms should be situated in industrially cutaway peatlands where the environment would be less sensitive to disturbance, because significant damage has already occurred to the bog as a result of peat harvesting. Whilst the wind regime in the midlands of Ireland, where great tracts of these industrially harvest peatlands occur, is not as strong as it is in the west of the country, improvements in the design of wind turbines should result in midland projects being viable (Renou-Wilson and Farrell, 2010:8). It is important that the chosen sites are located close to already established infrastructure, so as to reduce further disturbance to the environment (Renou-Wilson, 2010:8). Renou-Wilson and

Farrell (2010:9) argue that vulnerable peatland ecosystems should be excluded from proposed wind farm developments.

Using cutaway bogs for wind farms has become the primary after-use for Bord na Mona. However, as outlined earlier in the chapter with the international examples of best practice, a cutaway peatland should be rewetted to mitigate against the release of greenhouse gases. A concern of installing wind farms on a cutaway peatland is that greenhouse gases being released from residual dry peat may reduce the actual “green” outcomes of the wind farm. This concern will be explored at a later point in this research study.

The next chapter sets out the research methodology used in this study and the rationale for its selection.

Chapter 4: Research Methodology

4.1 Introduction

In a professional or academic context, research can be viewed as a process of collecting, analysing and interpreting information to answer questions (Kumar, 2011:8). Graziano and Raulin (2000:28) define research as a “systematic search for information” and as “a process of inquiry”. When conducting a research study to find answers to a question, the process will be undertaken within a set of philosophies, it will be objective and unbiased and it will use procedures, methods and techniques that have been tested for their validity and reliability (Kumar, 2011:5).

This chapter sets out the research methodology employed in this study. It includes the research question and the research design.

4.2 Research question

A research question should be closely examined and refined until it is specific enough so as to give the researcher a clear idea of what direction he or she should go to answer it (Grazian and Raulin, 2000:56). Thus developing the question will determine how the researcher will conduct their investigation (Graziano and Raulin, 2000:56).

The research question in this study is as follows:

Is Bord na Mona’s present use of its post industrially harvested peatlands sustainable from economic, environmental and social perspectives and is it aligned with ecopreneurial models of best practice?

The following chapter outlines and justifies the course of action taken in order to answer this question.

4.3 Research design

According to Kumar (2011:138), there are two predominant sources from which a researcher can attain information about a situation, person, problem or phenomenon: from primary data and from secondary data.

Primary data is obtained from first-hand experience (Kumar, 2011:139). Information obtained first-hand from interviews, observations and questionnaires are all primary sources of information (Kumar, 2011:139; Kumar, 2011:393). Graziano and Raulin (2000:373) consider primary sources to include the original results found in journal articles and dissertations. Kumar (2011:139) disagrees, and argues that all “second-hand” information, including journals, should be considered as secondary sources. Kumar (2011:139) states that other secondary sources include articles, census data, organisations’ records, magazines and books. For the purposes of this study, only that information which has been gathered on a first-hand basis by the author will be considered as a primary source.

According to Graziano and Raulin (2000:374), secondary sources provide reviews of areas of research. However, this wide approach, which takes in many research reports, fails to provide the detail found in the original research studies (Graziano and Rrauln, 2000:374). Research discussed in reviews will also be several years old, given the lag found in publication of the review itself, which can take one or two years to be made available for use (Graziano and Raulin, 2000:374). This could mean some information may be out of date by the time it is published.

This research study includes both primary and secondary sources of information. Secondary sources, as defined by Kumar (2011:139) have been used throughout this research, including information gathered from journals, books and online newspaper articles. These sources will form part of the case study approach found herein. Primary sources, in the form of interviews with key stakeholders, will supplement the secondary information presented. These interviews will aim to provide information which is not currently found in the published literature. The information presented is predominantly qualitative in nature.

The rationale for the approach taken is set out in the next section of this chapter.

Qualitative and quantitative research

There are two broad approaches of enquiry; qualitative and quantitative methods (Kumar, 2011:394). The next part of this chapter will critically explore both. The rationale for selecting the approach for this research study is set out below.

The qualitative, or unstructured research approach is an open, flexible approach to enquiry, and aims to describe rather than measure (Kumar, 2011:394). Qualitative research tends to be associated with words as the unit of analysis (Denscombe, 1998:174). According to Neergaard and Ulhøi, (2007:4), the aim of qualitative research is to develop concepts which provide an understanding of a given phenomenon with an emphasis on meanings, experiences and views of the participants. Moore (2006:141; 2006:150) offers a similar perspective on qualitative research, stating its aim is to allow respondents to talk, often at length, about their attitudes, views, beliefs, feelings, behaviour and values. It is concerned with achieving an in-depth understanding of an issue by understanding perceptions and feelings in a small sample (Kumar, 2011:394). According to Denscombe (1998:220), this is an advantage because it provides the researcher with rich and intricate detail relating to situations which are complex in nature. This approach is appropriate in this study as a detailed understanding of the usage of cutaway peatlands is sought. However, the qualitative approach has a number of drawbacks.

Qualitative research has been accused of lacking rigour and stringency (Neergaard and Ulhøi, 2007:4). This is because qualitative analysis is based on the interpretations of the researcher, which then opens the possibility that other researchers, when presented with the same data, may draw very different conclusions (Denscombe, 1998:221). This suggests that more than one interpretation of qualitative data is valid (Denscombe, 1998:221). As such, the research findings may not be as reliable as those derived from quantitative data.

Another disadvantage of the qualitative approach is the danger that the researcher could lose the context, and thus the true meaning, of the data as it is categorised away from its original location (Denscombe, 1998:222). There is also the concern that researchers may oversimplify the

explanation arising from the data owing to pressure to find themes within (Denscombe, 1998:222). In this process, the researcher is in danger of underplaying or even disregarding data which does not fit in with the theme (Denscombe, 1998:222).

Quantitative research on the other hand is structured, it is concerned with measurements, and is rigid and narrow in its focus (Kumar, 2011:20; Kumar, 2011:394). It is a form of research which is associated with numbers as the unit of analysis (Denscombe, 1998:174). It is concerned with large sample sizes, and aims to quantify variations in phenomena (Kumar, 2011:394).

The key advantage of quantitative research is that it carries an aura of scientific respectability because it uses numbers which can easily be presented on simple graphs and tables (Denscombe, 1998:177). Owing to its numerical form, quantitative research conveys a sense of being objective in its nature (Denscombe, 1998:177). The quantitative research method is best used when the researcher has a detailed knowledge of the subject being studied (Cronholm and Hjalmarsson, 2011:94).

Quantitative research can have its drawbacks. A large amount of data can overload the researcher, as too many cases, too many variables and too many factors can lead to too much complexity (Denscombe, 1998:205). Quantitative data may appear to be objective in its nature, but Denscombe (1998:205) argues that this may not be the case, owing to the fact that researchers can manipulate categories and the boundaries of grouped frequencies to achieve a “data fix”. This could be likened to gerrymandering in a political sense.

Neergaard and Ulhøi (2007:5) state that qualitative and quantitative methodologies are frequently depicted as being at odds with one and other, presented in a fashion whereby they are adversaries squaring off in a great methodological battle. Denscombe (1998:173) disagrees with this depiction however, and argues that qualitative and quantitative approaches are not mutually exclusive. Denscombe (1998:173) states that research of a high quality will use parts of both approaches, but with a slant towards one methodology over the other. Therefore a “mixed method” of using both types may be appropriate for some research studies because quantitative research is concerned with finding out what is happening, whereas qualitative research aims to understand why it is happening (Moore, 2006:141).

The aim of this study is to critically examine Bord na Mona's approach to its cutaway peatlands. The approach used in this study is qualitative in nature because this method provides the researcher with an in-depth and intricate understanding of a complex situation. Research in the area of entrepreneurship is often descriptive in nature according to Neergaard & Ulhøi, (2007 p2). As such, the qualitative approach to the research presented herein is considered to be suitable, particularly given the fact that an in-depth understanding of a small sample is desired.

A quantitative approach has not been chosen for a number of reasons. First, as outlined above, a quantitative approach is useful for measuring variances in phenomena. However, the present study is not concerned with measuring differences in any identified phenomena. Second, in Chapter 2, it was found that when assessing a given firm's environmental and social outcomes, it is not easy to measure these in a quantitative fashion, unlike economic outcomes (Economist, 2009). As such, when using Elkington's (1999) Triple Bottom Line model as a lens to critically explore Bord na Mona's cutaway bog after-use strategy, a quantitative approach is not considered inappropriate.

The case study method used in Chapter 5 entails researching secondary sources that are based on reports and interviews; this approach is qualitative in nature. In the interviews, qualitative information is gathered by way of seeking the views of key informants and stakeholders on a range of key issues. However, there is some quantitative material and information presented at various points where it has been deemed necessary to illustrate a point or a concern.

Case study method

The use of the case study design is common throughout research (Denscombe, 1998:30). A case study can examine such things as an individual, a group, a community, an event, or a subgroup of a population (Kumar, 2011:126). It will often involve asking questions of a participant (Graziano and Raulin, 2000:50). This means that it can be used as part of an interview approach.

Case studies explore situations which already exist, as opposed to an experiment whereby a situation is created for the specific purposes of research (Denscombe, 1998:31). During a case study, various methods of information gathering can occur, such as observation of events,

interviewing of stakeholders, and the collection and analysis of documents relating to a particular point of interest (Denscombe, 1998:31).

The case study approach is used when it is a requirement that the researcher gain a detailed understanding of a complex situation (Moore, 2006:xiii). This is because other methods cannot provide as much depth; for example, surveys will not provide the same level of depth as a case study will provide (Moore, 2006:xiii). In a case study design, the “case” selected becomes the basis for an in-depth and holistic examination on the part of the researcher; it is focused upon to enable the researcher to gather the information relevant to the research question or hypothesis asked or to be examined (Kumar, 2011:126). The defining characteristic of the case study approach, according to Denscombe (1998:30), is to focus on a singular factor of the subject or topic investigated. This gives the case study its in-depth character (Denscombe, 1998:30). In the research presented in this study, the case is Bord na Mona’s cutaway bog strategy. The case is critically examined through a lens informed by literature on ecopreneurship.

There are limitations to the case study approach however. Whilst a case study provides depth, it is limited in its nature because it does not provide breadth (Moore, 2006:xiii). For example, in the case study approach taken as part of this research, the business models of all cutaway peatland owners in Ireland cannot be examined in detail due to resource limitations and time constraints. Another example is negotiating access to case study settings can be challenging and research can run into difficulties if permission for access is denied or withdrawn (Denscombe, 1998:40). Another concern is the fact that because the case study approach focuses on just one, or a handful of cases, the researcher may find themselves confronted with some skepticism of their findings (Denscombe, 1998:35-6). The researcher will find that some individuals will question how representative the research is in the broader sense, and whether or not the findings are unique to the particular circumstances of the case itself (Denscombe, 1998:36). This raises the issue as to whether the information gathered during a case study research can be applied elsewhere. However, if the case in question is similar to other external examples, the findings of a case can be extended and applied to those as well (Denscombe 1998:36). A case study design is based on the assumption that a given case which is studied, is typical of cases of a certain type; therefore the information gathered as part of the study is representative of events or situations

that are found within similar groups or organisations to the one studied (Kumar, 2011:126).

Case studies are often used as part of small-scale research (Denscombe, 1998:30), making it appropriate for the present study.

Interview method

The interview is a commonly used method of information gathering (Kumar, 2011:144). Johnstone (2007:109) defines the interview as “a series of questions by an interviewer, followed by a series of responses by a subject”. It is normally a one-on-one dialogue between two people (Le Voi, 2002:161) arranged before it takes place (Denscombe, 1998:110). They are relatively easy to arrange, particularly in comparison to organising a focus group consisting of several participants required to all be in one place at one time (Denscombe, 1998:114).

Interviews are easy to conduct; the researcher has only one person’s ideas to gather during an interview (Denscombe, 1998:114). According to Moore (2006:143) however, interviewing does require skill on the part of the researcher, and should not be carried out by those who are untrained.

There are a number of advantages to conducting the interview approach. In comparison to a focus group, where the moderator has to control and record the views of several people at once, who often interrupt and talk over one and other (Denscombe, 1998:115), interviews are relatively simple to control and record as they are normally just between the interviewer and the interviewee (Denscombe, 1998:114). Unstructured interviews provide a rich stream of data which can be used to achieve an understanding as to why particular phenomena occurs (Moore, 2006:143). Another advantage is that interviewees may feel uncomfortable and inhibited disclosing sensitive, emotional, or political views in the company of others in a focus group (Denscombe, 1998:115); however, this would be less of a concern in a one-on-one interview.

There are disadvantages to interviewing however. It can be time consuming and expensive if the respondents are located across a broad geographical area (Kumar, 2011:150). Analysing, coding and transcribing the interviewee’s responses can also be time-consuming (Denscombe,

1998:136). The quality of the information received during the interaction is likely to depend on the interview skills of the researcher (Kumar, 2011:150). The researcher may include their own bias in the design of the questions and the interpretation of responses (Kumar, 2011:150) which can affect the quality of the research. The presence of a tape or video recorder can inhibit the responses from some interviewees, as they are “going on the record” with their responses (Denscombe, 1998:137). This can prove daunting for some people (Denscombe, 1998:137). Lastly, information from an interview is based on what people say, as opposed to what people do (Denscombe, 1998:137). As such, the information supplied may not necessarily be the truth (Denscombe, 1998:137). In this sense, observation methods will provide a more accurate picture to the researcher as it draws on direct evidence which has been viewed by the researcher ((Denscombe, 1998:139).

The researcher has the freedom to decide the questions and format of the interview (Kumar, 2011:144). The interview process can be flexible, or unstructured, whereby the interviewer can formulate questions as they come to mind during the process, or inflexible, or structured, whereby the questions are predetermined beforehand and do not change during the process (Kumar, 2011:144). Interviews can also be semi-structured in their nature (Johnstone, 2007:109).

Structured interviews require less interviewing skills than the unstructured method (Kumar, 2011:145). Little training is required for interviewers conducting structured research (Johnstone, 2007:109). Structured interviews are similar to a questionnaire which is administered face-to-face with a respondent (Denscombe, 1998:112). In a structured interviewing process, the researcher asks a question and generally expects an immediate response, before swiftly moving on to the next question (Moore, 2006:142). In this sense, a structured interview allows the interviewer to quickly interview people, saving time (Johnstone, 2007:109). However, there may be some prompting or probing necessary during this process (Moore, 2006:142). For more nuanced information with meaning and description, an unstructured or semi-structured approach may be appropriate (Johnstone, 2007:110).

Unstructured interviews can be used as a method for information gathering in both the qualitative and quantitative methodological approaches. In the quantitative process, information gathered is coded and quantified by the researcher (Kumar, 2011:145). In the qualitative process responses

are used in the researcher's arguments, often in verbatim form (Kumar, 2011:145). The unstructured interview places a great emphasis on the interviewee's thoughts (Denscombe, 1998:113). In this method, the interviewer introduces the topic and lets the interviewee discuss it, pursuing their own train of thought, with no interruption on the part the interviewer (Denscombe, 1998:113). Moore (2006:142) refers to the unstructured interview approach as being a "depth interview", owing to its nature, whereby the interviewer seeks to explore a topic, and the interviewee's feeling relating to it, in-depth (Moore, 2006:142). The drawback to this however, is that it is often not practical to cover the breadth of a topic at a time when such depth is being explored (Moore, 2006:142).

A semi-structured interview approach can also be used by the researcher (Denscombe, 1998:113). It is a "half-way house" between the rigid formality of a structured interview, and the flexibility of the unstructured interview (Moore, 2006:141). In this method, the researcher has a clear list of questions to be asked and topics to be discussed; however, they are prepared to be flexible in the order in which these questions are asked, and more significantly, are prepared to allow the respondent to elaborate freely in their responses, and to speak more widely on the issues raised by the researcher (Denscombe, 1998:113). The researcher must be careful not to "lead" the respondent during this process (Johnstone, 2007:111) as this may impact on the quality of the information received.

In practice, it is likely that the interviewer will shift from the unstructured interview technique to the semi-structured technique (Denscombe, 1998:113). This is acceptable as these methods are relatively similar because they both allow the respondent "room to speak", which often results in the respondent moving into surprising and unexpected areas of discourse (Berglund, 2007:83).

In the current study, a semi-structured interview approach is used as the basis of the primary information-gathering process. It has been selected as it allows for specific questions to be asked of the respondents, whilst at the same time allowing for sufficient depth to be explored on a given subject, similarly to the unstructured approach.

Key stakeholders involved with the cutaway bogs project at Bord na Mona were identified and interviewed so as to gather relevant information. A list of those interviewed as part of this

research is located in Appendix G. The questionnaires used as part of this study can be found at Appendix H.

4.4 Administration of research

For the case study, books, academic journals and articles on the internet were used to research Bord na Mona. Interviews were recorded on a tape recorder. The interviews were then transcribed manually from the tape recorder into individual word processor documents, before being analysed for use in this study.

The research was conducted between September 2012 and July 2014. The semi-structured interviews were conducted in a number of different locations throughout June 2014. Information gathered was then analysed during July 2014.

4.5 Conclusion

This chapter sets out the research methodology used in the current study. The methodology chosen is informed by the literature and the nature of the study; the approach selected is qualitative in nature because the research aims to present information which is intricate and in-depth.

A secondary research information-gathering approach is used during the case study of Bord na Mona. The primary information-gathering phase of this study involves interviews with key stakeholders. A semi-structured interview method is used during the information gathering stage of this project. This approach allows for specific questions to be asked of an interviewee, but allows for sufficient depth within the answers of these questions.

The case study of Bord na Mona is set out in the next chapter.

Chapter 5: Case Study of Bord na Mona: Findings

5.1 Introduction

This chapter will critically evaluate Bord na Mona's past and present use of its bog land resource since its establishment until the present day through the lens of ecopreneurship theory, most notably using Elkington's (1999) Triple Bottom Line.

The case study will be presented in two parts: the first part will focus on the company's history and provides a context. It uses an amended product life cycle model consisting of four sections: growth, decline, diversification and the entrepreneurial era. The second part of the chapter will focus on Bord na Mona's after-use options for its cutaway peatlands.

In order to critically review Bord na Mona's business practices since its establishment, a number of models and theories are used to analyse Bord na Mona during key stages of its development. These are the product life cycle model, the SWOT analysis, and Ansoff's product-market expansion grid. Analysis of innovation is also a key theme running throughout this case study.

This case study will structured around a modified version of the product life cycle model. There are typically four stages to the standard product life cycle:

1. Introduction: A period of slow sales as the product is introduced into it's a given market, with profits non-existent owing to the associated costs of market entry.
2. Growth: A period of market acceptance and improvement in profit generation.
3. Maturity: A slowdown in sales growth because the product has achieved acceptance by the target market. Profits will stabilise at this stage or will decline because of the increase in competition which may have arisen.
4. Decline: Sales decrease and profits disappear.

(Kotler, et al. 2009:490)

The product life cycle varies from product to product. For example, if a product is a fad it may see rapid growth, but very quickly, this will decline (Kotler, et al. 2009:491). Upon decline, sales can increase for various reasons. Marketing pushes can help increase declining sales, though this cycle-recycle pattern will likely produce a bump in sales that is not quite as high as the first spike (Kotler et al. 2009:490-1).

In the early stages of the product life cycle, there is a focus on product innovation (Porter, 2004:194). As the product matures, there are less innovations applied to it, and mass production techniques are introduced (Porter, 2004:194). In this, process innovation takes over from product innovation as the primary activity, with attention shifting to reducing the costs of manufacture for a now standardised product (Porter, 2004:194). Ultimately, diminishing returns to the process innovation sets in, reducing innovative activity in the product completely (Porter, 2004:195).

The product life cycle model was chosen for this case study because it is an appropriate model to use for the analysis of the performance of various aspects of a given business, including individual products, product categories and brands (Kotler, et al. 209:490). This model is reliable as it has a strong track record in providing a basis for businesses to develop an understanding of how technology evolves (Porter, 2004: 194).

However, there are drawbacks to the product life cycle model. The model does not apply to all industries; for example, the focus remains on continual product innovation in the aircraft industry (Porter, 2004:194). It can also be difficult to tell at what point in the cycle a product or service is at and the cycle can vary in its shape (Kotler, et al. 2009:503). The latter issue can be seen within this case study; the typical “bell shape” of most product life cycle models (Kotler, et al. 2009: 490) is not found in this study when analysing Bord na Mona; as such, a modified product life cycle is adopted.

According to Porter (2004:194), innovation is a major component of the product life cycle. As outlined earlier in this study, innovation is a key component of the definition of entrepreneurship. As such, reference is made to innovation theory throughout the case study of Bord na Mona.

In Chapter 2, the importance of innovation in the context of entrepreneurship was critically explored. Innovation is a means by which the entrepreneur either creates new wealth giving

resources, or endows existing resources with enhanced potential for creating wealth (Drucker, 2008:69). As such, innovation, as a factor in a given firm, may offer an insight into how successful the business was within a particular timeframe. Drucker identifies four innovation opportunities from either inside a given organisation, the industry it operates in, or from outside both of these (Drucker, 2008).

The first source of innovation is the unexpected occurrence, which Drucker (2008:70) states is the “simplest source of innovation”. In this, opportunities can arise when a firm would not expect it. An unexpected failure can bring renewed opportunity from the lessons it brings to an organisation (Drucker, 2008:70).

Incongruities in a process, or problems arising from a process which is unsatisfactory, can give rise for an opportunity to innovate (Drucker, 2008:71-2). Process needs identified by a firm can also bring innovation opportunities: solving these needs can bring business success (Drucker, 2008:72-3). Changes in the marketplace or industry in which a firm operates in can also bring “tremendous opportunity for innovation” (Drucker, 2008:73).

There are opportunities for innovation outside of the business and the industry in which it operates. Changes in demographics can also bring innovation opportunities for example (Drucker, 2008:74). The movement, aging and educational changes of the population can bring about these opportunities (Drucker, 2008:74). The changes in perceptions of people can also bring about opportunities to innovate (Drucker, 2008:74-5). Finally, new knowledge can highlight opportunity to innovate (Drucker, 2008:76).

The innovation process is more complex than it may appear. Careful analysis of the sources of innovation and the needs and capabilities of the intended user are essential (Drucker, 2008:77). Drucker (2008:78) recommends that innovative ideas should be simple and start out small. Drucker (2008: 78-9) also argues that innovation in and of itself is not enough for business success; hard, focused and purposeful work is required as well as persistence and commitment if the innovation opportunity is to be turned into successful business.

A SWOT Analysis model is also be used in the case study. The SWOT Analysis will often provide a business with a list of factors which characterise it (Kotler et al. 2009:104). The main

concern of the SWOT Analysis is to identify business opportunities whilst avoiding threats, and weighing in the firm's strengths and weaknesses against those of its competitors (Morris, 2005:53). A given organisation's strengths might include its significant financial resources and favourable reputation with customers (Morris, 2005:53). Weaknesses may include a poor distribution network, obsolete facilities or a lack of managerial skill within the firm (Morris, 2005:53). Threats are defined by Morris (2005:53) as being conditions outside of the firm's direct control that stand in the way of long-term goals. Threats can include cheaper foreign goods becoming available in the marketplace, or increasing sales of substitute products (Morris, 2005:53).

The SWOT Analysis model was chosen for this case study because it is an appropriate model to use to illuminate important issues and themes within a given business (Kotler et al. 2009:104). It is used by firms in order to identify their internal strengths and weakness, and external opportunities and threats (Kotler et al. 2009:101). It is often used by firms as a means to develop a strategic plan (Morris, 2005:53).

Kotler et al (2009:104) identifies a number of concerns with the SWOT Analysis model however. For example, it may oversimplify critical issues through its "list-like" findings (Kotler, et al. 2009:104). It can also present its outcomes in an unbalanced fashion; on an initial inspection, weak opportunities may appear to balance strong threats in a findings report (Kotler et al. 2009:104).

The SWOT Analysis model has been chosen for this study so as to understanding the position of Bord na Mona at varying times throughout its history. For example, in order to understand the company's financial circumstance at a given time, the SWOT Analysis is appropriate tool to use. The model is also useful for identifying external threats and business opportunities which presented themselves to the company over the years.

Ansoff's product-market expansion grid was chosen for this case study as it is a useful tool for identifying potential opportunities for growing a business (Kotler, et al. 2009:92) and increasing its sales (Koch, 2006:190). Ansoff's matrix gives four options for increasing the firm's sales (Koch, 2006:190). These are described below.

First, the company will consider whether to gain market share with its current products in its current established markets, in what is known as a market penetration strategy (Kotler, et al. 2009:92). This is a low risk strategy, concerned with increasing market share (Koch, 2006:190). It can be initiated, for example, by increasing advertising or expanding the sales force within the company (Koch, 2006:190).

The next step will be to examine whether the firm can develop new markets for its existing products, in what is known as a market development strategy (Kotler, et al. 2009:92-3). This is a good strategy if the costs of entry into a new market are low; however, it is risky if significant investment is required (Koch, 2006:190). Third, the company may consider a product development strategy, whereby it develops new products for its current markets (Kotler, et al. 2009:93). This is a good strategy if new products share costs with existing products, and there is no significant competition within the marketplace (Koch, 2006:190).

Finally, a diversity strategy may be considered (Kotler, et al. 2009:93). This strategy sees the firm develop new products for new markets (Kotler, et al. 2009:93). It is the highest risk strategy to consider as it is like starting a new business from scratch (Koch, 2006:191). It should only be taken if a compelling short term opportunity arises which is not being exploited by competitors, or if the company is in a precarious situation (Koch, 2006:191). It goes against Collin's (2009:43) theory that firms should, in general, remain in the business sector in which they are most familiar, as moving into new business opportunities can result in the firm neglecting its core competence.

Bord na Mona's case is to be assessed through the lens of entrepreneurial theory identified earlier in this study. This approach will critically examine how Bord na Mona's decisions and activities affected its economic, environmental and social outcomes. Reference is also made to the company profiling text *How the Mighty Fall* (Collins, 2009). This text has been used as its author has conducted considerable research into the success and failure of large companies.

Other models were considered such as the Growth/growth matrix (Koch, 2006:248-9) and the Growth/share matrix (Koch, 2006:250). With little competition up until the Private Bog Development Scheme in the 1980s (Clarke, 2010:218-9), some analysis tools are of little value.

Competition is a core concern in the formulation of strategy. For example, in Porter's (2004) competitive strategies, a firm considers its position in relation to its competitors in terms of its costs, pricing, target-marketing or general differentiation. The Growth/growth matrix (Koch, 2006:248-9) was disregarded because it assess a given company's position within a marketplace in comparison to its competitors. Similarly, the Growth/share matrix was disregarded as it focuses on market growth rate in comparison to market share; once again, it is concerned with comparing competitors in a marketplace (Koch, 2006:250).

It is acknowledged that Bord na Mona had competition in some sectors, such as the peat moss industry in which it competed in Britain during the 1960s (Clarke, 2010:167) and the coal industry, which it competed against in the late 1930s (Clarke, 2010:45). Competition is nevertheless not considered a major factor during this case study; as such, models considered more appropriate have been selected.

5.2 Case study of Bord na Mona

The next section of this chapter will critically evaluate the case of Bord na Mona with the methods outlined above.

Bord na Mona Life Cycle: Growth

A distinct opportunity arose for the Turf Development Board in mid-1930s. In 1933, the total installed capacity of the Electricity Supply Board (ESB) was 90,000 KW (Clarke, 2010:38). The ESB estimated that demand would increase to 102,000KW by 1936, and to 146,000KW by 1938 (Clarke, 2010:38). To meet this demand, the ESB envisaged increasing its coal-fired electricity generating capacity (Clarke, 2010:38). This market change, based on an increase in demand, would provide the Turf Development with a chance to bring a new innovation (Drucker, 2009:73) to Ireland; the use of peat as a fuel for the generation of electricity. Bord na Mona would sell an existing product into a new marketplace in what Kotler et al. (2009:92) refer to as a market development strategy.

There had been some doubt whether the use of peat would be economically viable in place of coal for this purpose (Clarke, 2010:38). Nevertheless, the Department of Industry and Commerce, wishing to ensure security of supply in the context of a possible war in Continental Europe, decided to press ahead with plans to use peat for electricity generation (Clarke, 2010:39). This was an innovative approach to meet the needs of the country at the time, owing to the fact that peat would be used to exploit a process need (Drucker, 2008:73) in the Irish electricity market. It could also be argued that the unexpected occurrence (Drucker, 2008:70) of the outbreak of war contributed to the resulting innovation to use Irish peat for generation of electricity.

The use of peat for electricity saw the Turf Development Board enter into the growth phase of the product life cycle model. The company has been “free-riding” (Isaak, 1998) off of the natural peat resource of Ireland to the present day.

The outbreak of the Second World War presented the Turf Development Board with an economic opportunity. According to Gill-Cummins (2006) imported fuel was “virtually unobtainable”. Clarke (2010:46) agrees, stating that at this time importing good quality coal proved difficult and that coal which was brought into the country was, in general, of poor quality. Peat production was increased; in the particularly dry summer of 1940 twice the normal peat yield was produced (Clarke, 2010:46-7). Throughout each year of the war, the Turf Development Board produced more than 100,000 tonnes of high quality machine-won turf from its own bogs (Clarke, 2010:60). About one thousand bogs were in production in 1941 across Ireland (Gill-Cummins, 2006). The intense exploitation of this valuable natural resource and its resulting carbon emissions resulted in a negative environmental outcome on the company’s triple bottom line at this time.

Bord na Mona was established under the Turf Development Act, 1946. It replaced the Turf Development Board (Clarke, 2010:70). Bord na Mona’s role was to develop and utilise peatlands in Ireland on an industrial scale in order to produce peat products, and later, for electricity (Clarke, 2010:71) for the economic benefit of the country (Bord na Mona, 2014b:2). The environmental effects arising from this were not considered. The change from The Turf Development Board to Bord na Mona coincided with the release of a government White Paper,

later referred to as the First Development Programme, at the beginning of 1946 (Clarke, 2010:70). At government level, there was a renewed commitment to turf production, so that fuel security could be achieved at a reasonable price (Clarke, 2010:70). This commitment at government level would be a key strength for the firm.

The First Development Programme was a plan for exploiting a number of Irish bogs using mechanical means (Clarke, 2010:71). The process needs of the organisation required this new innovative approach (Drucker, 2008:72-3) to harvesting the peat resource. This new harvesting approach would be what Porter (2004:194) calls “process innovation”. The First Development plan would reduce Ireland’s dependence on imported fuels like coal, whilst offering employment to Irish people (Clarke, 2010:71). Developing and improving the market in which it operated amounted to what Kotler et al. (2009:92) describes as a “market penetration strategy”.

The Electricity Supply Board (ESB), a state-owned company which supplies electricity in Ireland, had concerns over the First Development Programme (Clarke, 2010:76). The ESB began to feel dependent on Bord na Mona for its fuel source and it was unhappy that the cost of generating electricity from machine-won turf was higher than from alternative fuels (Clarke, 2010:76). This strained relationship could be viewed as a threat to Bord na Mona’s role in the First Development Programme.

Changes in the marketplace can bring new opportunities to innovate (Drucker, 2008:73). One of the more notable projects in the first programme was the development of the peat moss (see Appendix I for a brief description of peat moss) factory at Kilberry, County Kildare. This factory was intended to meet the demand for peat moss in the United States, as well as develop the Irish market itself (Clarke, 2010:85). This was a new product for Bord na Mona to develop, and it would sell it into a new market. Viewed with Ansoff’s product market grid, this would be considered as a diversification strategy (Kotler, et al. 2009:91). Peat moss production would be an opportunity for the company to grow and diversify its portfolio of peat products. Bord na Mona had to be cautious however. There is the concern that when a firm moves into new markets and develops new products, it can neglect those which have seen it become successful in the past (Collins, 2009:43).

The proposal for the Second Development Programme was submitted to the government later in 1947, and proposed a one million tonne increase in production of machine turf per year (Clarke, 2010:108). The Second Development Programme was approved by the Irish government in the second half of 1949, with finances provided through the Turf Development Act 1950 and later, as costs overran, the Turf Development Act 1953 (Clarke, 2010:109). The programme officially began in 1952 with various bogs coming into production from 1955 to 1959 (Clarke, 2010:109). This development programme would present Bord na Mona with an opportunity to grow, though this kind of development has its drawbacks; an unsustainable quest for growth can impact negatively on employees, company culture and the systems within (Collins, 2009:63).

By the mid-1950s, Bord na Mona faced three threats. First, the economic downturn of the period saw the demand for electricity decrease (Clarke, 2010:112). Second, during 1956, the Department of Finance became concerned that Bord na Mona was spending too much money on bog development (Clarke, 2010:112). Up until this point, Bord na Mona had been strongly supported by the state. Lastly, in March 1956, the ESB informed Bord na Mona that plans for peat-fired electricity would be scaled back (Clarke, 2010:112).

Environmental issues would threaten Bord na Mona during this period also. With the expansion of its operations in the late 1940s, peat silt began to enter rivers, where it allegedly harmed fish (Clarke, 2010:122). The environmental aspect of its triple bottom line would be impacted by this. Contamination to water was the first instance of Bord na Mona coming under the environmental spotlight, though prior to this some scientists had concerns and reservations regarding the exploitation of peatlands, believing them to be both beautiful and of scientific importance (Clarke, 2010:105). From the years 1958 until 1973, Bord na Mona would have to deal with repeated claims and legal proceedings as a result of peat silt entering rivers (Clarke, 2010:183).

Bord na Mona Life Cycle: Decline

In the 1960s Bord na Mona entered a period of decline for several reasons. This section argues that Bord na Mona's product life cycle would take a different shape to the established model, having more of a cycle-recycle pattern as depicted by Kotler, et al. (2009:491); this variance in

company fortune may be the result of the contributions made by a number of CEOs appointed over the years.

Dermot Lawlor succeeded C.S. Andrews as Managing Director of Bord na Mona in 1958, remaining in the position until 1973 (Clarke, 2010:144). In 1958, the Irish economy was recovering, and the ESB, following negotiations, revised its attitude towards peat, which presented Bord na Mona with an opportunity for economic growth (Clarke, 2010:145): Bord na Mona increased peat production to meet the requirements of the ESB (Clarke, 2010:146).

In the 1960s, once again the ESB would prove to be a threat to Bord na Mona. A distinct weakness was emerging in Bord na Mona: it had not delivered on promised quantities of peat for several years (Clarke, 2010:146-147). The ESB wanted to reduce its intake of peat and have its relationship with Bord na Mona reviewed by consultants (Clarke, 2010:147). At the time, the ESB believed that it was losing money due to the increase in the cost of native peat and the decrease in the cost of imported oil (Clarke, 2010:147). The ESB also felt that the supply of peat was “unreliable in nature” (Clarke, 2010:147).

During the 1960s, Bord na Mona’s financial situation deteriorated as the decade advanced, and it needed financial supports from the state (Clarke, 2010:170). This was despite its central strategic objective of producing turf as efficiently and as cheaply as possible (Clarke, 2010:177). Its financial circumstance would be a major weakness for the firm during the 1960s. Its predicament in the 1960s could be viewed as a result of growing too quickly in the previous 15 years. According to Collins (2009:63), growing in an unsustainable manner is a marker for failure. However, growing a business in a planned and considered fashion can reduce the cost of the price of its individual outputs by between 20-30 per cent, once output has doubled (Koch, 2006:240). The concern with Bord na Mona at this time is that it grew in an unsustainable fashion in response to the fuel shortages of World War II, as a result of the state desiring a reliable indigenous fuel resource in the event of a similar international crisis occurring again.

There were considerable oil finds around the world during this period; this increased supplies of oil in the 1960s, which had the effect of reducing its price (Clarke, 2010:155). Oil would become a major threat to Bord na Mona during this decade. Bord na Mona’s financial situation would

improve in 1969 and in 1970 however, which saw it make profits owing to improved peat harvests (Clarke, 2010:172). The threat of oil in the 1960s would, ironically, present Bord na Mona with its greatest opportunity in the 1970s.

Bord na Mona Life Cycle: Diversification

Between 1965 and 1973, the board of Bord na Mona considered diversifying its business into other sectors. In 1964, Bord na Mona had decided to market its peat moss to the amateur or hobbier sector (Clarke, 2010:167), in what could be viewed as a market development strategy, whereby it sold an existing product into a new market (Kotler, et al. 2009:92). An improvement in the packaging of the product made it easier to handle, and more attractive to customers (Clarke, 2010:165). Diversification would provide Bord na Mona with opportunities to innovate and grow its business. Various opportunities were considered, including mining, manufacturing, joinery and entering the gypsum industry (Clarke, 2010:177).

An inherent weakness of Bord na Mona was its reliance on peat; the company knew that peat was finite in nature, and that the bogs of Ireland would become exhausted of their resource in time (Clarke, 2010:177). However, the government would block Bord na Mona's attempts to engage in economic activities not directly related to the exploitation of peat (Clarke, 2010:177). This threatened the long-term viability of the business. If Bord na Mona was to diversify, it would need to do so within the peat market. As such, Bord na Mona was largely limited to developing market penetration strategies at this time (Kotler et al. 2009:92).

Lawlor retired in 1973 (Clarke, 2010:187). He had seen Bord na Mona through a challenging period of its history, completed the two development programmes, and left the firm at a time where its finances were beginning to improve (Clarke, 2010:187). Following the retirement of Lawlor, Lewis Rhatigan was appointed as Bord na Mona's Managing Director (Clarke, 2010:188). Rhatigan would oversee a period of great opportunity for Bord na Mona as the oil crisis emerged in the 1970s. This crisis would threaten the supply of fuel into Ireland (Bord na Mona, 1974).

Oil had been steadily increasing in price in the years just prior to Rhatigan's appointment

(Clarke, 2010:188). An oil embargo in the Middle-East resulting from the Yom Kippur War in October 1973 lasted until March 1974 (Clarke, 2010:188). This embargo resulted in a rapid increase in the price of oil and petrol, and the subsequent rationing of both (Clarke, 2010:188). The opportunity for Bord na Mona emerged from a move by countries around the world to seek ways to reduce their dependence on imported energy (Clarke, 2010:188). In response to the energy problems faced by Ireland, the Irish government enacted a third development programme of Irish peatlands (Canny, 1996).

Rhatigan presented a broad outline of his plans for a third Development Programme for Bord na Mona in January 1974; it was subsequently approved by the board of the company and by the government (Clarke, 2010:189). The proposal included details of Bord na Mona's plans to open up new bogs for peat harvesting, which had previously been considered too small to be economically viable for use (Clarke, 2010:189). In light of the oil crisis, and the expected rise in the costs of other solid fuels in the future, these bogs would now be economically viable for harvesting (Clarke, 2010:189). This would result in negative environmental impacts when assessed using Elkington's (1999) triple bottom line model.

During the 1970s, environmental concerns were not as important as economic outcomes as they would become in later years. Whilst the oil crisis presented Bord na Mona with an opportunity to expand its operations, unsustainable growth can have negative consequences. The consequences of this growth would result in Bord na Mona requiring financial assistance from the government twenty years later (see Appendix J).

The beginning of Bord na Mona's environmental impact considerations emerged in the mid-1970s. Following pressure from the European Economic Community with its Directive for Wildlife and the Irish Government's Wildlife Bill 1975, Bord na Mona agreed to preserve three bogs of ecological interest (Clarke, 2010:206). This arose following encroachment on natural wildlife habitats in the previously intact Derryfadda bogs (Clarke, 2010:208). This decision by Bord na Mona had a positive effect on the environmental aspects of its triple bottom line.

The 1980s saw the real beginning of the Irish environmental movement, which sought to conserve Irish peatlands (Clarke, 2010:227). A renewed interest and urgency in peatland

conservation saw ecologists and conservationists becoming active in order to protect this valuable natural resource (Canny, 1996). In 1982 the National Peatland Conservation Committee, later in 1986 changing its name to the Irish Peatland Conservation Council (IPCC), was founded (Irish Peatland Conservation Council, 2014). In 1983, the European Parliament passed a resolution to protect significant amount of environmentally and scientifically important Irish peatlands (Clarke, 2010:227).

Bord na Mona would react to these emerging threats to its peat extraction business with a paper called “Bord na Mona Peatlands Conservation Policy”, which outlined its intention to conserve Irish peatlands to the extent where it did not interfere with its commercial activities (Clarke, 2010:227).

Paddy MacEvilly replaced Lewis Rhatigan on his retirement as the new Bord na Mona Managing Director in September 1983 (Clarke, 2010:208). At this point in time, Bord na Mona did not receive any state subsidy, but it did expect prices to be set to meet its costs (Clarke, 2010:209). In 1981, Bord na Mona negotiated a 23% rise in price for its peat with the ESB, and also raised the price of peat products sold on the domestic market by 30% on average (Clarke, 2010:210). These price increases were not enough to sustain continued investment in the Third Development Programme; the shortfall in capital required would have to be loaned at a 17% interest rate (Clarke, 2010:210). At this time, Bord na Mona’s financial problems were regarded as a major weakness within the company.

The financial position of Bord na Mona in the early to middle part of the 1980s was precarious; this would be the firm’s nadir. The company would decline dramatically through the middle part of the decade owing to the decrease in the price of oil, coupled with poor harvest yields which threatened the future of the company. The Third Development Programme was a disaster for Bord na Mona owing in part to an artificial market created by a temporary high oil price (Clarke, 2010:217).

A final threat for Bord na Mona to address in the 1980s was the looming Private Bog Development Scheme. In an effort to increase peat production, the government introduced a Bill to provide for subsidies to private peat harvesters (Clarke, 2010:218). Bord na Mona was tasked

with overseeing the allocations of funds for the scheme (Clarke, 2010:218). The subsidies would partially cover the costs of machinery and bog development (Clarke, 2010:218).

Competition has not been a factor in this Bord na Mona study because the company held a position of monopoly. In time, the competition arising from private harvesters would affect Bord na Mona's machine turf sales (Clarke, 2010:219) and market position. In the peat moss sector, Bord na Mona would also see a number of new competitors emerge in the 1980s (Clarke, 2010:223). By the end of the 1980, the peat moss business was no longer profitable (Clarke, 2010:251).

Bord na Mona Life Cycle: The entrepreneurial era

MacEvilly resigned in early 1987 and his replacement, Eddie O'Connor, was appointed in June 1987 (Clarke, 2010:232-3). O'Connor was the first Managing Director to be appointed from outside the company (Clarke, 2010:233). He had worked with the ESB previously (Cooper, 2008).

Eddie O'Connor had a significant impact on the company, and would see the business enter a new growth phase when assessed using the product life cycle model. Today, O'Connor can be considered as a highly successful entrepreneur and could also be regarded as a green entrepreneur, or even as an ecopreneur. Madden (2014) reports that O'Connor is not a man who is motivated by money. Cooper (2008) agrees that O'Connor is not motivated by "gathering excessive wealth for himself". According to Madden (2014), O'Connor is a "change-agent"; he sees the endgame from the very start, and finds his way there. This can be viewed as classical entrepreneurship behaviour. As outlined earlier in this study, entrepreneurs who are not motivated by money are often motivated to achieve other aims, such as positive social and environment goals, through the medium of business. When discussing his most recent business, Mainstream Renewable Power, O'Connor states that this company will help free the world from its unsustainable dependence on fossil fuel (Madden, 2014). This statement is an indicator of O'Connor position regarding the environment and may shed light on his motivations for starting this business.

After joining Bord na Mona, Eddie O'Connor's initial impression of the company was that it was in a "dreadful" state (Clarke, 2010:234). According to Madden (2014), O'Connor described Bord na Mona as a strict place with a lot of bureaucracy and there was "an air of communism about the place". Cooper (2008) reports that O'Connor thought that turning the company around initially appeared to be an impossible task.

O'Connor's first course of action was to improve communications at the company; weekly meetings with senior managers would take place at 8am sharp on Monday mornings (Clarke, 2010:234). O'Connor aimed to establish a more "marketing-orientated" and customer-focused approach to doing business (Clarke, 2010:235). O'Connor would later order his employees to treat the ESB with more respect as it was Bord na Mona's largest customer (Clarke, 2010:24).

O'Connor aimed to reduce costs, change work practices and improve productivity in the struggling company (Clarke, 2010:235). Cooper (2008) argues that a number of O'Connor's decisions were unpopular, but necessary, so as to reduce the company's costs. To achieve its aims, the structure of Bord na Mona had to change (Clarke, 2010:235). A task force was set up, and it recommended in 1988 that the firm be divided into three decentralised autonomous business units: one would run the milled peat business, another the solid fuels business and the other the horticultural peat enterprise (Clarke, 2010:236).

A spirit of innovation was then promoted within the organisation (Clarke, 2010:240). Innovation needs to be supported within an organisation because it usually arises from purposeful searches for innovative opportunities (Drucker, 2008:69-70). Without resources devoted to it, innovation is unlikely to occur.

In 1989, a strategic planning unit was established at Bord na Mona (Clarke, 2010:243). In 1990, O'Connor argued that over a period of up to twenty years, the company would become a diversified, global and highly profitable organisation, with a turnover of £1.5 billion, having acquired some fifty to sixty companies at the costs of up to £100 million (Clarke, 2010:243). Whilst it is clear that O'Connor was a strength in Bord na Mona, the firm was still in a dire financial situation: in its 1988/1989 accounts, having written off several assets, the company lost £91 million (Clarke, 2010:245).

In the late 1980s and early 1990s, environmental campaign groups became a significant threat to Bord na Mona's peat harvesting activities. In 1989, the board decided that the firm should establish itself as an environmentally friendly business (Clarke, 2010:257). A number of bogs of ecological or scientific interest were sold or transferred to the Wildlife Service (Clarke, 2010:257-8). Changes in the public's perception of environmental issues would result in further opportunities for Bord na Mona to innovate within its business processes in the future, as described by Drucker (2008:74-5). Cooper (2008) argues that O'Connor wished to pursue renewable energy goals at Bord na Mona, but that he was ahead of his time and those who had "true control" over the company did not agree with his approach.

A distinct opportunity arose for Bord na Mona with the enactment of the Turf Development Act 1990 (Clarke, 2010:256). Prior to this Act, Bord na Mona was restricted in its commercial activities to those involving peat harvesting. Bord na Mona could now broaden its commercial activities; this included acquiring other companies and operating outside of Ireland, though the company's operations were nevertheless subject to government control (Clarke, 2010:256). An industry or market change like this presents a great opportunity for a firm to innovate (Drucker, 2008:73). It would not be long before Bord na Mona would be developing new business opportunities.

Perhaps the most important innovation to come out of this period was the Oweninny wind farm in Co. Mayo in 1991. This was the result of the process of encouraged innovation at Bord na Mona (Clarke, 2010:241). Selling a new product, in the form of renewable energy, into the existing energy marketplace would see Bord na Mona establish a product development strategy (Kotler, et al. 2009:92). Developing a renewable energy strategy would result in an increase in its environmental aspect when assessing the company's triple bottom line.

Eddie O'Connor's first term of office came to an end in July of 1992, and he was reappointed by the government for a term of five more years (Clarke, 2010:261). In his second term, O'Connor would focus on three issues: the promotion of the public image of Bord na Mona, a campaign for equity in the firm, and a campaign to build a new peat-fired power station (Clarke, 2010:260).

A further threat emerged in 1992 when Bord na Mona learned that the European Commission

was proposing new carbon and energy taxes (Clarke, 2010:269). Bord na Mona hoped to have peat omitted from such taxes by having it classified as a renewable bio-energy (Clarke, 2010:269). Shortly after, Bord na Mona would sponsor *The Bogs of Ireland* by Feehan and O'Donovan, a book charting the ecology, harvesting, flora, fauna and conservation of Irish bogs, as well as research in 1997 at University College Dublin into Irish peatland's ability to act as stores for carbon (Clarke, 2010:292). This juxtaposition of policies is still present in the firm today, whereby it claims to be environmentally-focused, whilst at the same time continuing to extract peat from Irish bogs.

The campaign to protect peatlands around the world grew in the 1990s; this threatened Bord na Mona's continued peat harvesting business. Bord na Mona would eventually agree to develop guidelines for the wise use of peatlands (Clarke, 2010:293). From 1999 onwards, Bord na Mona would ordinarily require Integrated Protection Control (IPC) licences from the Environmental Protection Agency (EPA) in order to continue its operations (Clarke, 2010:293).

Bord na Mona lost a key strength following Eddie O'Connor resignation in July of 1996 (Clarke, 2010:278). Cooper (2008) believes that O'Connor "saved Bord na Mona from extinction". O'Connor had successfully turned the business around and had made it profitable once again (Independent, 2000). He had also introduced Bord na Mona to green business in the form of harnessing wind energy. O'Connor was replaced by Paddy Hughes (Clarke, 2010:279). Hughes's initial priorities were to improve operations at the company, oversee the completion of its recapitalisation programme, and deal with the consequences arising from the aging peat-fired power stations run by the ESB (Clarke, 2010:280). This period could be considered as a maturing of the business within its product life cycle, following a period of growth arising after the appointment of Eddie O'Connor in the late 1980s. This perspective is supported by reference to the stable financial position of Bord na Mona during Hughes' tenure (Clarke, 2010:286).

Bord na Mona faced the threat once again of carbon taxation in 1997 when the European Commission proposed a Directive on the taxation of energy products (Clarke, 2010:284). At the same time, emission reduction targets agreed in the Kyoto Protocol (see Chapter 1) would have implications for the company (Clarke, 2010:284). However, the changes within the marketplace and in the public's perception of greenhouse gas emissions would result in the opportunity for

Bord na Mona to further innovate (Drucker, 2008:73-4). These innovations would see the company develop sustainable wind energy, biomass and amenity projects on its post-industrially harvested peatlands.

Bord na Mona was restructured under the Turf Development Act 1998 into a limited company from a statutory corporation in 1998 (Clarke, 2010:284). Most of the previous business's assets were transferred to five new subsidiaries.

Hughes retired at the end of 2000; his replacement, John Hourican became Managing Director at the beginning of 2001 (Clarke, 2010:294). Hourican's first move was to initiate a review of Bord na Mona's corporate strategy (Clarke, 2010:295). According to Koch (2006:101), a company's corporate strategy is concerned with "guiding the evolution of the firm, determining its character and leadership, and deciding where and how to compete", in an effort to make profits and increase its value to both its owners and its customers. The company was financially stable at this time, though margins were tight in the horticulture business (Clarke, 2010:295; Clarke, 2010:299). The strategic intent, as agreed with the government, was to develop or acquire environment-focused businesses which had new technologies in the areas of energy and waste management (Clarke, 2010:295). This new strategy would see the company strive to develop its environmental outcome along its triple bottom line.

By 2001, Bord na Mona's environmental policy was well established; it was committed to the "Wise Use" process published in 2002 by the International Peat Society and the International Mire Conservation Group (Clarke, 2010:305). As part of its commitments, Bord na Mona would not open up any new intact peatlands in Ireland, it would operate in accordance with environmental licences, and would actively develop wetlands and dryland habitats where appropriate (Clarke, 2010:305).

In 2008 the board of Bord na Mona adopted a new vision called "A New Contract with Nature" (Clarke, 2010:296). This would see the company further move towards a more balanced triple bottom line outcome. In addition, the company's new mission statement outlined its position as Ireland's leading environmentally responsible utility service provider, engaging in sustainable and profitable business, in an open and honest fashion (Clarke, 2010:296).

According to Bord na Mona (2014k), nature is the public's greatest resource, and as such, deserves respect, and in turn, requires protection. This marks a considerable change in company policy since its establishment in the 1930s. In developing this new vision, Bord na Mona (2014k) examined its relationship with the natural world, and how it managed its natural resources. Its "New Contract with Nature" will see a curtailment of the company's impact on future generations (Bord na Mona, 2014k). At the core of this new policy exists Bord na Mona's (2014k) commitment to a low-carbon world. In order to achieve its goal of sustainability, the following measures will be taken:

- the company will not open up and new bogs for peat extraction,
- it will mix sustainable biomass with its peat for electricity generation,
- it will continue to invest in sustainable wind energy projects,
- it will commit to developing new eco-friendly ecosystems on its land,
- it will reduce the amount of waste going into landfill and
- it will invest in technology that provides for alternative uses for its waste resources

(Bord na Mona, 2014k).

The company aims to explore green business opportunities such as eco-tourism and various biodiversity initiatives (Bord na Mona, 2014k). Bord na Mona says its business practices will be inspired by the relationships of disparate elements of nature which rely on each other to co-exist; this will help its various operations work better together (Bord na Mona, 2014k).

Through its New Contract with Nature, Bord na Mona (2014k) aims to become Ireland's largest provider of clean air, clean water and clean energy. Whilst the New Contract with Nature policy appears to be an altruist endeavour on the part of Bord na Mona, it could be argued that it was initiated owing to the policies which came from "green" European Union Directives, as have been outlined in Chapter 1.

A number of strategic acquisitions were completed during the first decade of the 21st century.

These included Edenderry power station in late 2006, the Advanced Environmental Solutions (AES) waste management company in 2007 and Goff Recycling Ltd. in 2008 (Clarke, 2010:296-7). The company remained profitable throughout the whole of the first decade of the 21st century (Clarke, 2010:302).

Hourican retired from Bord na Mona in 2007 (Clarke, 2010:319). His replacement, Gabriel D'Arcy, joined Bord na Mona as Managing Director in 2008 (Clarke, 2010:313). He immediately established a new corporate structure, with directors overseeing various departments such as Human Resources and Finance (Clarke, 2010:297-8).

As of 2014, 48% of Bord na Mona's business comes from the harvesting of peat from its bogs for use as fuel for its PowerGen electricity generation operation, for the manufacturing of peat briquettes, and in use as a growing media for the horticulture sector (Bord na Mona, 2014b). The remainder of its business (52%) comes from the trading of oil and coal, commercial and municipal waste collection and processing, and the generation of electricity from biomass and wind (Bord na Mona, 2014b). This indicates that even with its drive towards sustainability over the last number of years, Bord na Mona's business remains predominantly concerned with fossil fuels. As peat supplies run out, Bord na Mona will once again enter into a decline phase of the product life cycle (Kotler, et al. 2009:490).

With the cessation of industrial peat extraction from its bogs, there is an opportunity to develop new landscapes which can provide environmental, social and economic benefits to its stakeholders (Renou, Egan and Wilson, 2006:97). Abandoning the peat industry at the present time will have exit barriers. If the barriers to exit are high, it could be difficult for Bord na Mona to leave the peat harvesting business sector (Kotler, et al. 2009:501). However, barriers to enter the peat business are high as a lot of technical expertise and peatland are required, which suggests that competition is likely to be low in the sector (Kotler, et al. 2009:305), meaning the sector remains relatively attractive from Bord na Mona's perspective, even if it is in decline. However, it is clear that Bord na Mona is going in the direction of sustainability, though this change may take a number of years to achieve.

This case study has critically examined Bord na Mona's business practices since its

establishment in the 1930s. The next section of this case study will critically explore Bord na Mona's use of its cutaway peatlands to date.

5.3 Bord na Mona cutaway bog after-use

Bord na Mona has attempted a number of different uses for its cutaway bog land resource. The next section of this chapter critically appraises each of these uses with respect to their economic, environmental and social outcomes.

There are a number of after-uses for peatlands once extraction has halted (Clarke and Rieley, 2010 p21). The literature points out that significant after-use planning is required once a new use has been identified (Clarke and Rieley, 2010:21). Clarke and Rieley (2010:21) argue that peatlands should not be abandoned once their economic use ceases; instead, depending on their condition, the cutaway bogs should be either rehabilitated, restored or used in an environmentally-sustainable fashion. After-use options are largely determined by the residual soil type found at a given location, the hydrological conditions present, the site's geographic location and the economic considerations of the business (Renou, Egan and Wilson, 2006:97). In order to decide the correct use for a cutaway site, Bord na Mona (2001b) developed a land-use review system which informs the decisions taken with regards to its cutaway bogs.

Bord na Mona has developed several after-use initiatives of differing success rates on its cutaway peatlands, including forestry, agriculture, amenity, crop growing and wind farms. In the past, after-use options have focused on commercial uses (Renou, Egan and Wilson, 2006:97). As Bord na Mona is moving towards a more sustainable business model, more environmental and social considerations have been prioritised in the late 20th and early 21st centuries.

In the past, after-use of industrial peatlands favoured forestry and agriculture (Collier and Scott, 2008:440). This focus has changed to wind farms at the beginning of the 21st century. Each of these uses will be critically examined below.

Peatland restoration and rehabilitation

Renou-Wilson et al. (2011:xix) state that the first option for any cutaway peatland should be to restore it back to its original state. As such, restoring a damaged bog rescinds it back to being a normal, functioning bog.

According to best practice guidelines in the International Peat Society's Strategy for Responsible Peatland Management, water levels in a post industrially harvested peatland should be restored to their natural conditions as closely as possible (Clarke and Rieley, 2010:6). From an environment perspective, restoring a post industrially harvested peatland to as near a natural state as possible would be the ideal outcome. However, this may not always be practical as it can be expensive, time consuming and may not yield any income for Bord na Mona.

Bord na Mona has engaged in restoration and rehabilitation projects in the past, in order to stabilise cutaway peat substrates. Unstable peat risks being washed into nearby rivers, resulting in negative environmental outcomes (Clarke, 2010:140). Clarke (2010:141) reports that a new layer of vegetation on the surface of cutaway peat would help to stabilise it. Bord na Mona has carried out work to rescind peatland conditions in order to support the re-establishment of peat-forming vegetation (Clarke, 2010:141).

Rehabilitation of cutaway boglands includes taking measures to allow the land to naturally recolonise (Bord na Mona, 2015b). These measures include blocking drains and planting trees (Bord na Mona, 2015b). The outcomes arising from the rehabilitation process of cutaway bogs are the creation of valuable habitats such as wetlands, dryland wilderness, birch woodlands, heaths and grasslands (Bord na Mona, 2015b).

Peatland restoration and rehabilitation has positive environmental impacts, but does not provide Bord na Mona with an income at present. The economic, environmental and social outcomes arising from peatland restoration and rehabilitation are discussed with key stakeholders and their views reported in Chapter 6.

Forestry

Throughout the late 1970s and into the 1980s, several short-term forestry for biomass projects were initiated on cutaway Bord na Mona bogs at Boora and Clonsast (Clarke, 2010:204-5). Crop yields were found to be inadequate and were deemed to be not economically viable (Clarke, 2010:205).

There has been significant research into planting and harvesting tree crops on post-industrially harvested peatlands in Ireland. This was initially considered a viable use for these lands in the early days of Bord na Mona (Clarke, 2010:103-4). The idea of using cutaway bogland for forestry would continue within the company until the early 2000s, before the BOGFOR programme outlined the difficulty of establishing an economically viable forestry initiative on post-industrially harvested peatlands (Renou-Wilson, 2008).

The BOGFOR programme was initiated to research methods to improve yields from forestry initiatives on cutaway bogland (Clarke, 2010:292). It was a joint venture between Bord na Mona, Coillte and the Forest Service, with the research co-ordinated by University College Dublin (UCD) (Clarke, 2010:292). Five separate research projects were conducted in the BOGFOR programme. The overall goal of the project was to establish a new approach to the afforestation and subsequent management of the cutaway bogs (Renou-Wilson, 2001c).

A review of failed plantations in 1994 in the first BOGFOR programme was carried out in 1997 (Renou-Wilson, 2001b). The second survey revealed further failure of plantations, with as much as 58% of planted trees failing when figures from both surveys were combined (Renou-Wilson, 2001b). A third BOGFOR programme was initiated in 1998.

The final BOGFOR report, published in 2008 (Renou-Wilson, et al. 2008), continued to address the issues concerning the establishment of successful forest plantations on an Irish cutaway bogland. The research concluded that afforestation is possible on some 16,000 to 20,000ha of lands owned by Bord na Mona (Renou-Wilson, et al. 2008:vii; Renou-Wilson, et al. 2008:123).

The report states that bogland is not appropriate for afforestation immediately after it has been cutaway (Renou-Wilson, et al. 2008:123). Significant physical and biochemical work must be carried out on the land prior to planting, in order to ensure that the growing environment is

suitable (Renou-Wilson, et al. 2008:123). This could prove costly for Bord na Mona.

To date, the afforestation of cutaway bogland in Ireland has not been a commercial success (Renou-Wilson, 2008). Aspects of afforestation and biomass production from Irish cutaway bogs is explored with key stakeholders in Chapter 6.

Agriculture

The conversion of peatlands to agricultural production land has taken place in a number of countries in northern Europe (Renou, Egan and Wilson, 2006:98). In 1954 it was proposed that Bord na Mona cutaway bog land could be used for agriculture (Clarke, 2010:104). In the 1960s, it was found that grass was the best crop for growing on the cutaway, with a view to rearing cattle on these lands (Clarke, 2010:181). A small amount of cutaway bogs would be used for the production of, and the eventual export of, of shrubs (Clarke, 2010:204).

There were issues with this agricultural strategy; cattle reared on grasslands based on cutaway were found to be deficient in copper, so supplementing of copper was required (Clarke, 2010:182). Other problems occurred; uneven subsidence of the surface lead to cracking of the pasture (Clarke, 2010:204). In 1973, cutaway bog at Oweninny was developed into grassland for the purpose of rearing a flock of 1,000 sheep (Clarke, 2010:140). Ten years later, the project was closed down as a result of high costs and poor animal performance arising from poor weather conditions at the site (Clarke, 2010:140). It also became widely accepted in Bord na Mona that cutaway peatlands are unsuitable for arable and vegetable production (Renou, Egan and Wilson, 2006:100).

By the 2000s, it was recognised that the capital investment necessary for the large-scale conversion of cutaway peatland to grassland would not be forthcoming from the market (Clarke, 2010:305). Funding for agricultural projects from the European Union under the Common Agricultural Policy was tied to specific land areas and linked to historical output (Renou, Egan and Wilson, 2006:100; Collier and Scott, 2008:440). As such, agricultural development of cutaway bogs was ineligible for European Union supports.

Paludiculture (see Chapter 3) may be a viable option for Bord na Mona to pursue in the future. This prospect is discussed with key stakeholders and their responses are reported in Chapter 6.

Conservation and amenity projects

In recent times, Bord na Mona has shifted towards using cutaway bogs for wildlife conservation and amenity (Higgins, 2006:1). These initiatives have been an environmental and social success. In 1991 for example, the drains of the oldest Bord na Mona cutaway at Turraun were sealed, and an embankment was constructed (Clarke, 2010:274). The resulting flooded areas has become a habitat for a large number of birds (Clarke, 2010:274).

Areas of the cutaway peatlands at Boora, Co Offaly, were found to develop rich flora and fauna habitats once they were allowed to rehabilitate themselves naturally (Clarke, 2010:273). In 1994, a group of Bord na Mona employees began a study into developing these cutaway bogs into areas of amenity, whilst extending the wetlands that had developed there once industrial peat extraction had ceased (Clarke, 2010:273).

The study became a project in 1995 and was co-funded by the European Union's Regional Development Fund and Bord na Mona (Clarke, 2010:273). The development saw 1,200 hectares become wetlands (Clarke, 2010:273). Significant areas of woodland and pastureland became established (Bord na Mona, 2014j). The Lough Boora parkland amenity was developed. It included 20 kilometers of walkways, a number of hides for bird watching, a series of outdoor art sculptures, a Mesolithic settlement for the public to visit, and a preservation project for the last known wild population of grey partridges left in Ireland (Clarke, 2010:273-4).

Bord na Mona (2014j) states that the Boora parklands project "embraced environmental and socio-economic concerns". Whilst the establishment of wilderness and natural habitats for wildlife are welcomed, a risk facing Bord na Mona is that "dryland areas", which have been left to recolonise naturally at Boora (Clarke, 2010:273) may be emitting greenhouse gases into the atmosphere: according to Joosten (ND:64), peatlands should always be wet. Equally, the economic benefit of the parklands must be questioned; tourism and visitors bring money into the hinterland and stimulate community initiatives (Renou, Egan and Wilson, 2006:103), but this is

unlikely to provide employment on a scale seen when Boora's bogs were in full turf production. Once peat-winning ceases at a Bord na Mona production site, redundancies are likely to occur (for example, see Clarke, 2010:140).

One potential option for Bord na Mona is the sale of carbon credits. Carbon credits could be sold from conserved peatlands or established wetlands, similarly to what is occurring in Belarussian peatlands (Tanneberger and Wichtmann, 2011). This potential economic opportunity will be explored with key stakeholders in Chapter 6.

When considering the social aspect of Bord na Mona's triple bottom line, the cultural and health benefits of the parklands project are clear: education services, sculptures and the promotion of healthy outdoor activities will bring positive social outcomes to the visitors of the Boora cutaway.

The main economic after-use proposed at Bord na Mona cutaway bogs is for the generation of wind energy.

Wind energy generation

Wind energy has become a significant part of Bord na Mona's peatland after-use strategy. As previously outlined in this chapter, Bord na Mona joined with a group of developers to establish Ireland's first commercial wind farm, which consisted of 24 turbines, on Bord na Mona cutaway peatland in Oweninny, County Mayo (Clarke, 2010:138). In the present day, Bord na Mona (2014a) refers to this installation as its Bellacorick wind farm. It has 21 turbines currently in place, with a combined capacity of 6.45 MW (Bord na Mona, 2014a).

In addition, Bord na Mona (2014a) has developed a 16 turbine, 40 MW wind farm at Bruckana, which is located at the borders of counties Tipperary, Killkenny and Laois. The facility is situated in the Templetuohy bog (Bord na Mona, 2014a). It is planned to begin operating commercially by the end of 2014 (Bord na Mona, 2014a).

A further wind farm of thirty turbines with a combined output of 80 MW is being constructed by Bord na Mona (2014a) at Mount Lucas in County Offaly. This project will be the first stage of

development in the construction of Bord na Mona's (2014c) Clean Energy Hub. This development will bring jobs, both temporary and permanent, to the area, and will help Ireland achieve its European Union Roadmap to 2050 (see Chapter 1) greenhouse gas emissions goals (Bord na Mona, 2014c). With its established wind farms and public demand for green energy sources, Bord na Mona is entering into a new growth stage of this particular initiative's product life cycle, meaning that it should result in considerable profits for the company (Kotler et al. 2009:490).

The idea behind the Bord na Mona's (2014d) Green Energy Hub is to develop, link and operate several wind farms together, which will be situated on cutaway bogs so as to form an "energy hub". This hub can generate electricity for the domestic market or other European countries, such as the United Kingdom (Bord na Mona, 2014d). Once European Union renewable energy targets are met in Ireland, surplus green energy, such as that acquired from wind, can be exported under the European Union Renewable Energy Directive 2009/28/EC (European Union, 2009; Bord na Mona, 2014f). This will provide a viable opportunity for Bord na Mona and other sustainability-focused companies to enter new markets. At the time of the completion of this study, the future of the Green Energy Hub remains uncertain.

The business model and the sustainability credentials of wind energy generation from cutaway peatlands in Ireland is explored with key stakeholders in the next chapter.

5.4 Conclusion

This chapter has critically explored the case of Bord na Mona using established theory including the product life-cycle framework.

Throughout its history, Bord na Mona has been a profit-driven company that has supplied both jobs and energy to the Irish economy. In doing this, it has had a significant negative impact on the environment and the landscape. However, in recent times it has made efforts to amend this impact by developing more sustainable business activities such as forestry production and wind energy generation, and develop not-for-profit initiatives such as protecting the near extirpated

grey partridge and the development of amenities on its lands, such as that seen at Lough Boora.

Significant environmental concerns still exist however. There is a national wind energy policy currently in place in Ireland, and in line with this approach, Bord na Mona will continue to locate wind farms on its cutaway bogs. Whilst the renewable nature of wind energy is not in question, the green credentials of wind farms located on damaged carbon-emitting dry cutaway peatlands is a concern. There is also a growing civic movement in opposition to wind farms in Ireland, and the concerns of these people must be heard and responded to.

The lack of development of paludiculture projects on its peatlands appears to be short-sighted, given their success in other countries (see Chapter 3). As such, distinct opportunities exist to improve the sustainability and profitability of Bord na Mona's business activities in the future.

A number of issues and concerns have arisen from this study. These include the suitability of cutaway peatlands for wind farms, the development of biomass regimes in cutaway bogs and the economic outcomes arising from peatland restoration and rehabilitation. These issues, amongst others, are discussed with key stakeholders in a series of interviews. These interviews are presented in the next chapter.

Chapter 6: Interviews: Findings

6.1 Introduction

Throughout this research, secondary sources of information, as defined by Kumar (2011:139), that are relevant to the research question, have been consulted for information and guidance. A number of interviews were conducted to supplement the secondary research. The interview approach was chosen for a number of reasons, as described in Chapter 4. One of these reasons is that interviews are a good method for collecting in-depth information (Kumar, 2011:150).

Key stakeholders were identified for the purpose of gathering first-hand information relevant to the research question. Eight key stakeholders were interviewed. Qualitative information was sought. The interviews were conducted in a semi-structured approach, so as to ask specific questions of the interviewees (see Appendices G and H), while also allowing for detailed and in-depth responses. The interviews approach also supplements the case study data.

This chapter outlines the responses from the key stakeholders interviewed during this research study. The respondents were chosen because of their specific expertise. Respondents included Thomas Egan, Bord na Mona Land Project Manager who was involved with a number of biomass trials on cutaway peatlands at Lough Boora, Co. Offaly. An alternative perspective regarding these trials was sought from renowned peatland research scientist and lecturer Dr. Florence Renou-Wilson of University College Dublin. Charles Shier, Strategic Development Manager at the Powergen arm of Bord na Mona, was interviewed for his expertise regarding the development of wind farms on cutaway bogs. An alternative perspective regarding wind energy was sought from Mark Malone of the Rhode Parish Wind Turbine Action Group. Dr. Catherine Farrell, senior ecologist at Bord na Mona was interviewed for her perspective on the restoration and rehabilitation of cutaway bogs and the sale of carbon credits from such initiatives. Peatland expert Professor Hans Joosten of the University of Greifswald and Green Party leader Eamon Ryan were interviewed for, inter alia, their views on the sale of carbon credits from rehabilitated peatlands. Bord na Mona's Biomass Manager, John O'Halloran, was interviewed about the company's present day biomass business model.

The issues emerging from the review of international literature informed who would be selected for interview. Issues raised in the interviews include:

1. Wind farms: the business case, and environmental and social issues,
2. Biomass: the business model, paludiculture and forestry,
3. Cutaway bogs: greenhouse-gas emissions, restoration, rehabilitation and rewilding
4. Sale of carbon credits
5. Community concerns
6. Tourism and amenity prospects
7. Solar power installations located in cutaway peatlands

The responses of the key stakeholders are presented and analysed in the next section of this chapter. The analysis includes an assessment of each of the variables using the lens of Elkington's (1999) Triple Bottom Line ecopreneurship theory.

6.2 Findings

Key respondents were interviewed and their views were sought concerning the business case and the resulting environmental and social outcomes emerging as a result of Bord na Mona's present post-industrially harvested peatland strategy. Alternative future use options such as the harnessing of solar energy from the cutaway bogs were also explored. The findings of the research are presented in the next section.

6.2.1 Wind energy

Green Party leader Eamon Ryan was interviewed in relation to wind energy as part of this research. He stated that, when all things are considered, "onshore wind is going to have an

increasing role in energy generation in the years to come”. According to Tom Egan, a Land Project Manager at Bord na Mona, the predominant economic use for cutaway peatlands at Bord na Mona is the harnessing of wind power for the creation of renewable energy. The following section outlines the rationale for Bord na Mona’s wind energy business model, including its development strategy. Using a lens based on Elkington’s (1999) triple bottom line theory, a critical appraisal of the wind energy strategy at Bord na Mona is presented.

Business model

As of summer 2014, Bord na Mona operates one wind farm: the Bellacorrick wind farm in Co Mayo. According to Charles Shier, Strategic Development Manager at the Powergen arm of Bord na Mona, several other wind farms are either under construction, or at various states of their development. Charles Shier described Bord na Mona’s two wind farm business approaches as its “project development capability” and its “project management capability”. Charles Shier noted that Bord na Mona has not sold off any of its wind farm projects, and does not offer its management services to third parties.

Charles Shier described Bord na Mona’s “project development capability” as the company’s “ability to take a project from inception, through all of its different stages”, up to the point of “financial close”, where it then becomes a “go project”. The steps leading up to the development process, as described by Shier, are outlined below.

According to Charles Shier, the first part of the development of a wind farm is to assess what land is available. This is conducted through an internal land review framework. Bord na Mona owns land in the midlands and western counties of Ireland. This land was acquired for peat production, with various parts of this land bank either in active peat production, or out of peat production.

According to Shier, the next concern is to assess a given portion of land’s characteristics; Shier asks “is it suitable for a wind farm?” Shier outlined that factors such as whether it is close to an existing grid connection must be considered. Shier stated that reviews of environmental concerns, such as whether the proposed site is located close to Special Areas of Conservation

(SACs) or Natural Heritage Areas (NHAs), will also be conducted. Shier stressed that once a given area has been identified as being suitable for a wind farm development, “rigorous screening is required of the site”. Shier said that a significant number of additional factors must be assessed, for example, “are there any communications in the area, such as mobile phone masts?”

Shier explained that planning permission must be sought, an application must be made for grid connection and an environmental impact study must be completed. Shier stated that “external consultants may be required to help with the technical aspects of the Environmental Impact Study (EIS)”. Shier said that the EIS assesses the proposed wind farm’s impact on nearby water, on the surrounding air, on archaeology and heritage sites, and on flora and fauna. Shier stated that the planning phase requires a lot of work, and has a long lead time. He noted that there is also a concern that there may be appeals to the process. It is widely acknowledged that the planning permission process in Ireland can be expensive.

According to Shier, the “go stage” is where the project is sanctioned by Bord na Mona. Shier stated that a project is only given permission to go ahead once the company is satisfied that it will pass a “hurdle rate of return”. PriceWaterhouseCoopers (2011:2) management consultants describe a “hurdle rate” as the minimum accepted return on a project which a given firm requires.

Charles Shier described Bord na Mona’s “project management capability” as the company’s approach at the construction phase of a wind farm. Shier said that this approach “sees the company manage the process to the point of the commissioning of the wind farm”. According to Shier, the management phase is concerned with: “managing infrastructure such as the civil works processes, including the construction of the turbine bases, the development of roads, the erection of the turbines and the completion of the electrical works, such as the internal collector network and the external connecting lines”.

Charles Shier stated that once the turbines are erected and connected to the electricity grid, they enter the commissioning stage. According to Shier, the commissioning stage sees the turbines undergo a series of tests; this includes an assessment of the turbine’s performance, including its

output and its reliability. Shier noted that some of these tests will be signed off by the System Operator, Eirgrid.

In order to develop a wind farm, Shier stated that finance and land are required. According to Shier, Bord na Mona has significant amounts of land available which were once in peat production, and are now available for other uses. Shier stated that Bord na Mona may finance a project itself, which it is currently doing with two wind farms. Shier said that Bord na Mona may work with a third party on a wind farm project if the company believes it is large-scale and it feels it is not capable of handling it alone. Shier gave an example of this: Bord na Mona plans to enter into a joint-venture agreement with the ESB to develop a large-scale wind farm within the next two years. Bord na Mona did not provide financial figures for this project, owing to commercial sensitivity.

The next section of the research critically explores Bord na Mona's wind farm business model with key stakeholders through the lens of Elkington's (1999) Triple Bottom Line: it begins by addressing the economic aspects.

Economic aspects

According to Charles Shier, wind farms are "very capital intensive". Shier stated that significant capital expenditure comes from purchasing turbines and installing them, as well as from the civil engineering process, whereby roads are constructed at the chosen location, electrical works are developed and the turbine bases are built.

According to Charles Shier, in order to ascertain the potential profitability of a wind project, Bord na Mona uses a cash flow model. This model will show the income and expenditure of a project both in the present and into the future (FTAdviser, 2014). Shier stated that the hurdle rate of return will be included in the cash flow model. Shier explained that it must be shown that the return on the wind farm project will be significantly higher than the cost of capital. Shier stated that "the board of Bord na Mona will not approve an investment in a project unless it is shown that it is going to be profitable". However, Shier acknowledges that "the wind regimes vary from day-to-day, month-to-month and year-to-year", and therefore, its cash flow, and ultimately its

profitability, will go up and down on an annual basis. Shier said that this unpredictability is offset by research conducted on the proposed wind farm site prior to its development. Shier described how a mast is placed at the location which measures the wind regime over a period of time. Shier said the subsequent data arising from this research gives the company an idea of the potential wind output from turbines if a wind farm was developed at that location. Shier stated that because of this trial process, and guarantees from the manufacturers of the turbines, it is not a “risky approach”, but one which works based on measured data. Shier explained that because wind energy is supported by the Irish government through schemes such as REFIT (see Appendix C), it is not going to make anybody rich, but it will be profitable. As such, harnessing wind energy for Bord na Mona is relatively low-risk, unlike most entrepreneurial business ventures.

Mark Malone, a member of the Rhode Parish Wind Turbine Action Group (RPWTAG), outlined a number of concerns about wind farm development. Malone, speaking with a mandate from, and on the behalf of the action group, casts doubt over the economic, environmental and social sustainability of wind farms.

The RPWTAG stated “when assessing the economic bottom line, it is necessary to look beyond the balance sheet of wind energy companies”. The economic concern that the group has is what they perceive to be the negative impact on landscape amenity as a result of wind farms, and by extension, the negative impact on the value of property therein. However, Charles Shier argued that property prices are based on market forces. To this, Shier stated that houses in the midlands, as of 2014, are only worth 50% of what they would have sold for in 2007, and that there are no wind farms near these properties. Further to this, Shier stated that in Cork and Kerry, where there are a significant number of wind farms, the price of property has not been “dramatically” affected by their presence. Shier believes that the perspective that wind turbines affect property price is a “myth”, but he did concede that there may be some impact on the price of individual properties located near wind farms. Shier conceded that the issue should be examined in more detail.

The RPWTAG based its argument on examples in Denmark and the United Kingdom where wind farms have impacted on the prices of homes. The RPWTAG argued that Carlow County

Council recently acknowledged that wind farms depreciate the value of properties in their vicinity, owing to their “visual impact, noise, and shadow flicker”. These occurrences formed part of a rejection for planning permission for a wind farm put forward by Galetch Energy Developments Ltd. (Pender, 2014).

The Rhode Parish Wind Turbine Action Group also made reference to other economic concerns. The group put across the view that “the greater the penetration of wind energy into the market, the higher energy prices will rise”. The group stated that Denmark has the highest electricity prices in Europe, and the highest wind energy penetration. This leaves the Danes at a “competitive disadvantage” according to the RPWTAG. The group argued that electricity prices “would be lower, except for high feed-in tariffs paid by consumers to help support the wind industry”. Because of this, the group believes that wind is an expensive form of energy, and that it will only get more expensive for the consumer as more and more wind power is harnessed. The group said that this will mean not only higher bills for domestic users, but also for businesses, which could lead to a lack of competitiveness against businesses located in jurisdictions which do not have similar policies in place. Shier disagreed with the RPWTAG, and stated that there are a number of studies which show that the annual support to wind energy coming from the Public Service Obligation Levy via the REFIT mechanism is probably equivalent to what is being saved on the wholesale price of energy. According to Shier, these savings on the wholesale price of energy are as a result of the cost reductions arising from the zero marginal cost of wind power; as a result, Shier believes the costs balance out.

The Rhode Parish Wind Turbine Action Group also takes issue with the amount of money being spent on upgrades to the transmission system. They believe that these upgrades are to “meet the needs of the wind industry”. The group stated that the issue with this is that “the wind industry is not paying for these upgrades; they are being paid for by the consumer and the taxpayer”.

According to the RPWTAG, “the wind industry is economically sustainable because of the supports coming from the government”. But the group believes that one industry should not be ring-fenced and supported by the state to the detriment of all its citizens. In conclusion, the RPWTAG argued, when considered from the perspective of the communities affected by wind farms, and from the perspective of the state’s best interests, “the wind industry is economically

unsustainable”.

Wind companies contribute back to communities in which their wind farms are located. Charles Shier stated that wind companies provide “community funds” in areas in which they operate. Shier said that these funds are used to pay for local amenities and services. According to Shier, they work in one of two ways: they can be mandated by An Bord Pleanala, which then sees them managed through the local authority, or the wind companies will manage the fund themselves in conjunction with the local community.

The Rhode Parish Wind Turbine Action Group questioned why wind companies feel the need to offer these funds to communities. They believe these funds are an admission by the wind industry that the negative impact of their business activities must be mitigated in some way. The group said that this money “is but a tiny percentage of the taxes and levies paid by communities to the wind industry in the first place”. The group argued that “the wind companies’ intentions are not to share the spoils of wind energy generation with the communities, but to fragment public opinion and undermine those who question the merits of wind farm projects”.

There is much controversy surrounding the debate around wind farms within rural Ireland. Clearly the underlying issues and concerns need to be resolved in the near future. The next part of this chapter critically explores the environmental aspects of wind farms located on Bord na Mona-owned cutaway bogs.

Environmental aspects

According to Charles Shier, the advantage of harnessing wind energy is that it “displaces unsustainable power produced through the use of fossil fuels”. Shier further said that “wind is a low carbon energy source.” The Rhode Parish Wind Turbine Action Group contested this viewpoint however, by stating that “the overall carbon emission reductions from the operation of wind farms appears to be marginal.” The group argued that this is because wind energy generating systems require a back-up fossil fuel supply. University College Dublin research scientist and lecturer Dr. Florence Renou-Wilson stated that “the problem with wind farms is you have to have a back-up”. The RPWTAG believes that this necessary back-up system is run in a

much more uneconomical manner than would be the case if it were run at all times to produce electricity. The RPWTAG said this is because the back-up system must be "ramped up and down at short notice". The RPWTAG then stated that "this inefficient system means that the carbon emissions are greater than if the supply was in continuous operation". This so-called "spinning reserve", according to the group, is not factored into wind energy developers' calculations when assessing carbon reductions. As such, when considered in their totality, the group believes that "wind farms do not lower carbon emissions substantially".

Another concern raised regarding the green credentials of wind farms located on cutaway bogs is that of greenhouse gas emissions coming from the remaining peat left over after harvesting has ceased. Charles Shier argued that "cutaway peatlands will emit carbon whether the wind farm is there or not". Shier stated that "by raising the water table, the rate of carbon oxidation will be reduced." Professor Hans Joosten of the University of Greifswald, a leading expert in palaeoecology and peatlands, believes that rewetting a cutaway bog which hosts a wind farm will "bring increased positive environmental outcomes than if it were to remain dry". When questioned about whether or not the process of raising the water table would be possible at a wind farm, Charles Shier said it would be. According to Shier, through a "system of cells" at Bord na Mona's Oweniney wind farm, the water table can be controlled in between the roads at the site. Shier stated that this system is in place to minimise the carbon emissions from the areas of peat which remain at the wind farm.

A further environmental concern arising from wind farms is their potential impact on birdlife. As part of the pre-planning for the development of a wind farm, Charles Shier stated that "an assessment of bird activity is conducted, including a review of migration routes". Shier said that "the information gathered forms part of the overall environment assessment". Dr. Florence Renou-Wilson said that "wind farms are now very technologically advanced; some wind farms even have a radar system which stops the blades of the turbines from moving if it detects a flock of birds in the area." As such, Dr. Florence Renou-Wilson believes that wind energy can be produced without impacting in a negative fashion on nature.

Another environmental concern of placing a wind farm in a cutaway bog is the effect of such a project on the residual peat itself. Charles Shier conceded that wind farm development will result

in damage to the peat during the construction phase, because “peat must be dug up so that solid turbine foundations can be laid.” Shier stated that the peat which has been dug out will likely be left on site, and will probably oxidise faster than if it had been left in situ. Thus, “you are actually causing additional carbon emissions by the wind farm development process”, according to Shier. Professor Hans Joosten calls this a “climate cost”. However, Charles Shier pointed out that the carbon emission resulting from this site disturbance, from the infrastructural development at the project, from the manufacture of the turbines and the on-going maintenance of the wind farm through its lifetime, “amounts to just 5% of the total carbon you are going to displace from fossil fuel electricity generation.”

In conclusion, Charles Shier, speaking on behalf of his employer Bord na Mona, believes that carbon emissions from the peat disturbance is a factor, but not a significant concern. Professor Hans Joosten agreed, stating that the extra carbon losses of wind farm establishment on cutaway bogs is negligible in the long run when compared to the greenhouse gas emission reductions achieved when wind energy replaces fossil fuel energy.

It is clear that the stakeholders interviewed have contrasting viewpoints regarding the environmental outcome of wind farms, and this debate looks set to continue. The next part of this chapter critically explores the social aspects of wind farms on Bord na Mona cutaway bogs.

Social aspects

Charles Shier argued that cutaway bogs are “ideal locations for wind farms because they are wide open areas”. Dr. Florence Renou-Wilson agreed; research carried out as part of the Bogland report (Renou-Wilson, et al. 2011) shows that cutaway peatlands are ideal for the siting of wind farms. Dr. Renou-Wilson stated the Bogland report (Renou-Wilson, et al. 2011) found that local people were happy to see cutaway bogs returned to an environmentally-friendly use. Charles Shier said these locations are able to host large turbines without the landscape becoming overwhelmed. Shier also stated that these locations are uninhabited, meaning that communities are not going to be affected by the presence of wind turbines. As such, Charles Shier argued that cutaway bogs are a good option for wind farm development. The Rhode Parish Wind Turbine

Action Group disagrees with this opinion however, and argued that there is a perception that placing wind turbines on cutaway bogs is “akin to locating them in the heart of the Saharan desert or some similar unpopulated and barren wasteland”. According to the RPWTAG, it would appear that Bord na Mona placing wind farms in these so-called “secluded” cutaway bogs paints a picture that the company has taken into consideration the wellbeing of communities. The RPWTAG argued the following: “the reality is that wind farms are being placed in the cutaway bogs because the government is eager to capitalise on these land banks”. The group believe that people who do not have knowledge of geography or settlement patterns incorrectly assume that wind farm developments on bogland does not negatively affect communities. The group said that the Mount Lucas Wind Farm is located exclusively on state-owned bogland, and even though it is incomplete, it is already having a dominant effect on the landscape as it can be seen from miles around. Bord na Mona Land Project Manager Tom Egan disagreed with the RPWTAG by stating that “bogs are isolated, and wind farms placed in them bring infrastructural benefits to the surrounding area”. Green party leader Eamon Ryan also believes that cutaway bogs may be suitable because they tend to “not be too close to rural housing in general.”

Charles Shier stated that “wind energy generation is indigenous, and thus an energy source which does not have to be imported into the country”. As such, it could be argued that energy derived locally provides a security of supply to the Irish energy sector, and in turn, the consumer. According to Shier, another positive social outcome arising from harnessing indigenous wind energy is its generation of employment. Shier believes that “wind energy will provide jobs in project development and planning, in the construction of the turbines and the associated civil works, and the ongoing maintenance and operations once the wind farm is in use.” The RPWTAG disagrees with this view however. As outlined earlier in this chapter, it stated that the cost of wind energy will leave Irish businesses uncompetitive, which will then negatively impact on employment.

According to Shier, a further positive social outcome arising from wind energy is that wind “companies pay rates to the local authority in the areas in which they operate.” Shier stated that “local authorities then spend this money on developing local services for the benefit of the citizens.” Lastly, Shier stated that one of the less well publicised positive social benefits of wind

energy production is that local infrastructure around a wind farm is upgraded prior to its construction, so as to enable the materials for its development to come on site; local people can then use and benefit from this upgraded infrastructure.

A number of social concerns have been raised by communities that reside close to wind farms. The Rhode Parish Wind Turbine Action Group outlined a number of health concerns which have been linked to wind turbines. The first of these is noise pollution, which the group argues leads to sleep disturbance and stress. The RPWTAG also referred to “Wind Turbine Syndrome”, which sees patients suffer a number of symptoms including nausea, dizziness, impaired sleep and impaired cognitive function. However, the methods used in the research on this “condition” have been heavily criticised (Donaldson James, 2013). Nevertheless, noise from turbines is likely to cause sleep disturbance, which itself could lead to stress in people residing in close proximity to wind farms. Charles Shier acknowledged that noise is of considerable concern. Shier stated that he is against a “one size fits all solution” to this problem, however. He believes that owing to the differences in the size of wind farms, noise levels vary. As such, Shier said that wind farms should be located in such a place that the nearest neighbour will not be impacted by noise coming from it.

Charles Shier believes the other major social concern of the action group can be resolved. “Shadow flicker”, whereby light is reflected from turbine blades into homes, can be controlled easily, according to Shier, by simply turning off the turbines during the period where the sun shines through them.

Shier was questioned regarding the wind farm action groups in Ireland. He considers the reaction of the wind protest movements as being a social drawback to Bord na Mona’s wind farm development projects. Initially upon seeking planning permission, Shier stated that Bord na Mona did not have much opposition; “it was only when large-scale wind projects based in the midlands were outlined, with a view to exporting the collected energy, did action groups develop.” Green Party leader Eamon Ryan believes that some protesters “take issue with the idea of trading the energy derived from wind farms with the United Kingdom.” However, this point has not been substantiated in this research.

Outlook

There are differing opinions emerging amongst the key stakeholders interviewed for this project regarding the development of wind farms on cutaway peatlands in Ireland. Clearly a model which benefits all stakeholders concerned must be identified.

One model which may meet the economic concerns of people living close to wind farms is a community shared-ownership scheme. Green party leader Eamon Ryan believes that community-owned wind farms can be developed in Ireland. Ryan stated that there may be a perception that a large multinational company is moving into an area, taking its energy, selling it abroad and not benefitting the community in which it was derived. Ryan said that this perception of wind farms would change with a community joint-owned, or wholly-owned initiative. Ryan stated that half of the renewable energy capacity in Germany is owned by local community co-operatives and small firms. As such, this model could be replicated in Ireland.

When questioned about community joint-ownership, the Rhode Parish Wind Turbine Action Group's representative Mark Malone stated that his concerns with wind farms built within his community are not just based on economics, but go beyond this, and include issues relating to health outcomes and the loss of visual amenity. Malone, speaking for himself, said he would not wish to be party to what he considers to be "an economically unsustainable industry". On the other hand, Charles Shier of Bord na Mona believes that it is worth considering taking the approach whereby communities are involved in funding wind farms in their locality. Eamon Ryan believes that wind farm developers would not object to a community joint-owned approach because they are looking for equity partners. Charles Shier stated that there is some anecdotal evidence to suggest that where communities are involved in owning wind farms in their area, there is a lot less opposition to the proposed development. Charles Shier stated that this is a factor that Bord na Mona will take cognisance of when they approach the next stage of their wind farm development programme.

In relation to the possible devaluation of property located close to wind farms, Green Party leader Eamon Ryan believes that the solution may be to connect a house situated close to a wind

farm directly to it, so that the house would receive a supply of renewable energy. Ryan stated that this would add value to the property, and thus increase the price of the house if it were to be sold.

The solution to the problem of wind farm's dependency on a back-up fossil fuel supply when the wind is not blowing is to develop a back-up system that could store excess wind energy. Dr. Florence Renou-Wilson of University College Dublin believes that a solution to this problem will be found imminently. Dr. Renou-Wilson stated she is aware of a system in Germany whereby water is heated and cooled and electricity taken from this process. Dr. Renou-Wilson believes this approach could be taken in Ireland at its wind farms, but it is prohibitively expensive technology at present. Mainstream Renewable Power, in cooperation with Enterprise Ireland, has started testing an innovative electricity storage system in the second half of 2014 (Mainstream, 2014h). The results of this may not be known for some time.

It is clear that locating wind farms on cutaway bogland will continue to be a divisive issue. It will be a challenge for all parties concerned to arrive at a solution. On the one hand, businesses and researchers view wind technology as being an attractive use for cutaway peatlands. On the other hand, communities living in close proximity to turbines have concerns for their health and wellbeing, the value of their property and the loss of the visual amenity of the landscape in which they reside.

A potential model that addresses a number of the concerns of stakeholders, particularly those who live near wind farms, may be to review planning guidelines, which some would argue are not fit for purpose: it is the understanding of the Rhode Parish Wind Turbine Action Group that the present guidelines have not changed since 1997, when wind turbines were only 30% of the size of those in use in 2014. In any new guidelines, the set-back distance from communities should be reviewed and increased where necessary.

The next section of this chapter explores Bord na Mona's indicative biomass business model from economic, environmental and social perspectives.

6.2.2 Biomass

According to Charles Shier of Bord na Mona, “there is an insignificant amount of biomass growing in Ireland in the present day.” Shier said that if Ireland wishes to generate a significant proportion of its energy needs from biomass, it will have to import it from abroad. Shier admits that a strategy like this could bring security of supply issues to Ireland.

The second part of this chapter critically examines Bord na Mona’s biomass strategy through the lens of Elkington’s (1999) triple bottom line theory. It begins by outlining Bord na Mona’s biomass business model.

Business model

John O’Halloran’s job as Biomass Manager at Bord na Mona is to oversee, in accordance with government policy, the co-firing of biomass with peat at the company’s Edenderry Power Station. The aim of Bord na Mona, according to O’Halloran, is to be co-firing 30% biomass with 70% peat by 2015. O’Halloran stated that by December 22nd, 2015, 700,000 energy tonnes (55% moisture) of peat will be burned with 300,000 energy tonnes of biomass. O’Halloran stated that this is to be achieved in as economic a fashion as possible.

John O’Halloran described the three different sources of biomass used by Bord na Mona. O’Halloran stated the first of these sources is derived from the Irish forestry sector’s saw mills. He said that from these private mills, which must be within 120km of the power station to make them an economic source owing to the cost of transportation, “Bord na Mona purchases wood-chips, which are a by-product of timber production, and saw dust.” O’Halloran said that Bord na Mona also purchases wood-pulp for use as biomass.

O’Halloran said that “the second main biomass source is supplied from the energy crop sector.” According to O’Halloran, this has proven to be a very challenging and ultimately unsuccessful part of the biomass business at Bord na Mona. O’Halloran has encouraged farmers to grow crops such as willow and miscanthus on mineral soils. However, O’Halloran stated that “concerns from farmers over possibly losing their Single Farm Payment, a lack of government leadership, a

lack of leadership within farming organisations and the slow-to-change nature of farmers has resulted in just 205 hectares of planted willow”; the company had originally aimed to have 5,000 hectares of willow growing, so as to provide for 100,000 tonnes of biomass for their power plant. O’Halloran envisaged that the remaining 200,000 tonnes would be derived equally from the forestry sector and from imported product, the latter of which makes up the third source of Bord na Mona’s biomass supply.

O’Halloran stated that “imported biomass includes sunflower husk pellets from Northern Europe, which are by-products from the production of sunflower oil, and palm kernel shells from Africa and Indonesia, which are by-products of palm-oil extraction.” According to O’Halloran, “these biomass products are high in calorific density, so they are economic to import into Ireland.”

Bord na Mona owns and cuts about 80,000 hectares of bog in Ireland (Bord na Mona, 2014). Bord na Mona’s (2014) aim is to generate “commercial, environmental and social value from this key asset”. In theory, Bord na Mona could use this land to produce sustainable biomass, such as reeds, similar to the Belarusian model outlined in Chapter 3. The resulting sustainable biomass could then be used as a co-firing medium. The next section explores this vision for sustainable cutaway bog use with Bord na Mona.

Economic aspects

According to Bord na Mona’s senior ecologist Dr. Catherine Farrell, the company has tried to grow various crops on its cutaway bogs since the 1960s, with little or no success. John O’Halloran stated that it is not possible to grow energy crops commercially on a cutaway bog as it “won’t stack up economically”. Professor Hans Joosten agrees, stating that Irish peatlands, from an economic perspective, “are unsuitable for energy crops as they do not produce enough biomass.” But Prof. Joosten pointed out that non-fuel crops however, “may be a better option.”

Various forms of biomass have been trialed at Boora bog, Co. Offaly. According to Land Project Manager at Bord na Mona, Tom Egan, willow has been undergoing a trial at Boora since the early 2000s on a twelve hectare site. Egan said this trial was established to assess the yield potential of the crop. According to Egan, it was expensive to level, plough and lime the site.

Egan reports that yields to date have been very poor; approximately 50-60% of what is normally produced on mineral soils. Egan said it has been concluded that “Bord na Mona cutaway bog land is not suitable for growing willow.” However, Egan acknowledged that the willow available for growing in a commercial fashion is bred to grow on mineral soils. Egan points out that there has never been a breeding programme conducted to produce willow which is suitable for growing on peat soils.

Tom Egan reports that miscanthus was also trialed on cutaway Bord na Mona bog, where it was initially found to do well. However, Egan stated that “the trial location is susceptible to fairly late spring frosts, early summer frosts and early autumn frosts.” Egan said that the result of this was that “the crop was wiped out with late spring frosts and was subsequently ruled out as being suitable.”

Tom Egan pointed out that Bord na Mona has also conducted reed canary grass trials on its cutaway bogs. According to Egan, “the Finnish use reed canary grass extensively on their peat-extracted bogs for the production of biomass.” However, this success has not been replicated in Ireland to date. Egan said that Bord na Mona trialed Finnish varieties of reed canary grass, but yields were so poor that it was deemed to be an uneconomical crop for use on Irish cutaway bogland. Egan said the crop was also invaded by rushes, which grew profusely once fertiliser was applied to the cutaway bog. However, Dr. Florence Renou-Wilson believes that reed canary grass does “very well” on cutaway and that further research is required. Dr. Renou-Wilson stated that there have been no published reports arising from the Bord na Mona trials. Dr. Renou-Wilson believes that the trials should have been carried out on a larger scale, as has been done in Finland.

Tom Egan stated that trials were conducted with alder on cutaway, but once again, yields were very disappointing. Egan said that “Bord na Mona has looked at harvesting naturally recolonising birch, and willow areas which had good growth.” Egan stated that a project was devised which saw the company harvest this naturally occurring biomass, dry it, chip it and draw it to the power stations for use. However, Egan said this was “not deemed to be economically sustainable owing to the costs of the various processes involved in preparing the biomass and transporting it to the power station.” Dr. Renou-Wilson agreed, saying that “there is not enough

wild birch on the cutaway to go out and cut it with machinery.” However, Dr. Renou-Wilson said that “if there was more wild birch on the cutaway in the future, it might become a viable source of biomass.”

According to Tom Egan, results from planted birch trials have also been “desperately poor”. According to Dr. Catherine Farrell, naturally regenerating birch is far superior to commercially established birch crops, in terms of its ability to grow on cutaway bog. In the future, Dr. Farrell said Bord na Mona will consider felling some of the birch for use as a biomass in its power stations if enough of it grows on the cutaway. Dr. Farrell stressed it is important that there is sufficient amounts of birch to ensure that it is economically viable to cut it.

Tom Egan said that afforestation of the cutaway with coniferous crops has been trialed. Egan stated that “the ground was not of good enough quality to sustain tree growth, rushes once again posed a problem as they grew a lot in the first years of the crop’s establishment, and the late spring and early summer frosts caused problems as well.” Egan stated that “frosts wiped out crops in some of the years in which these trials occurred.” Egan said when the crop did grow, it “grew in an uneven fashion.” Egan also stated that it required fertilisation. Egan said that fertilisation would become unfeasible however, “due to new environmental restrictions.” Egan stated that the project has produced poor quality timber to date, so as a result it can be considered economically unfeasible.

However, Dr Renou-Wilson believes that the biomass trials conducted by Bord na Mona did not make as much money as the company would have liked, because in the period they were initiated, Ireland was in a “boom time”. Dr. Renou-Wilson stated that if they were reassessed in 2014, the trials may be viewed quite differently from an economic perspective.

The next section of this chapter critically explores the environmental aspects of Bord na Mona’s biomass strategy.

Environmental aspects

Bord na Mona’s Land Project Manager Tom Egan acknowledges that the various biomass trials

conducted on Bord na Mona's cutaway peatland were carried out on dry substrate. Charles Shier stated that "dry peat emits carbon." The question arises as to why these trials were not carried out on wet cutaway peatlands? According to Tom Egan, rooting systems would not survive in rewetted areas. However, paludiculture, the growing of biomass in a rewetted peatland, has been successful in Germany, Belarus and Canada (see Chapter 3).

Professor Hans Joosten offered the view that the site conditions determine the type of crop which should be used. Egan stated that Finnish reed canary grass has been used in Ireland without success. This may have arisen from the fact it was not suitable for conditions in Ireland. Other inappropriate growing media has been used; as described earlier in this chapter, Egan stated that willow trials in Irish cutaway have been conducted with biomass which was never intended to be used on a peat substrate. As such, using an unsuitable growing medium in a particular environmental context to which it is unsuited, is unlikely to result in a successful trial.

Professor Joosten stated that "reeds must be grown on nutrient-rich and buffered sites." Prof. Joosten added that "at nutrient poor and acidic sites cultivation of sphagnum is more suitable." According to Professor Joosten, "Ireland is a rain-rich country," and as a result of this, "[Irish] bogland tends to be nutrient poor and acid in nature." As such, Prof. Joosten argues that paludiculture crops grown in Ireland should be specific to the local environmental conditions.

Professor Hans Joosten believes that "Ireland should be a highly productive sphagnum producer owing to its climate." However, according to Bord na Mona Senior Ecologist Dr. Catherine Farrell, initial sphagnum trials have not been successful in Ireland to date. Dr. Farrell said that in one particular trial in 2012, sphagnum was spread on bare peat, but the performance of this trial had been poor. Dr. Farrell said that one of the concerns is that "sphagnum cannot grow in the fen layers of the cutaway." As such, the challenge, according to Dr. Farrell is finding the right site, being able to control the water level, having the right peat and finding the right species of sphagnum. Dr. Farrell said that other Bord na Mona sites will be subject to new trials in the future.

Dr. Farrell has successfully grown sphagnum moss in a flooded area in Ireland in 1997, though that species, *Sphagnum cuspidatum*, has limited commercial value. This does bring some

optimism that successful commercial cultivation of sphagnum moss can be achieved in Ireland. Nevertheless, Dr. Farrell advised that “farming sphagnum in Ireland on a large scale is going to be a long way off into the future.”

If a suitable biomass is developed for the Irish cutaway bog and used in a paludiculture regime, as outlined in Chapter 3 of this research study, it will likely provide positive environmental outcomes. The challenge for Bord na Mona going forward, is to find or develop a suitable growing medium.

The social aspects of Bord na Mona’s biomass strategy are described in the next part of this chapter.

Social aspects

When discussing the economic aspects of Bord na Mona’s biomass strategy, John O’Halloran said that imported biomass is only marginally more expensive than Irish-sourced product. However, O’Halloran expressed a social concern in the company’s biomass importing strategy when he acknowledged that “imported biomass does not provide employment in Ireland.” O’Halloran said importing biomass is considered a “last resort” for Bord na Mona because the company would prefer to create employment for Irish people. If Bord na Mona were to successfully develop a biomass programme for its cutaway bogs, it could create employment in rural areas, which would be particularly beneficial to former workers who had been made redundant as a result of the cessation of peat extraction.

A major social drawback to a broader paludiculture strategy at Bord na Mona would be the potential requirement to move people from their own land, in what Dr. Renou-Wilson describes as “land re-allotment”. Dr. Renou-Wilson said this would see landowners’ property “moved” to a “better place”, so as to provide for a catchment area to rewet. Dr. Renou-Wilson said this process would also require public money. It is likely that such a policy would cause concerns for any community or land-owners effected.

Outlook

It is clear that Bord na Mona has invested considerable time and resources into researching methods to harness its cutaway peatlands in such a way as to produce biomass. However, as outlined in this study, any crop trials in cutaway bogs should always be conducted in wet conditions, so as to reduce carbon emissions from the remaining peat layer. It is clear from the research presented in this chapter that this has not been the case so far.

Dr. Florence Renou-Wilson stated that the Irish government should require that Bord na Mona carry out further research, with independent review, into sustainable uses for its cutaway peatlands. Dr. Renou-Wilson said that Bord na Mona has the resources available, and that these resources should be invested into long term projects. One option would be for the company to seek the expertise of peatland researchers who have worked on paludiculture initiatives in Europe and Canada. This would provide an independent perspective which could bring experience and innovative solutions to the cutaway bogs of Ireland. If a suitable biomass medium is to be developed for the Irish cutaway bog, Bord na Mona would no longer need to import product from across the world.

Importing biomass is not without risk; according to Charles Shier, Strategic Development Manager at the Powergen arm of Bord na Mona, there are security of supply concerns and, according to Bord na Mona Biomass Manager John O'Halloran, a possible rise in the price of shipping, should the world economy improve in the coming years, could make the process of importing biomass expensive.

Resources for research into the farming of sphagnum moss could be provided either by Bord na Mona, the Irish government or through European funding mechanisms. The sale of cultivated sphagnum as a growing medium for the professional horticulture sector would provide for a sustainable economic return for Bord na Mona's investment, and provide green jobs, which could replace jobs lost from a slowdown in peat harvesting in the future.

The next section critically explores the approaches to rehabilitation and rewilding taken by Bord na Mona for its cutaway bogs. Elkington's (1999) Triple Bottom Line model is used as a lens to look at the economic, environmental and social aspects arising from these measures.

6.2.3 Restoration and rehabilitation, rewilding and amenity

The beginnings of the era of restoration of Irish bogland began in the 1970s. Research between the 1970s and the 1990s indicated that a new layer of vegetation would be required on the cutaway blanket bogs of Co. Mayo, in order to stabilise the remaining peat and thus prevent its erosion (Clarke, 2010 p140-1). If the peat was eroded, it would have ended up in the surrounding waterways and would have resulted in serious environmental consequences (Clarke, 2010:140). In 1996, Catherine Farrell, a then doctoral student at University College Dublin, was assigned the task of conducting a study into the development of a plan for the area (Clarke, 2010:141).

In 2001, Farrell's PhD. research findings indicated that it would be possible to restore peat-forming plant communities to the area, as it had been observed that peat-forming vegetation had spontaneously regenerated at locations where the water table was at the peat surface (Clarke, 2010:141). A plan was devised, and work soon began to block drains and establish ponds and small lakes in the area (Clarke, 2010 p141). The result of the work was the creation of an acidic wetland with habitats that blend into the surrounding blanket bog landscape (Clarke, 2010:141).

Since 2009, Dr. Farrell said she and her colleagues at Bord na Mona have rewetted and restored 1,000 hectares of raised bog back to carbon sinks. As well as restoration projects, significant swathes of Bord na Mona land has returned to wilderness naturally in what is referred to as "rewilding".

According to Tom Egan, the Lough Boora Parklands encompasses 2,000 hectares, and includes vast areas of naturally recolonised cutaway bog. Rewilding of cutaway peatlands will happen naturally as these tracts of land come out of active peat production (Bord na Mona, 2014m). This natural regeneration process sees plant species such as sedges and rushes stabilise the bare peat surface (Bord na Mona, 2014). Depending on the local hydrology, more complex plants species may develop (Bord na Mona, 2014m). Flora and fauna benefit from these ecosystems, including a number of species of high conservation value (Bord na Mona, 2014m).

In the early 1990s, parts of Bord na Mona's Boora dryland areas had begun to recolonise naturally (Clarke, 2010:273). In 1994, a group of Bord na Mona employees, led by Tom Egan,

developed a Lough Boora Parklands pre-feasibility study (Clarke, 2010:273). It was proposed that the wetlands present at the site should be extended, lakes built and provision made for amenity areas (Clarke, 2010:273). Tom Egan said the project's stakeholders had various different interests, including walking, fishing and hunting. Egan said the plan was to develop amenity and integrate it into the existing agriculture and forestry that existed at the location. Egan outlined that "the entire integrated project amount to approximately 2,000 hectares in size." Walkways, angling lakes with access for all people, including wheelchair users, cycle tracks, a Mesolithic site and a sculpture park would all benefit local people as sources of amenity, and help attract tourists to the Parklands. According to Egan, as of 2014, "the Lough Boora Parklands is visited 40,000 times per year."

Bord na Mona has developed a number of other amenity projects on its land holdings for the benefit of local communities. Tom Egan said these include an amenity area in Portarlington, and another at Littleton in Co. Tipperary. However, Egan said it is unlikely that a project on the scale of the Lough Boora Parklands will be developed by Bord na Mona again in the near future, owing the cost associated with it.

The next section will examine the economic aspects of the various restoration, rehabilitating, rewilding and amenity projects at Bord na Mona.

Economic aspects

Bord na Mona does not have a business model for restoring or rewetting its cutaway because it does not perceive the practice as a commercial activity. The next section addresses some of the possible funding opportunities with the key stakeholders.

The restoration and rehabilitation of former industrially-exploited Irish peatlands would appear to be a positive after-use, but how do land owners expect to pay for this work, and subsequently derive an income from it in the future? The process is not cheap: Dr. Farrell said that the processes involved, depending on the condition of the cutaway, can cost between "€100 and €400 per hectare." One funding option for restoration and rehabilitation projects is to sell carbon credits for the environmentally beneficial outcomes which arise from the restoration and

rehabilitation process.

Bord na Mona Land Project Manager Tom Egan has acknowledged that receiving funding has been a challenge for the Parkland development. Egan said “the Lough Boora Parklands was funded through the Co. Offaly LEADER programme, European Union structural funds, Failte Ireland and through Bord na Mona itself.” Egan stated that “Bord na Mona provided €500,000 in finance, man-hours and machinery” for the development. Egan said that admission to the Parklands is free, so the on-going costs of the amenity, which Egan stated amounts to over €100,000 per annum, is paid for by Bord na Mona’s corporate social responsibility fund.

There has been development of the amenity in recent times. Egan said “the central gateway development is costing €1.5 million.” Egan stated that one half of this cost is coming from Failte Ireland, and the other from Bord na Mona itself. Egan said that two full-time guides will be employed at the gateway. Egan acknowledged that there will be little economic return arising from this investment, apart from small revenues derived from guided tours and a €2 car parking fee, which Egan stated has proven to be unpopular with locals who use the Parklands for amenity purposes. However, it could be argued that if the community and tourists wish to enjoy the amenity in the future, an economic return to Bord na Mona may be necessary from the development, particularly if the company has a number of unprofitable years of business.

According to Dr. Farrell, “restoring bogs has a carbon value.” Green Party leader Eamon Ryan and Dr. Farrell both stated that Bord na Mona has not traded in carbon as of yet. Dr. Florence Renou-Wilson believes that “a model similar to the Moor Future Project should be adopted.” In the Moor Future Project, a number of people came together and rewetted land. It was shown that a certain amount of carbon was going to be prevented from being released into the atmosphere; that carbon-saving is then tradable according to Dr. Renou-Wilson. She believes that replicating this model in Ireland would provide “a good source of revenue.”

There are a number of concerns regarding this model however: Dr. Renou-Wilson said the project would require a significant amount of land in Ireland in order to make it a reality and “it would need enough people to agree to its implementation.” According to Dr. Catherine Farrell, “land ownership patterns are different in Ireland than they are in the United Kingdom.” Dr.

Farrell stated that in the United Kingdom, land tends to be held by a few big landowners, whereas in Ireland, there tends to be lots of separate landowners and many small land-holdings. Dr. Florence Renou-Wilson argued “because it has proven difficult to get people to stop turf-cutting, it is going to be even more difficult to get a lot of people to agree to rewet an area of land.”

Dr. Farrell cast doubt on the likely successful implementation of a carbon-trading initiative. Dr. Farrell stated that Bord na Mona does not know “where the carbon market value is at the present time”. Dr. Farrell believes that rewetting peatlands and cutaways in order to keep the carbon in the ground offers benefits in and of itself, but is concerned about how the market value is extracted from this. Dr. Farrell is also concerned about the possible fluctuations in the price of carbon if a carbon-selling initiative were to be implemented. In conclusion, Dr. Farrell believes that the rehabilitated cutaway has inherent value, and it does not have to be a source of revenue.

Professor Hans Joosten disagreed with Dr. Farrell. Professor Joosten outlined how Bord na Mona could finance its rehabilitation projects in the future through a carbon trading initiative. Prof. Joosten said under the United Nations Framework Convention on Climate Change-Kyoto Protocol (UNFCCC-KP), Ireland could claim emission reductions through the rewetting of its peatlands. To do this, Prof. Joosten believes Ireland would have to have an emission reductions surplus overall, so that it could sell this surplus to other countries. According to Prof. Joosten, “Bord na Mona would have no direct involvement with this, but it could claim money from the government if it was responsible for the emission reductions through its restoration and rehabilitation of its cutaway peatlands.”

However, Professor Joosten said that reductions in emissions cannot be sold if they were going to occur anyway, as part of policy, for example. Prof. Joosten said that the reduction in emissions can only be traded if they are “in addition” to normal business activity, because emissions cannot be traded if they “would have occurred anyway”. Professor Joosten also said that if it can be shown that rewetting would not have been made plausible without the income derived from carbon trading, a project’s emissions reduction measures are considered tradable.

As noted earlier, Dr. Catherine Farrell expressed concerns with possible fluctuations in the price

of carbon. Eamon Ryan described these fluctuations in the last number of years. Ryan said initially, “the European Union spent a considerable amount of time in establishing the carbon credit industry.” However, Ryan said that in recent times, “the price of carbon has fallen from €30 per tonne, to two or three Euros per tonne.” Ryan said that the market has become “incredibly volatile” and oversupplied, and “too many free allocations of carbon were given to industry.” Ryan said the outcome is that the low price for carbon is not going to make it easy to establish carbon credit systems that will pay for habitat and wildlife restoration projects in the near future.

Green Party leader Eamon Ryan did offer an alternative system which could be implemented to support rehabilitation projects in an economic fashion. Ryan outlined how the charity Burren Beo puts an economic value on the maintenance service provided by farmers who graze cattle in what is a very sensitive ecosystem: the Burren. Ryan said the charity pays people to continue this farming activity, which these farmers may not do otherwise, because it helps to maintain the Burren’s ecosystem; this in turn, supports tourism to the area. Ryan believes this model could be extended to bogs. Ryan envisages that bogland which could be used to store water in times of flooding would be seen as an “environmental service”: a specific payment to the landowner could be provided for this service. According to Ryan, land which supported greater biodiversity than would ordinarily be present at a given location could also be considered for an “environmental service payment”.

Eamon Ryan argued that tourism is an option for cutaway after-use. According to Professor Joosten, rewetting peatlands may be an economic option in this context. Prof. Joosten stated that “Ireland gains a substantial part of its income from tourism”, and “peatlands and wetlands may play an important role in this sector in the future.” Tom Egan said that Bord na Mona is developing a “gateway”, or hub area, at its Lough Boora Parklands, which will provide a defined centre for the amenity. Egan said as part of this development, Bord na Mona employed consultants to examine the creation of a tourism business. Egan said the consultants concluded that a tourism business was not viable at the location. However, Egan stated that “the consultants did identify possible niche opportunities for local entrepreneurs to set up business in the parklands.” Egan said an example of this is a private bike-hire enterprise which is currently

established in the parklands. Egan said another private business which will be established in the near future is a café in the central gateway hub. Both of these businesses will cater to tourists and amenity users who visit the parklands.

Egan stated that it is envisaged that the Lough Boora Parklands will become incorporated into a wider grouping of tourism attractions in the region, which would include the Slieve Bloom Mountains, Birr Castle and a number of monastic trails. According to Egan, there are opportunities to establish private businesses as a result of this tourism drive, such as a caravan camping park and hostel accommodation.

Rhode Parish Wind Turbine Action Group believes that tourism may be a more sustainable use for bogs than wind turbines. The group sees particular potential in “eco-tourism”. Eco-tourism is a growing part of the global tourist industry (International Ecotourism Society, 2014). This represents a distinct opportunity for entrepreneurs to develop eco-tourism businesses in conjunction with Bord na Mona on cutaway peatlands. However, according to Tom Egan, Bord na Mona is more open to working with communities to establish projects which are beneficial to local interests. Egan stated that “policy at Bord na Mona prioritises amenity projects that benefit the community more than projects which will benefit private businesses.” Egan stated that this is the case owing to the fact that the land that Bord na Mona holds is state-owned. Nevertheless, precedent has been set with the bike-hire business at the Lough Boora parkland amenity, so Bord na Mona will entertain private business if it benefits the local community and provides for what Egan describes as an “essential facility” at the company’s various cutaway bogs.

Environmental aspects

According to Tom Egan “rehabilitated and rewilded cutaway bogs provide valuable habitat for flora and fauna.” Egan said a number of different ecosystems can develop or be created at cutaway sites, including “natural dryland recolonisation, semi-wetlands and large-scale wetlands.” Bord na Mona is working closely with Bird Watch Ireland and the National Parks and Wildlife Service on various research studies. Egan pointed to one successful project that has occurred at the Lough Boora Parklands is the Grey Partridge conservation project. Egan said that

Bord na Mona, along with Bird Watch Ireland, is now focusing on “creating habitat for endangered waders such as the lapwing.”

Amenity is a positive social outcome arising from the rehabilitation of cutaway bogs and is explored in the next section of this chapter. However, there may be some environmental concerns resulting from people using restored, rehabilitated and rewilded cutaway bogs for amenity purposes. Bord na Mona Land Project Manager Tom Egan stated that at the Lough Boora Parklands for example, there is intense amenity usage of particular sections, such as at the sculpture park and the cycle paths. According to Bord na Mona senior ecologist Dr. Catherine Farrell, the level of environmental impact will vary depending on the type of amenity taking place. Dr. Farrell said these impacts vary from the “gardening” and tending that is required to keep tracks open for users, to noise pollution which may arise if there is activities such as quad-biking or jet-skiing at the amenity.

Even with considerable amenity in place, restored, rehabilitated and rewilded peatlands offer positive environmental outcomes. As noted earlier in this chapter, Dr. Catherine Farrell pointed out that restoring bogs has a carbon value. Farrell said that alone “is a justification on its own for restoring bogs.” Dr. Farrell said that “rewetting bogs keeps the carbon in the ground.” This results in a positive climate change mitigation outcome.

Looking towards the future, Tom Egan envisages that Bord na Mona will likely develop large-scale wetlands for the benefit of wildlife along the Shannon river and other river basins. Egan argued that “this will have positive biodiversity outcomes for the whole of Ireland.” Egan hopes that at some point in the future large-scale reed beds can be established, and extirpated species such as the bittern and the crane can be reintroduced into these ecosystems.

The next section presents the social aspects of restoration, rehabilitation and rewilding of Bord na Mona cutaway bogs identified with the key stakeholders.

Social aspects

According to Dr. Catherine Farrell, “there are many positive social outcomes that result from

restoring, rehabilitating, and/or rewilding cutaway bogs and other natural areas.” When assessing the resulting social aspects, Dr. Farrell believes that health benefits for people arise from enjoying nature and exercising in rehabilitated and rewilded cutaway bogs.

As outlined earlier in this chapter, Tom Egan developed the Lough Boora Parklands as an amenity so that the community could enjoy various activities at the location. Tom Egan believes that the Lough Boora Parklands have brought “huge benefits to the quality of life” to those who use the amenity. A significant number of different activities are present at the parklands and effort has been made to include people with disabilities.

Tom Egan pointed out that Bord na Mona is developing an amenity for walking and cycling at its Mount Lucas wind farm. This presents a positive social outcome for the community which lives near the wind farm and will enhance the social aspect of this particular installation’s triple bottom line (Elkington, 1999).

Outlook

This research has shown that the restoration, rehabilitation, and rewilding of cutaway peatlands provides positive social and environmental outcomes for their stakeholders. However, it would appear that the economic return for such projects does not cover the costs associated with their development and maintenance. Bord na Mona has encountered opposition to the idea to charge the public for the amenity it provides at some of its rehabilitated and rewilded cutaway bogs. Considering the costs of developing and maintaining these amenity projects and the valuable economic boost they provide to the surrounding community from tourism, this opposition may seem churlish. Rehabilitation and amenity projects could be compatible with economic uses: it may be necessary to “pair” rehabilitation and rewilding projects with more economic uses in a dual-use strategy in order to provide the funds required to maintain the amenity in light of public opposition to pay for them.

The benefits of rehabilitation, rewilding and amenity can be harnessed whilst the land is used for alternative means. This dual-use option, as well as other sustainable after-uses, are critically explored with key stakeholders and reported in the next section of this chapter.

6.2.4 Alternative approaches

The interviews with the key stakeholders revealed that the harnessing of wind energy from the cutaway bogs of Ireland will likely continue to prove divisive. It was found in the interviews that the production of biomass on Irish cutaway bogs requires considerable further research. Restoration and rehabilitation provides for positive environmental and social outcomes, but sees little economic return at present for Bord na Mona.

Going forward, Bord na Mona is likely to encounter difficulties in its peat business. Green Party leader Eamon Ryan believes that Ireland does not need electricity derived from peat-fired power plants because there is a present day over-supply of electricity in the Irish market. Ryan stated that Ireland's electricity needs can be supplied by wind and solar and from the use of our interconnections to import electricity, with gas being used in the short term. Ryan believes that "coal and peat-fired plants should be closed immediately." This perspective shows that peat-generated power could be under threat in the near future. Professor Hans Joosten believes that "peat mining in Ireland will soon cease." Dr. Renou-Wilson disagrees however, and stated that peat power stations are still a necessity for Ireland. However, Dr. Renou-Wilson conceded that within the next decade "there should be alternative electricity sources available to replace peat."

Bord na Mona's Strategic Development Manager Charles Shier indicated that the harnessing of solar energy is a possible option that Bord na Mona could consider. Shier stated that Bord na Mona is currently "tracking the technology" and its development. Eamon Ryan believes that solar energy in Ireland in 2014 is "viable." Ryan argued that "if it is viable in Germany, and if it is viable in England, than it is viable in Ireland." Ryan remarked that solar energy has been successful in Germany, and its cost has plummeted in Ireland over the last five years. However, Charles Shier stated that "solar energy is too expensive for Ireland at present." Shier believes that in time, the "efficiency of photovoltaics may increase to a level where it is economic to install solar panels in Ireland." However, Shier argued that solar is, by its very nature, an intermittent source of energy, so it will only be a partial solution to Ireland's energy needs in the future.

Similar to wind, storing solar energy is an issue.

When considering solar energy for cutaway peatlands, it is necessary to consider its compatibility with the environment and the effects on the local community. Dr. Renou-Wilson believes that solar panels could be placed on pylons on the cutaway, so that they would not be in direct contact with the ground. According to Dr. Renou-Wilson, this would mean that the residual peat at the cutaway bog could be rewetted, so as to prevent emissions of greenhouse gases which would occur if the peat layer was left dry. As such, it would appear that solar could be environmentally sustainable in a cutaway bogland context.

Speaking on behalf of the Rhode Parish Wind Turbine Action Group, protestor Mark Malone believes that there is certainly a “marked difference” between solar panels and wind farms in the landscape from a visual perspective. This indicates that solar energy may be more socially acceptable than wind turbines within communities, though Malone’s view may not be representative of the wider rural communities residing near cutaway bogs; the RPWTAG advises full public consultation be carried out at the outset of any policy formulation on the matter.

There are concerns regarding solar energy’s economic sustainability. Charles Shier believes that the “economics are poor at [Ireland’s] latitude”. Shier argued that solar energy would need price supports in place. Shier stated that the Irish government has not yet considered solar energy for supports within the renewable energy sector. Shier believes without government support, it is unlikely that anyone will invest in solar energy in Ireland. The RPWTAG does not believe that any power generating system should be subject to significant government subsidies however. It could be argued that without some level of government support, the solar power industry will find it challenging to become established in Ireland.

The option exists to adopt a dual-use strategy on the cutaway bogs of Ireland. Bord na Mona has already coordinated a number of initiatives together in the past. At the Lough Boora Parklands, Tom Egan stated that Bord na Mona has developed forestry, agriculture, amenity and conservation projects together at one location. Dr. Renou-Wilson believes that rewetted and rehabilitated peatlands can potentially host solar energy installations.

According to Dr. Renou-Wilson, at the Bellacorrick wind farm, turbines are situated in a

rewetted peatland. Dr. Renou-Wilson believes that planning approval for wind farms situated in cutaway bogs “should only be granted on the condition that the land is rewetted.” Harnessing wind energy is a suitable use for cutaway bogs, according to Professor Hans Joosten, and more so if it is “associated with rewetting”. This rewetted cutaway could be used for paludiculture, amenity, or as a restoration measure. Charles Shier also said that a reservoir holding water that was based in a cutaway bog could have wind turbines operating close by to it without any drawbacks. This multipurpose thinking should lead to a balanced outcome on Bord na Mona’s triple bottom line, owing to the fact that each of the established individual uses for Irish cutaway bogs identified have unbalanced outcomes: for example, weak social outcomes in the case of wind farming and weak economic outcomes in the case of rehabilitation.

The cultivation of paludiculture crops such as reeds and sphagnum would be compatible with wind farms, because, according to Dr. Farrell, “any biomass present would need to be low-growing, so as to not create any drag on the turbines.” Dr. Farrell said owing to the fact that an infrastructure would be in place to access the wind farm, harvesting these low-profile crops would be relatively easy. Professor Hans Joosten agreed. He said that there are “synergetic opportunities” at a dual-use wind farm and paludiculture site because both will benefit from a shared road infrastructure. Dr. Catherine Farrell stated that wind farms could even be placed in rehabilitated bogs. Dr. Farrell argued that the environmental impact would be limited, with cabling and other infrastructure only having a “small impact on the bog.”

According to Dr. Renou-Wilson, a “considerable amount of research” is required to ensure that the policy put in place for cutaway bog use is one which is going to have a successful, sustainable outcome. To enable it to extract the maximum value from its land base, Bord na Mona should engage in what Eamon Ryan identifies as “quadruple helix innovation”. Ryan said this model sees business, academia, civil society and industry working together in a collaborative fashion, so as to empower innovation. In this approach, this study suggests that Bord na Mona should work with universities both at home and abroad, as well as the professional growing media industry, so as to develop appropriate biomass and wet-crop solutions for its cutaway peatlands. Small-scale trials using species which are not adapted genetically for Irish cutaway substrate should not be conducted in the future owing to the costs of such trials. Bord na Mona

should also consider working with external companies to develop uses for its cutaway bogs. The company has done this in the past on its cutaways, where it worked with Northland Cranberries Inc. from the United States during the 1990s on a cranberry-growing pilot project, which would ultimately prove not to be commercially beneficial to continue (Clarke, 2010:257). As such, working with external stakeholders is not unprecedented at Bord na Mona, but as this example suggests, it is no guarantee of success.

Through collaboration with a number of partners, and with government support and adequate resources, the company may be in a position to extract the maximum sustainable use from its cutaway peatlands, whilst not impacting on communities and wildlife in a negative fashion.

6.3 Conclusion

This chapter presented the findings of primary research conducted as part of this study into Bord na Mona's use of its cutaway peatlands. A number of key stakeholders were interviewed. Their views were captured and presented and a number of potential solutions arising from these views were outlined. The respondent's feedback was critically examined through the lens of Elkington's (1999) triple bottom line theory. Alternative approaches such as harnessing solar energy from cutaway bogs and the adoption of a dual-use strategy were critically explored with the key stakeholders. However, this chapter does not provide for a clear path forward for Bord na Mona. No single solution was identified and agreed upon by the key stakeholders as being economically, environmentally and socially sustainable for use in the cutaway bogs owned by Bord na Mona.

The next chapter discusses the findings in this research. Conclusions will then be made and recommendations are set out.

Chapter 7: Discussion, Conclusions and Recommendations

7.1 Introduction

This chapter discusses the research findings, draws conclusions, makes a number of recommendations, and suggests areas where further research is required.

Chapter 1 set out the aims and objectives of this study, as well as the research question. The background of Bord na Mona is outlined before the international legislative context is described. This research is concerned with whether Bord na Mona's present use of its post-industrially harvested peatlands is sustainable from economic, environmental and social perspectives. These three variables arise from Elkington's (1999) triple bottom line theory. This model, along with a critical exploration of a number of other entrepreneurial and green business theories found within the international literature, were critically explored in Chapter 2.

The aim of Chapter 2 was to define and critically examine the concept of ecopreneurship. It was concluded that the ecopreneur, is concerned with either achieving environmental goals through the medium of business, or taking advantage of an economic opportunity within the green economy. The ecopreneur, much like the traditional entrepreneur, is a risk-taker and an innovator.

The aim of Chapter 3 was to critically appraise models of best practice for cutaway peatlands. It began by exploring the emerging agricultural practice of paludiculture: an economically, environmentally and socially sustainable use of post-industrially harvested peatlands. Two differing international examples of paludiculture were critically explored. The second part of Chapter 3 critically appraised Ireland's current proposed sustainable use of its post-industrially harvested peatlands in the form of the harnessing of wind energy.

Chapter 4 outlined the research methods used in this study. A qualitative approach was selected as the research method as it was deemed appropriate to the research question. This approach included a case study supplemented by a series of interviews with key informants identified either in the literature, or through contact with major stakeholders.

Chapter 5 presented the case study of Bord na Mona. The first section of the case study critically explored the history of the company with a number of theoretical tools, including the product-life cycle model and the SWOT Analysis tool. The second part of the case study critically appraised the company's past and present use of its post-industrially harvested peatlands. This chapter informed the questions posed to the key informants interviewed in Chapter 6. These questions could not be answered from within the present literature.

Chapter 6 analysed the responses of a number of key stakeholders about Bord na Mona's past and present uses of its post-industrially harvested peatlands. Three uses were explored in this study. They are (i) the harnessing of wind energy, (ii) the production and use of biomass, and (iii) the restoration, rehabilitation, rewilding and the development of amenity. The responses were contrasted amongst the respondents and were critically appraised using Elkington's (1999) triple bottom line theory.

The next section of this chapter critically discusses the findings of this study before drawing conclusions.

7.2 Discussion

Chapter 1 explored present day European Union directives and legislation which are concerned with the environment. This legislation informs national government policy and the supports which are available to businesses. In turn, this informs company strategy. It could be argued that Bord na Mona's New Contract with Nature initiative is as a result of European Union legislation which aims to limit greenhouse gas emissions.

Chapter 2 of this research began by outlining the value of the green economy, before defining the entrepreneur as an individual who creates new value by thinking "outside the box". The literature states that the entrepreneur identifies a problem and solves it, whilst assuming the financial, social and psychological risks associated with such actions. The entrepreneur is innovative, competitive and a wealth-generating change agent. However, the entrepreneur is a "creative free-rider" (Isaak, 1998:28). Free-riding off of the planet's finite resources are inherently

unsustainable.

Chapter 2 then argued that green entrepreneurship is sustainable entrepreneurship; they are one and the same, both resulting in positive economic, environmental and social outcomes. The sustainable business may be run by an ecopreneur if it is entrepreneurial in nature, as defined by the literature.

A broad definition of ecopreneurship is adopted in this study, as opposed to Isaak's (1998) more limited "ideal type". The "ecopreneur" is found to be an entrepreneur who either sets up a business to meet environmental goals through the medium of enterprise, or they may be a business person who sees an opportunity for economic gain in the green business sector. Whilst most ecopreneurs have strong green values, it is accepted in this study that some entrepreneurs can become green accidentally.

Elkington's (1999) triple bottom line theory argues that positive social outcomes should also be achieved. Social outcomes have become particularly important when considering the construction of wind farms in areas where people reside. Although there is argument in the literature that the social, environmental and economic outcomes of a given sustainable business should be largely equal, this study found that a positive economic outcome is essential so as to facilitate the achievement of long term environmental and social goals.

In Chapter 3 models of best practice in the form of paludiculture regimes in both Belarus and Canada were critically explored. Paludiculture is a sustainable use of cutaway and cutover peatlands. It involves rewetting an area of cutaway, and growing and harvesting a crop in a sustainable fashion. The rewetting of the cutaway land reduces greenhouse gas emissions from the land. If left dry, these cutaway peatlands can contribute a significant amount of carbon and other greenhouse gases into the atmosphere. Paludiculture crops also contribute to the formation of new peat substrate and provide an ecosystem for endangered species to reside in. The harvesting of the crops provide rural jobs and an income for ecopreneurs. Because this method of cutaway bog usage is new, it has not yet become common practice across the cutaway peatlands of the world.

Paludiculture could present an option for ecopreneurs and ecopreneurial organisations. Private

cutaway or cutover peatlands in Ireland could be transformed with its successful implementation. It could also be adopted by Bord na Mona for use in its cutaway peatlands. Renou-Wilson, et al. (2011:xviii) recommend using paludiculture, where suitable, along with peatland conservation and restoration, to avoid further carbon loss into the atmosphere from degraded peat soils.

Whilst paludiculture of reeds in Belarus and the farming of sphagnum mosses in Canada has been successful to date, these projects may not necessarily be applicable to Ireland: geographical context is very important. Ireland is predominantly made up of blanket and raised bogs (Coillte, 2007), and Belarusian peatland areas, for example, consist primarily of fen lands (Bambolov and Rakovich, 2005:21). Projects conducted successfully in one region may not work as well, if at all, elsewhere. As such, applying the Belarusian reed production model to Ireland may not be straightforward.

Bord na Mona, the state-owned industrial peat harvester, is committed to co-fueling its power plants with renewable fuels (Egan, 2008:392). However, reed-based paludiculture, as seen in the Belarusian example, may not be suitable in Ireland owing to the type of peat typically present. Gaudig et al. (2014) argue that sphagnum farming may be suitable for the nutrient-poor soils. This could mean it is suitable for poor quality soils found in heavily harvested cutaway bogs in Ireland. As outlined in Chapter 6, trials in Ireland with various reed species have been deemed unsuccessful. Egan (2008:392) stated that “the potential of cutaway boglands for short rotation crops is very limited and the longer rotation of crops such as birch and willow appear to be the best solution”. However, establishment of reed beds at the Lough Boora Parklands is nevertheless viewed favourably as a wetland habitat for wildlife (Egan, 2008:391).

Research by Wilson et al. (2013) over the course of three years shows the potential for Irish cutaway bogs to retain their remaining carbon dioxide stores upon the re-establishment and maintenance of their natural hydrological condition. Sphagnum mosses were used as a growing medium on some of Renou-Wilson, et al.’s (2013) study sites. This suggests that Canadian peatland practices and initiatives could potentially be applied across the cutaway bogs of Ireland. However, bogland conditions in one part of the country may be different to other sites, so significant research may be required before a large-scale sustainable sphagnum peat moss strategy can be adopted.

There is a market already in place for sphagnum-derived products. Sphagnum-based growing media will fill the needs of the professional horticulture industry for a high-quality, environmentally-friendly product (Gahlert, et al. 2010:1). Sphagnum farming is an innovative solution to the question of how Bord na Mona should utilise its cutaway bogs as it meets the firm's process needs (Drucker, 2008:72-3): it will meet the requirement to provide an after-use which is equal parts environmentally, socially and economically sustainable. With Bord na Mona's experience in the horticulture growing media market, this approach will carry less risk than if the company had not served this sector previously (Koch, 2006:191).

One significant drawback to this after-use strategy is the cost of sphagnum-based growing media; at present, niche markets can be profitable for sphagnum-based products, but it cannot compete with cheaper white peat, or peat moss, in the wider marketplace (Gaudig, et al. 2014:9). In terms of its product life cycle, sphagnum as a growing media is a nascent product at the introduction stage (Kotler, et al. 2009:490). This cost may reduce in time; as outlined earlier in this research, when a product is developed and its use doubles, costs associated with its production decrease by between 20-30 percent (Koch, 2006:240).

The initial costs associated with such a sphagnum project could be supported through the Public Service Obligation (PSO) levy, an annual charge on electricity customers of which approximately 38% is paid to support the unsustainable peat industry in Ireland (Commission for Energy Regulation, 2013:17). Renou-Wilson et al. (2011:xvi) argue that the present support for the peat industry, which is responsible for significant carbon emissions, is not in the public's best interest in the long term owing to its contribution to climate change.

Chapter 3 also critically explored the present day response in Ireland by Bord na Mona to the question of what sustainable uses can be applied to cutaway peatlands. The solution proposed is to develop a series of wind farms on this land base. This chapter found that sustainable energy can be harnessed from wind turbines and that peatlands are attractive to wind farm developers owing to their geographical location. These two points are contested by Mark Malone of the Rhode Parish Wind Turbine Action Group in Chapter 6. Lastly, Chapter 3 finds that wind farms can be used for secondary purposes.

A number of issues were identified from the review of the literature. It was considered appropriate to research Bord na Mona to ascertain whether its proposals for its cutaway bog use were sustainable. The research approach chosen in Chapter 4 was to develop a case study of the company and then supplement this with a series of interviews with identified key informants from within and outside the company. A qualitative approach was chosen because a rich, detailed and in-depth account of Bord na Mona's past and its present operations was desired.

The case study in Chapter 5 critically examined the case history of Bord na Mona using a number of theoretical frameworks. This approach demonstrated that the company has had a turbulent past with many external factors affecting its success, such as the Second World War, the weather, and the oil crisis of the 1970s. The case study found that in 1989, Bord na Mona decided to become a more environmentally-friendly company (Clarke, 2010:257). The case study documented the movement of the company from its unsustainable business practices and negative environmental outcomes, to a point in which it strives to become truly sustainable. However, the concern is that in the present day, Bord na Mona is continuing to cut bogs and use peat for the generation of electricity. This continued business activity is contributing to greenhouse gas emissions and thus climate change.

The second part of the case study critically explored the uses the company developed for its cutaway bogland resource. Various uses were identified and critically appraised, including forestry, agriculture and the cultivation of biomass. Forestry has proven to be a challenge at Bord na Mona, with many of the trials concluded as being economically unsustainable. The interviews of key stakeholders in Chapter 6 revealed that it is not profitable at present to cut naturally growing timber from the bogs for use as a biomass either. Agriculture has also been dismissed for the most part as not being viable on the cutaway bogs. Chapter 6's interviews outlined the failure of several biomass projects piloted by Bord na Mona on its cutaway bogs.

Restoration is the ideal environmental outcome for cutaway peatlands. However, there is a cost attached to this. It may be difficult to acquire a long term income from restored bogs or rehabilitated cutaway bogs through the sale of carbon credits. However, this is nevertheless worth further investigation on the part of Bord na Mona, as this research revealed that the company does not receive any income from the sale of carbon credits at present.

Based on the findings in Chapter 6, it would appear to be challenging to implement a carbon credits trading scheme to monetise cutaway bogs which have been restored or returned to nature. Nevertheless, Professor Hans Joosten outlined a means by which Bord na Mona could derive an income from the sale of carbon credits in Chapter 6. Such a scheme could be sustainable from economic, environmental and social perspectives if implemented successfully. To develop a business model for such a scheme would go beyond the scope of this research study however.

Chapter 6 included information concerning the wind farm business model in place at Bord na Mona. The findings revealed that wind farms are profitable for the company and have led to positive environmental outcomes, such as the displacement of fossil fuels from the Ireland's energy consumption mix. There were concerns that cutaway bogs hosting wind farms were left in a dry condition, thus emitting carbon into the atmosphere. The interview with Charles Shier found that Bord na Mona is now planning on rewetting cutaway bogland around wind turbines to prevent this from occurring. However, there has been social unrest in some rural communities in which wind turbines have been erected. Local people have concerns regarding the loss of visual amenity, health issues arising from living close to wind turbines and the possible depreciation in property value of residencies located adjacent to wind farms. It is difficult to ascertain whether wind farms will be a long term solution in Ireland to the country's energy needs given this negative public reaction.

Bord na Mona's present use of biomass for co-firing is dependent on imports and purchasing from private companies. There may be issues in the future with the security of supply for imported biomass and an upturn in the world economy could result in higher shipping costs for Bord na Mona. To not use its own land resource for biomass production appears on initial inspection to be an oversight. However, the difficulties faced by the company in the past with attempting to grow various crops on its cutaway bogs must be acknowledged.

7.3 Conclusions

When critically exploring Bord na Mona's cutaway bog sustainability credentials, some key issues emerge. Bord na Mona continues to industrially harvest the peatlands of Ireland and its

business activities remain based upon the harvesting and trading in fossil fuels, 25 years after the company decided to become more environmentally-friendly. Dr. Renou-Wilson of UCD believes the term “harvest” should not be applied to the activities of Bord na Mona because the term implies that the crop can grow back again: it takes many hundreds of years for peat to re-accumulate. Dr. Renou-Wilson argues that Bord na Mona’s activities on the bogs of Ireland amount to open-cast mining.

From an environmental perspective, Bord na Mona’s efforts to develop alternative sources of energy in the form of harnessing the wind must be commended. The negative social outcomes as a result of wind farms have been explored in Chapter 6. Bord na Mona Strategic Development Manager Charles Shier believes that the protest movement may threaten wind farm development in the future. Cutaway bogs located near communities face stiff challenge from local residents. As such, when answering the research question posed in this study as to whether or not Bord na Mona’s present use of its cutaway bogs is sustainable from economic, environmental and social perspectives, it is clear that the social element is challenged if wind farms are located near rural communities. Owing to the fact that people reside near bogland in Ireland, a wind energy strategy cannot be considered sustainable when analysed with Elkington’s (1999) triple bottom line model. There is also the concern that the requirement to have a fossil fuel back up power facility for its wind farms, calls into question the environmental sustainability of such wind farming. This view was put forward by the Rhode Parish Wind Turbine Action Group. To critically explore this aspect would be to go beyond the scope of this study however. Dr. Renou-Wilson acknowledged the concern that wind farms require a sustainable back-up solution but said that it is likely that this issue will be solved in the near future.

This study finds that solar energy projects in cutaway bogs could be developed when the technology is economical to use in Ireland. Community ownership initiatives could be put in place for renewable energy projects as this may lead to enhanced community support. Paludiculture projects may attract little or no community protests owing to their minimal impact on landscape amenity and the possible opportunity to bring jobs to rural communities.

The international literature concerning the sustainable after-use of peatlands once industrial extraction has halted has concluded that paludiculture is a desirable option. Successful biomass

paludiculture has not taken place in Ireland to date. Tom Egan stated in his interview that biomass was grown by Bord na Mona on dry bog. The species selected for these trials were inappropriate. Dr. Catherine Farrell has successfully implemented a paludiculture project for sphagnum moss in Ireland. However, Dr. Farrell stated that the species used in this project is not considered a commercially suitable crop.

Implementing paludiculture regimes in Ireland successfully will be challenging. However, the two examples presented in Chapter 3 of this research study should be considered as potential after-use options by Bord na Mona. Considerable research will be required however. To offset the potential cost, government supports could be provided to the stakeholders of such paludiculture developments in Ireland. A suggestion offered by Renou-Wilson et al. (2011: xviii) is that paludiculture projects should be encouraged on industrial cutaway peatland through tax relief incentives.

In order to develop a viable paludiculture crop, Bord na Mona could work with a number of collaborating partners. For example, in the past, Bord na Mona has worked with University College Dublin on the BOGFOR programme, which identified the difficulties of successfully growing viable tree crops on cutaway bogland. It is recommended that Bord na Mona seek other partners, for example the Michael Succow Foundation or the University of Greifswald to explore the development of a suitable paludiculture crop for Irish cutaway bogs.

A research-informed paludiculture strategy at Bord na Mona could result in the company diversifying its present business activities. It could offer an innovative solution to its present concerns regarding the after-use of its cut-out bogs. When applying the product life cycle to Bord na Mona's activities, a successful paludiculture regime could usher in the company to a renewed growth stage, and provide positive environmental outcomes, a source of employment for rural communities and offer a good return on investment.

A dual-use strategy could be applied to Bord na Mona's cutaway bogs. This research found that paludiculture regimes can be developed in cutaway bogs that house wind farms owing to the fact that wind turbines have a very small physical footprint, and the height of reeds and sphagnum is such that they would not interfere with the movement of wind over the blades of the turbines.

It is likely that Bord na Mona will allow some of its cutaway bogs to rewild naturally. There are concerns surrounding the costs of rehabilitation projects and whether Bord na Mona has the finances to develop more parklands such as that at Lough Boora. Working with local ecopreneurs at these locations could result in modest revenues for the company and the creation of green jobs within the local economy, resulting in enhanced outcomes across Bord na Mona's triple bottom line.

Summary

This section presents a summary of the research findings in this study under the headings of wind, biomass and restoration, rehabilitation, rewilding and amenity.

Wind

1. Bord na Mona should continue developing wind farms on its cutaway bogs in remote locations and consent widely with key stakeholders.
2. Communities should be consulted prior to the construction of wind farms in the areas in which they reside. The business model for such projects should be transparent and made available to the public. Bord na Mona should consider a community ownership scheme to allow local people to benefit directly from such developments. Larger-sized turbines should be located further away from residences than is presently set out in legislation.
3. Bord na Mona should collaborate with partners to develop an innovative green energy storage system so that its wind farms are no longer dependent on fossil fuels as a back-up when wind is not actively blowing.

Biomass

1. This research finds that Bord na Mona's strategy of importing biomass from around the

world may not be viable in the long term owing to concerns over the security of supply and the potential increase in the cost of shipping in the future.

2. The research presented concludes that the growing of biomass, such as reeds and timber, on Irish cutaway bogs appears to be uneconomic, owing to the nature of the substrate present.
3. This research finds that there is the potential to grow and cultivate sphagnum moss on the cutaway bogs of Ireland. The resulting produce could be used as a growing medium in the place of unsustainable peat moss. It is recommended that Bord na Mona research the practice of sphagnum moss farming at its cutaway bogs, including those which presently host wind farms.

Restoration, rehabilitation, rewilding and amenity

1. This research finds that restoration, rehabilitation and rewilding of cutaway bogs is desirable from environmental and social perspectives. However, it does not bring direct income for the landowner at present.
2. This study recommends that Bord na Mona should research carbon credit trading schemes in order to fund these projects. A business plan for the restoration, rehabilitation and rewilding of the company's cutaway peatlands should be developed and used across the company's land holdings.

This research envisages an ideal outcome for the cutaway bogs of Ireland would include a dual-use strategy, which would result in positive outcomes across all three aspects of Bord na Mona's triple bottom line. It is recommended that Bord na Mona identify suitable business partners and stakeholders to work with them in order to implement this ecopreneurial vision.

7.4 Recommendations

This study recommends that further research is required.

Gibbs (2009:74) argues that as part of a research agenda into green enterprise and sustainable business, further research should be conducted. According to Gibbs (2009:74), there is scope to carry out detailed research within green business in order to assess the extent to which its practices differ from more mainstream, profit-focused firms, as well as ascertain whether the employees working in green businesses hold the same ecopreneurial vision of the founder or founders of the enterprise. A more detailed understanding of green business may result in further supports for this emerging sector to be developed.

Further research into paludiculture is recommended by this study. Paludiculture projects around the world are at an early stage, but as Chapter 3 outlines, they have seen success. Paludiculture is little understood in Ireland. It is likely that paludiculture regimes would result in little or no civil unrest.

If wind and solar options are to be used in Ireland in the long term, then it is essential that a storage medium for this renewable energy is developed. Present back-up options are unsustainable and there is concern that they may result in significant greenhouse gas emissions, thus reducing the green credentials of the renewable energy systems in which they support.

A business model for trading carbon credits arising from rehabilitation and rewilding projects should be explored. At present, Bord na Mona does not trade in carbon credits. As such, this is an opportunity for Bord na Mona to develop a sustainable use for its cutaway bogs.

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List of Appendices

Appendix A – Treaties and European Union Directives concerned with the environment

A number of treaties and European Union Directives which are concerned with the environment are outlined below.

Treaties of Rome

Two treaties, agreed in Rome, and which entered into force in January 1958, were the Euratom Treaty and the European Economic Community Treaty; the latter of which is considered by Pinder and Usherwood (2007:14) as the more important of the two. In fact, it is widely considered *the* Treaty of Rome (Pinder and Usherwood 2007:14), and will be referred to as such throughout this study.

Environmental policy was not part of the Treaty of Rome (European Environment Agency, 2011; Treaty of Rome, 1957). However, as concern surrounding various environmental disasters began, action was taken at Community level by the setting up of the European Action Programme in 1972 (European Environment Agency, 2011). By the late 1970s, the European Union would be making legislation to protect environmental concerns.

The Bird's Directive and the Habitats Directive

The Bird's Directive of 1979 is the European Union's oldest piece of nature legislation (European Commission, 2014e; European Commission, 2014d). It is a comprehensive policy which aims to protect the wild bird population of the European Union (European Commission, 2014e). This Directive recognises that habitat loss is the most serious threat to Europe's wild birds (European Commission, 2014e). As such, the Directive places a great emphasis on the protection of the habitats of endangered or migrating species (European Commission, 2014e).

The Habitats Directive, together with the Bird's Directive, form the cornerstone of the European Union's nature conservation policy (European Commission, 2014c), came into effect in 1992 (European Commission, 2014d). It consists of two pillars; the Natura 2000 network of protected sites, which include over 200 different habitats types, and a strict system of species protection (European Commission, 2014c).

Natura 2000 is the "centrepiece of European Union nature and biodiversity policy" (European Commission, 2014d). A European Union-wide network of protected natural sites (European Commission, 2014d), aims is to ensure the long-term survival of Europe's most valuable and threatened species and habitats (European Commission, 2014d). Its comprises Special Areas of Conservation (SACs), which are designated by member states, and incorporates Special Protected Areas (SPAs), which are designated under the 1979 Bird's Directive (European Commission, 2014d).

Single European Act

The Single European Act (SEA), signed in February 1986 and entering into force in 1987, was the first revision of the Treaties of Rome (Europa, 2010a). It was designed to further integrate the nations and complete the internal market (Europa, 2010a).

Polluted air and water cannot be prevented from moving from one country into another, where it can then cause damage (Pinder and Usherwood, 2007:100). As such, there is a common interest in controlling pollution at its source (Pinder and Usherwood, 2007:100-1). Under Article 130R of the Single European Act, the European Community reaffirmed its objective to "preserve, protect and improve the quality of the environment" (Pinder and Usherwood, 2007:101; Single European Act, 1986:17). It also provided for policy to deal with the pollution issue (Pinder and Usherwood, 2007:101).

Article 130R part 2, the Treaty (Single European Act, 1986:17) states that actions taken by the community will be proactive in nature, with action taken prior to events which could lead to environmental damage. The Act (Single European Act, 1986:17) also states that repairing of damage should take place at source, and that those responsible must pay for the damage.

Environment Action Programmes

According to the European Commission (2011a), many of today's measures for protecting the environment and its natural resources can be traced back to the first Environment Action Programme (EAP). This study will examine the two most recent EAPs; the fifth and sixth Environment Action Programmes.

The Fifth Environment Action Programme (1993:18) provided a framework for a new approach to the environment, and to economic and social activity. The programme acknowledges the difficulty in changing unsustainable patterns of behaviour and consumption, but it intended to break current trends as much as possible (Fifth Environment Action Programme, 1993:18). The programme was approved in February, 1993 (Europa, 2005). It had longer term objectives than its predecessors (Europa, 2005).

The Sixth Environment Action Programme, "Environment 2010: Our Future, Our Choice", covered the period from July 2002 to July 2012 (Europa, 2011a). It builds upon its predecessor (Europa, 2011a). It proposes five main areas for strategic action. These concern improving the implementation of existing legislation, integrating environmental concerns into other policies, working in partnership with business, empowering citizens and changing their behaviour, and taking account of the environment in land-use planning and management (Europa, 2011a). In respect to working with the business community, companies are incentivised to improve their environmental performance through a reward scheme; they are encouraged to conduct the Eco-Management and Audit Scheme (EMAS) and an eco-labeling scheme is encouraged (Europa, 2011a).

The Sixth Environment Action Programme recognises that climate change poses the main concern within its framework (Europa, 2011a). The intention is to meet the objectives laid out in the Kyoto Protocol (Europa, 2011a). The main objective in this area is to reduce emissions of green-house gases to a level which will not cause unnatural variations in the planet's temperature (Europa, 2011a). To meet this challenge, the European Union endeavours to integrate climate change policies into various community policies, in particular energy policy and transport policy,

reduce green-house gas emissions through increasing the use of renewable energy sources, encourage industry to make energy savings and enact specific measures to improve energy efficiency (Europa, 2011a).

The Sixth Environment Action Programme is also concerned with the concept of biodiversity. Its aim is to “protect and restore the functioning of natural systems and halt the loss of biodiversity in the European Union and on a global scale” (Europa, 2011a). To achieve this objective, measures will be taken, including the protection, conservation and restoration of landscapes, the integration of nature conservation and biodiversity into commercial policies, support for research into nature conservation, and the establishment of a strategy for the protection of soil (Europa, 2011a).

Another aim of the Sixth Environment Action Programme is to improve the environment for the benefit of human health (Europa, 2011a). It focuses on areas such as pollution, noise control, evaluating the risk from chemicals and banning or limiting the use of hazardous pesticides to meet its aims (Europa, 2011a).

Part of the Sixth Environment Action Programme is to ensure that the consumption of both renewable and non-renewable natural resources does not exceed the carrying capacity of the environment (Europa, 2011a). In this regard, the programme aims to achieve a significant reduction in resource use and reduce waste in business (Europa, 2011a). Actions to achieve this include developing a strategy for the sustainable use of resources, implementing a tax on resource use, removing subsidies which encourage over-use of resources, the establishment of a strategy for the recycling of waste, and improving existing waste management schemes (Europa, 2011a).

Article 191 of the Treaty on the Functioning of the European Union

Since the early 1970s, the European Union has been committed to protecting the environment (Europa, 2013a). This includes protecting air and water quality, conserving biodiversity, managing waste, and controlling activities which have an adverse environmental impact (Europa, 2013a). As such, European Union policy, based on Article 174 of the Treaty Establishing the

European Community (2002), aims to facilitate the sustainable development of European society (Europa, 2013a). This article is now referred to as Article 191 of the Treaty on the Functioning of the European Union (2010:132).

In section 1 of Article 191 of the Treaty on the Functioning of the European Union (2010) it states that the European Community will adhere to achieving the following objectives: it will preserve, protect and improve the quality of the environment, it will protect human health, it will utilise natural resources in a prudent and rational fashion, and it will promote measures at international level to deal with regional and worldwide environmental problems, with particular regard to combating climate change. Section 2 of Article 191 of the Treaty on the Functioning of the European Union (2010) commits to aim at a high level of protection of the environment, taking into account the diversity of circumstances in the various regions of the Community: it will take preventative action where possible, it will rectify environmental damage at source and make the polluter pay for their actions. In section 3 of Article 191 of the Treaty on the Functioning of the European Union (2010), in respect of the preparation of environmental policy, the European Union shall take account of available scientific and technical information, the environmental conditions in the various regions of the European Union, the potential benefits and costs for actions and the lack of action, the economic and social development of the Community as a whole, and the balanced development of its regions. Section 4 of the Article 191 of the Treaty on the Functioning of the European Union (2010), notes that the European Union and member states may cooperate with “competent international organisations”.

Appendix B - European Union funding and supports

The European Commission (2012a) provides funding to individuals and organisations that promote its policies within the European Union, and further afield. It does this through two distinct programmes; LIFE and The Competitiveness and Innovation Framework Programme – Entrepreneurship and Innovation Programme (CIP-EIP).

The LIFE initiative is a European Union funding instrument for the environment (European Commission, 2012b). Its objective is to support EU environmental policy by co-financing

environmental, biodiversity and nature-related projects (European Commission, 2012b) and the raising of awareness of European Union policy (European Commission, 2012d). Since its establishment in 1992, the LIFE project has supported 3,104 projects, a cost of €2.2 billion to date (European Commission, 2012b).

The Competitiveness and Innovation Framework Programme – Entrepreneurship and Innovation Programme (CIP-EIP) supports eco-innovation projects by providing funds to those eligible. The initiative supports entrepreneurs to bring innovative ideas to market (European Commission, 2012c). To be eligible, these ideas should include new products, services, techniques or processes which reduce current CO₂ emissions, promote recycling, or improve established use of resources (European Commission, 2012c).

Intelligent Energy – Europe and Enterprise Europe Network

The Intelligent Energy – Europe (IEE) programme was established to support cleaner, greener energy usage throughout the European Union (European Commission, 2012e). Its main objectives are to promote energy efficiency, encourage the rational use of resources and increase the use of renewable energy sources (European Commission, 2012e). The initiative aims to support the European Union’s “3 times 20” target; 20% less greenhouse gas emissions, 20% better energy efficiency, and 20% share of energy will come from renewables (Executive Agency for Competitiveness and Innovation, 2013a).

Intelligent Energy - Europe funds projects which promote and support energy efficiency or renewables (European Commission, 2012f). These funds can cover as much as 75% of the cost of a project (European Commission, 2012f). €65 million was available for projects in 2013 (Intelligent Energy Europe, 2013).

The European Enterprise Network (Executive Agency for Competitiveness and Innovation, 2013b) is a large network of contact points providing information, advice and answers to questions to European businesses about European Union matters. 3,000 staff in 600 contact points provide assistance about EU legislation, help finding a business partner, or information regarding funding opportunities (Executive Agency for Competitiveness and Innovation, 2013b).

Eco-Innovation

Eco-innovation is the introduction of innovative products, processes and services which protect the environment (Eco Innovation, 2011:4). The Eco-Innovation scheme is focused on changing consumption and production patterns, in an effort to reduce people's impact on the wider environment (Executive Agency for Competitiveness and Innovation, 2013c).

Between 2008 and 2013, the Eco-Innovation initiative made almost €200 million available to fund projects that contribute to eco-innovation across Europe (Executive Agency for Competitiveness and Innovation, 2013c). The objective of the scheme is to boost Europe's environmental and competitive position by "supporting innovative solutions that protect the environment while creating a larger market for "green" technologies, management methods, products and services" (Executive Agency for Competitiveness and Innovation, 2013c). Eco-Innovation will provide funding to projects it deems to be the most worthy, basing its decision on the applicant's level of innovation, the benefits it will bring to the environment, its marketability and its estimated economic impact (Executive Agency for Competitiveness and Innovation, 2013c).

Eurostars Programme and Eco-Innova

The Eurostars Programme is a European Joint Programme which supports small and medium sized enterprises (SMEs) that are involved in research and development together (Eurostars, 2013a). To be eligible for support, the leading firm must spend at least 10% of their turnover, or full-time equivalent, on research (Eurostars, 2013a, Eurostars 2013b). The aim of the Eurostars programme is to stimulate SMEs to lead international collaborative research and innovation projects by easing access to funding and supports (Eurostars, 2013a). Projects should be three years in duration, or less, with the outcome reaching market within two years of the completion of the project (Eurostars, 2013b). Thirty-three European countries participate in the Eurostars Programme at present, with this being facilitated through the EUREKA network of national offices (Eurostars, 2013c).

Eco-Innova (2013a) supports research and its dissemination in the area of eco-innovation. It provides a networking platform for information exchange for stakeholders of eco-innovation across Europe (Eco-Innova, 2013a).

Appendix C - Supports for green businesses in Ireland

The next section of this chapter will examine the various green enterprise supports available in Ireland.

Under the European Union Directive 2009/28/EC, the Irish State is bound to its agreement whereby 16% of energy consumed in the country across the electricity, heat and transport sectors comes from renewable sources (Department of Communications, Energy and Natural Resources, 2014a). As part of this, the country has introduced the REFIT scheme.

The Renewable Energy Feed-in Tariff (REFIT) schemes are the primary support structure for renewable electricity production in Ireland (Department of Communications, Energy and Natural Resources (2014a). REFIT provides funding for onshore wind, hydro, and various biomass projects (Dreblow, et al. 2013:5) through its guaranteed pricing system (Sustainable Energy Authority of Ireland, 2014a). This will provide certainty to renewable energy generators in Ireland, and will foster a sustainable energy sector in the country (Sustainable Energy Authority of Ireland, 2014a).

The High Level Action Group (2009:47) believes that the development of the green economy in Ireland can boost future economic growth through the creation of jobs and export opportunities. In order for green entrepreneurs to develop and grow their offerings, they will need support. Forfas (2011) acknowledges in “Developing a Green Enterprise”, four bodies which offer support to green businesses in Ireland; these are Sustainable Energy Authority of Ireland, Enterprise Ireland, Environmental Protection Agency and IDA Ireland.

Of particular interest to entrepreneurs is Enterprise Ireland, which is concerned with the development and growth of Irish enterprise (Forfas, 2011:10). Enterprise Ireland helps businesses start up, innovate, win export sales, research and scale up their operations once

successful (Forfas, 2011:10). Enterprise Ireland (2012) has a specific Environment and Green Technology team which helps firms “incorporate sustainable business practices into the day-to-day running of [their] business”. Other Enterprise Ireland supports include the Green Start initiative and website Envirocentre.ie. Green Start is an information and advisory service designed to help firms meet and exceed regulatory requirements (Enterprise Ireland, 2012). Envirocentre.ie is an information portal designed to promote environmental awareness and improve Irish enterprise. It includes information on a range of subjects such as legislation, regulations, waste management, recycling, eco-design and carbon management (Enterprise Ireland, 2012).

Funding is available for businesses seeking to become more ‘green’ in their future business activities. One of these is called the Enterprise Ireland Business Process Improvement Grant. Successful applicants to the scheme can gain funding towards the cost of carrying out an Environmental Improvement Assignment (Enterprise Ireland, 2012). This assignment may include researching methods to improving environmental management practices at the firm, and help with assessing and applying environment best practice to the business (Enterprise Ireland, 2012). With Enterprise Ireland’s (2012) Technical Feasibility Grant, successful applicants will receive funding to conduct a technical feasibility study into products, processes or services which may be environmentally superior to those presently in use.

In line with the theory that improved resource efficiency leads to reduced costs in the running of a business, Enterprise Ireland has established a “Green Team” (Enterprise Ireland, 2012). The Green Team helps businesses incorporate sustainable practices into their day-to-day activities (Enterprise Ireland, 2012).

The GreenStart department at Enterprise Ireland is a free service which provides information and advice to clients on how they can meet and exceed regulatory requirements (Enterprise Ireland, 2012). Its aim is to increase environmental awareness in businesses which do not have in-house environmental expertise or who have had little or no expose to environmental issues to date (Envirocentre.ie, 2014). Once greener thinking and practices are put in place, these may become stepping stones towards more advanced improvements in time (Envirocentre.ie, 2014).

Through Enterprise Ireland's Business Process Improvement Grant, successful applicants will receive funding towards the cost of a GreenPlus assignment (Enterprise Ireland, 2012). GreenPlus is designed to build on GreenStart. These assignments are designed to help managers to increase business efficiencies, reduce waste, increase competitiveness and help them strive towards sustainability (Enterprise Ireland, 2012). GreenPlus is designed to help a given business to achieve a high level of environmental capability (Envirocentre.ie, 2014). GreenPlus can also help a business achieve various environmental standards, such as ISO 14001 Environment Management Systems, ISO 50001 Energy Management Standard and ISO 14064 Carbon Management (Envirocentre.ie, 2014). Following on from GreenPlus, the GreenTransform initiative provides businesses which have met energy efficiency and carbon footprint reduction measures, with capital support from Enterprise Ireland in order to expand their operations (Envirocentre.ie, 2014).

There are alternative supports for sustainability-driven businesses in Ireland. One is called "Green Business". Green Business is a free resource efficiency service available to all small-to-medium (SMEs) enterprises in Ireland (Green Business, 2014a). It is funded through the Environment Protection Agency (EPA) under the National Waste Prevention Programme (Green Business, 2014a). The aim of Green Business is to help SMEs improve resource efficiency and reduce their waste outputs, water usage and energy consumption (Green Business, 2014a). Businesses can request a free on-site audit from Green Business, which is carried out by experienced, professional environmental consultants (Green Business, 2014a). The resulting report will provide the business with recommendations for resource efficiency savings (Green Business, 2014a). In time, reductions in resource use will save the business money (Green Business, 2014b).

Six months after the audit, Green Business will follow up on the recommendations, and will help the business to assess the extent of savings in a case study (Green Business, 2014b). Green Business (2014b) also provide workshops for businesses conducted by experts, advice by telephone or the internet, and may also refer business to other resource agencies and funding schemes where appropriate (Green Business, 2014b).

Many businesses have benefitted from Green Business assistance. One example is the

Cork-based Atlas Box and Crating Company (Green Business, 2014c). The business manufactures bespoke packaging for other businesses (Green Business, 2014c). Resource efficiency measures include the installation of solar panels for energy, skylights being used in the ceiling of the facility to reduce lighting costs, and reducing gas-use for heating (Green Business, 2014c). After an initial investment of €1,800, the business now saves €12,368 per annum (Green Business, 2014c).

Green businesses who have difficulty is securing finance from one of the schemes or initiatives outlined above or from high-street banks can apply to Microfinance Ireland. Microfinance Ireland (2014) is a not-for-profit lender, established to deliver the Irish government's Micro Enterprise Loan fund. Start-up businesses in Ireland of less than ten employees and a turnover of under €2 million can apply to Microfinance Ireland (2014) for a loan of between €2,000 and €25,000 for a term of between three and five years.

Whilst standard funding is available from mainstream financial institutions such as banks, and building societies, it may be desirable for Ireland to adopt a "green business loan scheme". In the Netherlands, a bespoke funding system is currently in place for green enterprises. In 1995, the Green Funds Scheme was launched in the Netherlands (European Commission, 2013a). Thousands of successful sustainability projects have been funded through this scheme (European Commission, 2013a). The Dutch government designed the initiative to encourage investors, through tax incentives, to provide capital to green projects (European Commission, 2013a). Funding is provided to green entrepreneurs and green project managers at a lower interest rate than would be charged for normal loans (European Commission, 2013a). This scheme may be suitable for use in Ireland, as it would encourage investment in start-up green businesses who may find it difficult to acquire seed capital from banks. Investors would benefit from tax-reduced returns in a time where interest rates on savings accounts at mainstream banks are low (Sheehan, 2013).

Appendix D: Examples of green businesses

There are a number of green business described in the literature. Several are described below.

The Body Shop was established by Anita Roddick in Brighton, in the United Kingdom, in 1976 (Body Shop, 2013a). Roddick's enterprise sold 'natural' cosmetics which were ethically sourced (Isaak, 1998:45-6). As an example, Roddick contracted with native Brazilian Kayapo people to gather and process nuts for use in hair conditioner (Isaak, 1998:46). This arrangement increased the value of the nuts, resulting in higher wages for the Kayapo (Isaak, 1998:46). Owing to the fact that they were making a good living, the Kayapo people moved away from logging in the forests (Isaak, 1998:46). As such, Roddick's business had both positive social and environmental outcomes. The business is regarded as a pioneering green-green firm by Isaak (1998: 43-6).

Ben & Jerry's (2013a) was established in Vermont, in 1978. It became well known for its social responsibility, innovation and progressive activism (Isaak, 1998:47). An example of social responsibility by the firm is their contract with Native Americans to pick berries in Maine for use in ice-cream (Isaak, 1998:48). This gave sustainable jobs to people who may have struggled to find other employment (Isaak, 1998:48). Similarly to The Body Shop, Ben & Jerry's gave value to nuts derived from rainforests – offering to buy them for use in its ice-cream range, so as to offer a sustainable use for forests which might otherwise have been used for logging (Isaak, 1998:48).

De Bruin and Lewis (2010) describe three green enterprises in their examination of small and micro-sized firms in New Zealand. The first of these examples is an enterprise ran by Linda Lee, which aims to educate people about recycling of food through vermiculture, and the growing of organic food, whilst at the same time earning a living from the worm farm (De Bruin and Lewis, 2010:103). Waste Not Consulting is a for-profit consultancy firm, focusing on providing waste audits for local government and territorial authorities (De Bruin and Lewis, 2010:103). Jackie and Wayne Rive run Brookby Herbs, a business which produces natural, organic, additive-free herbal remedies for equine and canine health (De Bruin and Lewis, 2010:104).

Dixon and Clifford (2007) identify a firm with a unique business model for the United Kingdom: Green-Works was a small not-for-profit organisation and franchise set up by Colin Crooks in 2000. The business involved encouraging companies to supply them with unwanted furniture to Green-Works, as opposed to disposing of it in landfill, where it would have a negative impact on the environment (Dixon and Clifford, 2007:329). Companies who engaged in this practice would

be able to report that they were committed to tangible green or social initiatives (Dixon and Clifford, 2007:334). Green-Works employed and trained people from disadvantaged sectors of society to refurbish the furniture, thus providing positive social contribution to society (Dixon and Clifford, 2007:329). The repaired furniture would further serve a social good as it would be sold for a low sum of money onto organisations which would not normally be able to afford such high quality goods (Dixon and Clifford, 2007:329).

As is the case with profit-focused enterprises, green-green firms are not always successful. Earth Sanctuaries Ltd, which launched in 1985, is a case in point (Volery, 2002:109). The business was an attempt by entrepreneur Dr. John Wamsley to preserve rare and endangered native animals, which would be funded by eco-tourism at the sanctuaries based around wild regions of Australia (Aretino, Holland and Peterson, 2001:6). As well as tourism, Earth Sanctuaries Ltd. generated revenues from merchandise sales, accommodation, conference hosting, contracts for wildlife and conservation management, and consultation services (Volery, 2002:111). Wamsley believed commercialising conservation was critical to the long-term survival of threatened species (Volery, 2002:112). By putting a price on animals, it was envisaged that vested interests would ensure their long-term survival (Volery, 2002:112). For example, if people rent accommodation at a resort so as to see a rare species of bird, then it is in the best interests of the proprietor of the business to preserve that bird species (Aretino, Holland and Peterson, 2001:8). However, this perspective has the drawback that rare species which may not garner much public interest, may not receive the support they require in order to thrive (Aretino, Holland and Peterson, 2001:8). Earth Sanctuaries Ltd. collapsed in 2002 (Vollery 2002:115) owing to the fact that there was a large amount of capital required to purchase land and install sufficient fencing, institutional investors were reluctant to support the company owing to its uniqueness and overly aggressive expansion plans led to cash-flow problems (Volery, 2002:114).

However, Australia has seen a more successful outcome at the Banrock Station Wetland Complex in South Australia. In 2002, it was listed as a wetland of international importance under the Ramsar Convention on Wetlands in October 2002 (Butcher, et al. 2009:1). The business brings together conservation and commerce. Its primary focus is to sell wine around the world, which it produces in a sustainable way in its vineyards (Banrock Station (2013a). Tourism also

forms part of its business. A wine-tasting centre at the complex attracts 100,000 visitors every year (Butcher, et al. 2009:73). Its sustainable business credentials are clear: water irrigation is used sparingly at the business, resulting in the company receiving the international environment management system accreditation ISO 14001 (Banrock Station, 2013b). Solar energy is generated and used for electricity at the complex (Butcher, et al. 2009:73). For every bottle of wine sold, the business donates money to conservation projects around the world (Banrock Station, 2013c). For example, Banrock Station (2013d) has donated funds to help support the reintroduction of otters into the Netherlands, extirpated there since 1983. It also supports the restoration of wetlands in Sweden in an effort to help various bird species reproduce (Banrock Station, 2013e).

Appendix E: Origins of the green movement in Ireland

The Irish “green” movement can be traced back to the anti-nuclear sentiment of the 1970s. This will lead to the establishment of the Irish Green Party. The widespread environmental concerns across Ireland during the 1970s and 1980s would provide for a favourable context in which more sustainable energy generation would be feasible.

In the 1970s, the Irish state sought to develop a nuclear policy (Leonard, 2006:80). There are several reasons for this. The onset of the global oil crisis in 1973, which saw oil shortages and high prices, saw the state look towards nuclear energy as a secure source of power (Leonard, 2006:81-82). Energy demands in the economically buoyant late 1970s grew (Leonard, 2006:82). Lastly, the development of a nuclear energy plant at Carnsore Point was considered a vital component in presenting Ireland as a good destination for industrial investment (Leonard, 2006:83).

Nuclear energy has been a contentious issues in Ireland for many years, with organised opposition existing since the 1970s (Engineers Ireland, 2012). Campaigns against nuclear power plants arose from concerns about the dangers of radiation exposure in the decades following World War II (Leonard, 2006:79). However, Better Environment with Nuclear Energy (Griffin, 2013) has presented the case for nuclear energy to the Oireachtas Transport and Communications

Committee by stating that using nuclear energy to generate electricity is clean, safe and cost effective. According to Renou-Wilson and Farrell (2010:2) nuclear energy remains unpopular in 21st century Ireland. This divisive matter has its roots in a time when the Irish state was considering building a nuclear power plant in Carnsore Point, County Wexford. In 1978, protests (RTE, 1978) helped to persuade the government to abandon its plans (Leonard, 2006:81).

The Nuclear Energy Board was established in 1973 under the Nuclear Energy Act, 1971 (Radiological Protection Institute of Ireland, 2014a). It was established to regulate a proposed nuclear power station at Carnsore Point in County Wexford (Radiological Protection Institute of Ireland, 2014a). Upon consultation with the Nuclear Energy Board, the government of the time decided against plans to establish a nuclear energy plant at the proposed site (Radiological Protection Institute of Ireland, 2014a). In place of the nuclear power stations, a coal-burning power station was built in County Clare (Engineers Ireland, 2012). This plant would emit significant amounts of greenhouse gas during its lifetime (Engineers Ireland, 2012).

During the 1980s, and particularly after the Chernobyl accident in 1986, the role of the Nuclear Energy Board was to monitor radiation levels in Ireland and protect the public (Radiological Institute of Ireland, 2014a).

Radiological Protection Institute of Ireland (2014a) succeeded the Nuclear Energy Board in 1992 under the Radiological Act, 1991. Its role today is to protect the public from the health and safety risks associated with ionizing radiation, license and regulate the use of ionizing radioactive materials in medicine, industry, research and education, map indoor radon hotspots across the country and representing Ireland abroad in matters concerning radiation and nuclear matters (Radiological Protection Institute of Ireland, 2014a).

The Carnsore Point protests were the beginning of the environmental movement in Ireland (Leonard, 2006:99). One of the most notable outcomes was the founding of the political grouping of the Green Party. This arose as a result of a coalition of many green and left-wing groups from across the island of Ireland (Leonard, 2006:99). These groups would go on to form the Green Alliance, before later becoming the Irish Green Party (Leonard, 2006:99).

The Green Party was formed in 1981; its first county councillor was elected in 1985 and its first

TD was elected in 1989 (Green Party, 2014a). The Green Party is a member of the European Green Party (Green Party, 2014a). It was formed by people concerned with protecting the environment, improving planning, a movement towards sustainable economic growth and achieving social justice in Ireland (Green Party, 2014a).

The founding principles of the Green Party (2014b) include the following:

- The impact of society on the environment should not be disruptive;
- Conservation of resources is vital to a sustainable society;
- As caretakers of the earth, [people] have the responsibility to pass it on in a fit and healthy state

The Green Party would go on to make significant gains from its establishment in the 1980s, holding seats in both the Dail and the European Parliament (Leonard, 2006:167). In the Irish local elections of 2004, the party received considerable support, which resulted in it taking local authority seats across the country ((Leonard, 2006:167). The party would go into a coalition government with Fianna Fail from 2007 until 2011 with six TDs (Green Party, 2014a). The Greens would lose these six seats following the Irish general election of 2011 (Dowling, 2011:25).

Whilst the Green Party does not have any elected TDs in the 31st Dail (Dowling, 2011:25), it continues to be a vociferous advocate for environmental protection and green energy, with leader Eamonn Ryan a regular contributor to the public discourse concerning environmental issues.

In the present day, there have been significant developments in policy concerning the environment (Renou-Wilson and Farrell, 2010:2). These developments include the end of an era of cheap fossil fuels, particularly oil, the realisation that fossil fuels are finite in nature, and the need for action on climate change (Renou-Wilson and Farrell, 2010:2).

Appendix F: Irish wind energy's major stakeholders

The wind energy sector has a number of key stakeholders. These are briefly outlined below.

Irish Wind Energy Association

The Irish Wind Energy Association (2012) is an organisation committed to the promotion of wind energy in Ireland. It was established in 1993 (Irish Wind Energy Association, 2013). The Wind Energy Association (2012) works to influence government policy and other decision-making bodies on behalf of the Irish wind industry. Its other activities include research, commissioning of reports and organising informative bi-annual conferences (Irish Wind Energy Association, 2012).

The Irish Wind Energy Association (2013) is dedicated to creating awareness, educating the public and promoting the use of wind as an energy source in Ireland, and abroad, as an economically viable alternative to conventional energy generation.

The Government

In 21st century Ireland, successive Irish governments have been concerned with the environment and have committed resources to the green economy. For example, in 2008, the then Taoiseach Brian Cowen's government had a strategy in place to implement a new "green deal"; a commitment to move the country away from its dependency on non-renewable fossil-fuels such as coal, oil, peat and gas through investment in renewable energy, promotion of the green enterprise sector and the creation of "green-collar" jobs (Government of Ireland, 2008:4). The present day government is similarly committed to a sustainable future for Ireland.

In its Programme for Government (2011:13), coalition partners Fine Gael and Labour committed to supporting the creation of "green jobs". In respect of wind farms, the Programme for Government (2011:59) states that they will be built in locations where the wind regime is best, they will be built in large numbers together so as to reduce the costs of grid connection under the

GATE 4 process.

The National Renewable Energy Action Plan sets a number of goals in three key sectors; electricity, transport, and heat (Government of Ireland, 2010:5). The government has set a target of 40% of electricity will come from renewable energy by 2020 (Government of Ireland, 2010:5).

At present, Ireland's transport sector is dependent on imported oil (Government of Ireland, 2010:6). The Irish government is working on a two-pronged solution to this: increase the use of biofuels and accelerate the usage of electric cars across the country (Government of Ireland, 2010:6). Under the Biofuel Obligation Scheme, as of January 1st 2013, 6% of fuel must be sourced from renewable energy (Department of Communications, Energy and Natural Resources, 2012a). This presents an opportunity for further production of biofuels in Ireland (Government of Ireland, 2010:6). It may be viable to source biofuels from biomass grown on land within wind farm facilities in a paludiculture initiative.

Following on from the National Renewable Energy Action Plan, the Department of Communications, Energy and Natural Resources (2012b) launched its Strategy for Renewable Energy: 2012-2020 in 2012; it sets out five strategic goals:

- Increase onshore and offshore wind energy production
- Build a sustainable bioenergy sector
- Foster research and development in renewable energy sources
- Grow sustainable transport
- Build robust and effective networks

The first goal which is concerned with the increase of onshore and offshore wind energy production, is most relevant to this study.

Local authorities have an important role to play in the country's overall renewable energy strategy. Local authorities are involved in identifying and zoning suitable areas for renewable energy projects such as wind farms (Sustainable Energy Authority of Ireland, 2014f). As such, local authorities now play a key role in Ireland in achieving its renewable energy targets

(Sustainable Energy Authority of Ireland, 2014f). On request from local authority planning representatives, the Sustainable Energy Authority of Ireland (2014f) developed a Local Authority Renewable Energy Strategy (LARES) to help guide decision making.

This guidance, or methodology, is designed to bring a consistent approach to all local authority renewable energy strategies (Sustainable Energy Authority of Ireland, 2014f). It is designed to align county development plans with national and European Union obligations (O'Rourke, 2013:33). It has the potential to attract local development and investment in the jurisdiction in which it is enacted (O'Rourke, 2013:33). The Methodology for Local Authority Renewable Energy Strategies (Sustainable Energy Authority of Ireland, 2013a) outlines the steps a local authority should take when planning a renewable energy strategy. There are specific guidelines available which is concerned with wind energy generation called "Wind Farm Planning Guidelines".

EirGrid

EirGrid is an Irish state-owned commercial company which provides wholesale electricity transmission across the island of Ireland (EirGrid, 2014a). Eirdgrid (2014a) holds the licences of Transmissions System Operator (TSO) and Market Operator (MO) in the Republic of Ireland, and is the owner of System Operator Northern Ireland (SONI Ltd.), which itself is the TSO and MO in Northern Ireland. The Single Electricity Market Operator (SEMO), which operates the Single Electricity Market (SEM) on the island of Ireland, is part of the Eirgrid Group (EirGrid, 2014a). As Transmissions System Operator, EirGrid (2014a) operates and maintains a safe, reliable and economical electricity transmission system, and develops strategically important infrastructure projects for the socio-economic development of Ireland. EirGrid is committed to meeting renewable energy goals across the island of Ireland (EirGrid, 2014b).

Under the National Development Plan 2007-2013 (141), the Irish government identified a need to develop a strategic energy link in the form of a High Voltage Direct Current interconnector (HVDC) between the Republic of Ireland and Britain (EirGrid, 2012a).

Ireland's first electricity connection to Britain was officially opened in September 2012 (EirGrid

2012a). The EirGrid East West Interconnector runs between County Meath in Ireland to Deeside in Wales in the United Kingdom and has a capacity to carry 500 megawatts and can carry electricity both ways (Eirgrid, 2012a). This connection will increase security of supply for both countries and will encourage the growth of renewable energy generation as it provides a means to export green energy from the Republic of Ireland to Britain (EirGrid, 2012a). In County Antrim, the Moyle Interconnector facilitates the exchange of electricity between Northern Ireland and Scotland (Mutual Energy, 2009).

Grid25 is EirGrid's plan to develop and upgrade its transmission networks up to the year 2025 (EirGrid, 2014e). This major development will require a €3.2 billion investment, but will provide Ireland with a safe, secure and affordable electricity supply going forward (EirGrid, 2014e). EirGrid (2014e) states that this project "critical to Ireland's future from both an economical and environmental standpoint".

SSE Airtricity

Airtricity was founded and by Irish businessman Eddie O'Connor in 1997 (UCD, 2014). O'Connor was Chief Executive Officer, and ran the business as a renewable energy-focused company (UCD, 2014) until it was purchased by Scottish and Southern Energy (SSE) in 2008 in a deal worth €2.1 billion (Brodie, 2008).

Scottish and Southern Energy (SSE) is a leading electricity and gas company which operates predominantly in the United Kingdom and Ireland (SSE, 2012a). The company has 13,000 megawatts of capacity for generating electricity in its power stations, wind farms and hydro electric generators (SSE, 2012a). Renewable energy makes up a significant part of SSE's portfolio (SSE, 2012a).

SSE is working with communities on renewable energy projects through its Sustainable Development Fund (SSE, 2014a). The recently launched fund supports strategic energy projects which bring social, economic and/or environmental benefits to the community in which it is based (SSE, 2014a). Funding is available within the local authority area in which SSE operates a wind farm that was constructed after the 1st of January 2012 (SSE, 2014a). Funding could be

worth as much as £50 million over the next 25 years (SSE, 2014a).

SSE has been working with communities for over ten years through funding initiatives which support local groups and charitable activities in areas close to their wind farms (SSE, 2013a:2). These funds have totaled over £11 million to date (SSE, 2013a:2).

Since its purchase in 2008, Scottish and Southern Energy has invested €2 billion in the company (Airtricity, 2014a). Across the island of Ireland, Airtricity (2014a) provides domestic and business customers with electricity and gas, as well as public lighting.

Airtricity is committed to generating electricity in a sustainable fashion. 24% of its electricity is sourced from renewables (Airtricity, 2014a). Over 500 megawatts of renewable energy from 25 wind farms makes up Airtricity's green energy portfolio (Airtricity, 2014a).

Mainstream Renewable Power

In 2008, businessman and entrepreneur Eddie O'Connor founded Mainstream Renewable Power (UCD, 2014). The company is in the business of developing green business projects and producing sustainable power from wind and solar sources for utility companies and investors (Mainstream, 2014a). The firm's business model differs for onshore and offshore developments.

The offshore business model requires Mainstream (2014b) to identify a suitable area of sea, receive planning permission for the development of a wind farm there, design and negotiate its construction with developers, secure the materials such as the turbines and electricity cables, and organise the vessels required for its construction. Once this process is complete, Mainstream (2014b) then sells the project to a buyer, who can immediately proceed with the project.

Onshore operations work in a similar fashion to offshore; however, the project is developed up to the point where it is fully operating (Mainstream, 2014c). Investors can become involved with the project at any stage during its development (Mainstream, 2014c). Mainstream (2014c) will fully operate the project for investors if required.

At present, Mainstream (2014a) has operations across the world, including in Ireland, Chile,

Canada and South Africa. Mainstream (2014a) is Europe's leading independent offshore wind energy business, resulting from its development of almost 8 gigawatts of power from projects in England, Scotland and Germany.

Mainstream Renewable Power is an advocate for a proposed "supergrid" across Europe. This development would be a new Europe-wide electricity grid which would "revolutionise how [society will] generate, transmit and consume electricity for generations to come" (Mainstream, 2014f).

Mainstream Renewable Power's Eddie O'Connor first had the idea for the Supergrid in 2001, before establishing the "Friends of Supergrid" (FOSG) in 2010 (Mainstream, 2014f). Friends of Supergrid is made up of more than twenty different companies (Mainstream, 2014f). The organisation regularly contributes to national and European consultations on matters concerning energy and electricity grids (Mainstream, 2014f).

Mainstream has a wind farm in the construction phase at Carrickeeny in County Leitrim (Mainstream, 2014d). This project will be sold to Swedish retailer IKEA once fully operational (Mainstream, 2014d). This purchase will further IKEA's ongoing sustainability strategy, which sees the retailer embrace renewable energy (IKEA, 2013:40). Mainstream Renewable Power is also developing the Energy Bridge in the midlands of Ireland.

Production of renewable energy for export to the United Kingdom presents the midlands with an opportunity for economic growth and social development (Energy Bridge, 2014b). This opportunity is placed in the context of the gradual reduction in the unsustainable harvesting of peat in the region in the coming years (Energy Bridge, 2014b). During the first phase of the project, 400 wind turbines will be constructed across seven counties (Energy Bridge, 2014b).

Element Power Ireland

Element Power (2014a) is renewable energy company established in 2008 by Hudson Clean Energy Partners. Hudson Clean Energy Partners is a private equity firm which invests in renewable power, alternative fuels and energy efficiency projects (Element Power, 2014a).

Element Power (2014a) develops, acquires and operates a portfolio of wind and solar power generating facilities in sixteen countries across the world. Greenwire (2014a) is a proposed development of up to forty wind farms, containing as many as 750 turbines, positioned in clusters throughout five counties of Ireland: Kildare, Laois, Meath, Offaly and Westmeath (Greenwire, 2014a). The project will see green energy, derived from Irish wind, being exported to the United Kingdom (Greenwire, 2014a).

To offset community concerns, Greenwire (2014a) claims that all its cabling will be underground, and the project can co-exist with agriculture. The firm recently held public information events in Meath and Westmeath to present its project, explain its potential and engage with stakeholders in the area (Tullamore Tribune, 2013).

Element Power has negotiated with Bord na Mona about using cutaway bogs as sites for its wind farms (Greenwire, 2014c). To date, Element Power has not installed any wind turbines on cutaway bogs (Greenwire, 2014c). Instead, the company works with private landowners to accommodate its wind farms (Greenwire, 2014c).

Irish public, local residents and community groups

Whilst it is clear that overall society will benefit from wind energy generation, residents living close to wind turbines have expressed concerns. Many individuals and community groups in Ireland are opposed to or concerned about wind farms. Concerns include the cost of their development, bird and bat fatalities during their operation and damage to the appearance of the landscape (Layton, 2014:1). Speaking about local concerns that the wind farms may impact on the appearance of the landscape, energy campaigner De Jong (2012) expressed a desire for a public debate on the matter.

Wind energy companies such as Element have taken note of the various local concerns and have attempted to counter the issues that residents have through “information days” (Tullamore Tribune, 2013). Mainstream CEO Eddie O’Connor stated (Madden, 2014) that local communities must be engaged with, and their views listened to. O’Connor insisted that his employees visit every house within one kilometer of their planned wind farm development, to

engage with those who would live within the vicinity of the wind farms (Madden, 2014).

It could be argued that community funding initiatives as outlined in this chapter from Mainstream and Airtricity for example, are designed to appease concerned individuals and groups. Against the best efforts of the wind energy generators, various opposition movements have emerged.

Rhode Parish Wind Turbine Action Group is an example of a community movement which campaigns on the behalf of residents against some aspects of wind energy generation. It recently lobbied for wind farms not to be built within five kilometres of villages and settlements in Offaly (Offaly Independent, 2013). In March, 2014, it will protest in Dublin alongside other community groups, against what it believes is an industrialisation of the landscape of Ireland (Rhode Parish Wind Turbine Action Group, 2014).

The Laois Wind Energy Awareness Group (2013b) is comprised of a group of rural citizens from County Laois who are driven to raise awareness of proposed wind farm development projects across their county and the surrounding midlands. Their group's overall aim is to stop these wind farms developments by means of informing the public in an effort to increase resistance (Laois Wind Energy Awareness Group, 2013b).

North Kerry Wind Turbine Awareness (2014) is a group which campaigns to raise awareness of the issues it believes surround wind farm development in the north of County Kerry. Hickey (2014) reports that the group handed in a petition containing over one thousand signatures opposing wind farm development at Ballyhorgan to Kerry County Council. Three hundred objections have also been lodged against the wind farm's planning permission application and protest have taken place outside the council's buildings in Tralee (Hickey, 2014). The proposed wind farm operating company, Stacks Mountain Windfarm Ltd., has stated that a full environmental impact assessment had been carried out at the proposed wind farm site and it would be happy to discuss the development with each homeowner in the vicinity of the wind farm (Hickey, 2014).

Laois Wind Energy Awareness Group (2013a) question the impacts of wind farms on local residents. Concerns include an assumed decrease in the ease of sale of properties in close

proximity to wind farms, an impact on tourism, noise pollution from the operation of the turbines and the possibility of contracting “Wind Turbine Syndrome” (Laois Wind Energy Awareness Group, 2013a).

Wind turbine syndrome, identified by Harvard Medical School’s Dr. Nina Pierpont, allegedly affects some individuals who live near wind turbines and sees sufferers experience nausea, headaches, insomnia and dizziness (Donaldson James, 2013). However, the condition is not recognised by the Centres of Disease Control and Prevention in the United States (Farberov, 2013). Research into wind turbine syndrome has been called into question owing to its methodology, which consisted of research into a small sample (Donaldson James, 2013). Individuals were interviewed by telephone, were not examined physically nor were their medical records examined by Pierpont (Donaldson James, 2013). It should also be noted that Dr. Pierpont’s husband lobbies against the wind energy industry (Farberov, 2013).

Research prepared for the Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health in the health effects of wind turbines on human health revealed that the noise of turbines can cause sleep disruption in people if they are located close to homes (Ellenbogen, et al. 2012:13). Sleep deprivation can adversely affect mood, cognitive functioning, and the individual’s overall sense of health and well-being (Ellenbogen et al, 2012:13). However, the report finds is no evidence to suggest that noise in and of itself can cause health problems (Ellenbogen et al., 2012:13). The available evidence shows that infrasound levels near wind turbines cannot impact on the vestibular system (Ellenbogen et al, 2012:13). The report found no evidence of a set of symptoms which could be called “Wind Turbine Syndrome” (Ellenbogen et al, 2012:14). No evidence was found to suggest that shadow flicker from rotating wind turbine blades could cause seizures (Ellenbogen et al., 2012:14). However, ice can be thrown from frozen wind turbines, and precautions should be taken to stay a reasonable distance from them in cold weather (Ellenbogen et al., 2012:15). The report states that public participation in wind farm projects can make people feel more positive and more accepting towards them (Ellenbogen et al., 2012:15).

Landowners are set to benefit from wind farm developments on their land. Landowners receive significant rents from wind farm developers from hosting turbines on their property (Irish Wind

Energy Association, ND:1). They also enjoy long term certainty for this income as wind farms typically have a lifespan of between twenty and twenty-five years (Irish Wind Farm Association, ND:1). In the Irish midlands, Mainstream Renewable Power aims to pay 400 private landowners €7.2 million per year to provide areas for wind farms, planned for construction (Mainstream, 2014g). This is an average payment of €18,000 per landowner per year, for the duration of their participation in the harnessing of wind energy.

Appendix G: Interviewee details

Chapter 6 saw four senior employees of Bord na Mona interviewed. Charles Shier, Strategic Development Manager at the Powergen arm of the company outlined its business model for the development of wind farms at the company's cutaway bog land resource. John O'Halloran is the Biomass Manager at Bord na Mona. O'Halloran's views were sought regarding the biomass business model at the company. Dr. Catherine Farrell, senior ecologist at Bord na Mona was interviewed for the purposes of ascertaining the feasibility of a widespread rehabilitation, rewilding and paludiculture strategy being adopted at the company. Tom Egan, a Land Project Manager who oversaw the development of the Lough Boora Parklands was interviewed about tourism and amenity, as well as biomass trials conducted on the cutaway bogs owned by the company.

Four external stakeholders were interviewed to give their views of the sustainable business practices of Bord na Mona. Dr. Florence Renou-Wilson is a lecturer and researcher of peatlands at University College Dublin. She expressed concerns regarding the outcomes of the biomass trials conducted at Bord na Mona. Peatland expert Professor Hans Joosten of the University of Greifswald in Germany was interviewed. Prof. Joosten outlined the suitability of Ireland for growing sphagnum mosses and explained how Bord na Mona could exploit the carbon trading market. Eamon Ryan, leader of the Green Party, was interviewed for his perspective on the continued activities of Bord na Mona. Finally, Mark Malone of the Rhode Parish Wind Turbine Action Group was interviewed for his organisation's perspective on Bord na Mona's present days use of its post-industrially harvested peatland.

The below table outlines the interviewee's names, their respective organisations, their position therein, and the date of their interview.

Interview date	Name	Organisation	Position
05/06/2014	Charles Shier	Powergen, Bord na Mona	Strategic development manager
05/06/2014	Dr. Catherine Farrell	Bord na Mona	Senior ecologist
26/06/2014	Tom Egan	Bord na Mona	Land project manager
26/06/2014	John O'Halloran	Bord na Mona	Biomass manager
20/06/2014	Prof. Hans Joosten	University of Greifswald	Professor in peatland studies and palaeoecology
25/06/2014	Eamon Ryan	Green Party	Party leader
28/05/2014	Dr. Florence Renou-Wilson	University College Dublin	Research scientist and lecturer
06/07/2014	Mark Malone	Rhode Parish Wind Turbine Action Group	Member

Appendix H: Interview questions

Eight interviews were conducted as part of this study. The questionnaires used during each interview can be found below.

Interview 1: Questions for Dr Catherine Farrell, Senior Ecologist at Bord na Mona

Could you briefly outline your job title, area of expertise and your academic background please?

1. Outside of tourism potential, it is difficult to monetise rehabilitated peatlands. Does the European Union Emissions Trading Scheme or other carbon trading initiatives represent an opportunity in this regard?
2. What are the costs associated with peatland rehabilitation at Bord na Mona, and how are these initiatives funded?
3. Which of the European Union Directives have the most impact on rehabilitation activities in Ireland?
4. The Environmental Protection Agency's *Bogland: Sustainable Management of Peatlands in Ireland* report recommended the adoption of a paludiculture regime as the most appropriate after-use of cutaway and cutover peatlands. What paludiculture regimes has Bord na Mona initiated to date?
5. The recent draft for the National Peatlands Strategy noted that new crop production techniques, such as paludiculture, and especially relating to sphagnum cultivation, should be explored. Is Bord na Mona presently researching sphagnum farming?
6. What are the challenges in implementing a sphagnum farming paludiculture programme in Ireland today?
7. Bord na Mona is pursuing a wind energy after-use strategy on a significant number of its cutaway peatlands. The Environmental Protection Agency's *Bogland: Sustainable Management of Peatlands in Ireland* report states that wind farms and paludiculture should be encouraged on industrial cutaway peatlands. Can the two after-uses operate together, or in your opinion, are these uses mutually exclusive?
8. Likewise, can rehabilitated bogs play host to wind farms? What would be the environmental impact of wind farms of rehabilitated bogs?

9. The literature says that rehabilitating bogs has a positive environmental outcome, but what positive social outcomes can arise from rehabilitating Irish peatlands?
10. Research in Canada on peatland after-use is primarily focused on the cultivation of sphagnum moss grown on cutover peatlands. Whilst the overall environmental and substrate context in Canada may be different to Ireland, what lessons, if any, can be applied to Ireland from the Canadian experience to date?
11. In Britain, the Moors for the Future Partnership has been relatively successful in rehabilitating and protecting moorlands in the Peak District and the South Pennines. Could a similarly large-scale project such as this be conducted in Irish peatlands? What would the challenges be to such an initiative in Ireland?
12. Bord na Mona continues to cut peat from the bogs of Ireland, even though it promotes itself as being sustainability-focused. There is a need however for electricity for businesses, homes and organisations across Ireland. Whilst this need must be met somehow, do you think that future generations of Irish people will pay an environmental price for this continued exploitation of bogs taking place in Ireland today? If so, what can we do about it in the present?

Do you have any other comments to make in relation to the rehabilitation of cutaway peatlands in Ireland, paludiculture regimes, and the supports which are necessary at government level to help make widespread peatland rehabilitation and sustainable use a reality?

Interview 2: Questions for Charles Shier, Strategic Development Manager at Powergen, Bord na Mona

Could you briefly outline your job title, area of expertise and your academic background please?

1. Could you describe the business model for wind farms at Bord na Mona?
2. What steps lead up to the development of a wind farm on Bord na Mona's cutaway bogs?
3. How profitable have they been to date? And are they capital intensive?
4. Can you describe the positive social and environmental outcomes resulting from the Bord na Mona wind farm experience to date?
5. What have been the main social, economic and environmental drawbacks to Bord na Mona's wind farm policy so far?
6. What are the challenges and threats to future wind farm development on cutaway bogs in Ireland?
7. What impetus or impact did Eddie O'Connor have on wind farm policy at Bord na Mona?
8. Local communities residing in the vicinity of wind turbines have concerns regarding turbine flicker, the value of their property decreasing, and pylons located close by. What can be done to assuage these concerns? Could joint-owned Bord na Mona and community wind energy projects be the answer?
9. Wind farms can be viewed *prima facie* as being a green after-use option for post industrially harvested peatlands. But how environmentally friendly are wind farms if they are located on a dried out, carbon-emitting degraded peat substrate?
10. The Environmental Protection Agency's *Bogland: Sustainable Management of Peatlands in Ireland* report states that wind farms and paludiculture should be encouraged on industrial cutaway peatlands. Can the two after-uses operate together, or in your opinion, are these uses mutually exclusive?

11. Which European Union Directives or international agreements have had the most impact on Bord na Mona's wind policy to date, in your opinion?
12. What other sustainable secondary uses does Bord na Mona envisage for wind farms sites based on cutaway peatlands? What would be the main challenges of a dual-use strategy if enacted?
13. A given wind farm's lifespan is finite before it decommissioned; do you see wind farm developments as being a "green stepping-stone" onto a more social and environmentally sustainable solution to our green energy needs, or are they a long term remedy to the present day energy question?
14. Has Bord na Mona given any consideration to installing solar photovoltaic installations in its cutaway peatlands?
15. Minister Pat Rabbitte recently remarked that the midlands wind export project, which involved Mainstream Renewable Power, Element Power and Bord na Mona, was now not a realistic proposition owing to policy and economic issues. Will the cancelling of the government's energy export proposals affect Bord na Mona's plans for its Clean Energy Hub?

Have you any other comments to make on the present after-use of cutaway in Ireland, wind farm development in general and government policy in relation to green energy?

Interview 3: Questions for John O'Halloran, Biomass Manager at Bord na Mona

Could you briefly outline your job title, area of expertise and your academic background please?

1. Can you describe how Bord na Mona utilises biomass at present?

2. It would appear that Bord na Mona is reliant on external sources of biomass to co-fire with its peat in power stations. Does this come at a cost to Bord na Mona, or is it a profitable to do this?
3. According to the Environment Protection Agency's *Bogland: Sustainable Management of Peatlands in Ireland* report, paludiculture offers more advantages than other peatland after-use options. Initial reed canary grass trials at Bord na Mona showed poor results however. Can you elaborate on the reasons for this?
4. The *Bogland* report goes on to suggest that further trials should be conducted using different seed species and different seed sources and the appropriate fertilisation regimes should be used. Is Bord na Mona acting on this recommendation?
5. What other forms of biomass have been trialled on Bord na Mona cutaway peatlands?
6. Given the difficulties in the production of tree crops encountered over many years of research and trials in Irish cutaway bogs, what is the general consensus towards the production of timber as a cutaway after-use option today?
7. The *Bogland* report recommends that Bord na Mona trials Alder as a medium for biomass. Has Bord na Mona acted on, or has considered action on, this recommendation?
8. In Florence Renou-Wilson et al.'s paper *The Potential of Birch Afforestation as an After-use Option for Industrial Cutaway Peatlands*, it was found that downy birch may be useful as a medium for biomass production on cutaway bogs. Have the recommendations in this paper been acted upon in Bord na Mona to date?
9. Does the European Union Emissions Trading Scheme or other carbon credits sales schemes represent an opportunity for Bord na Mona to fund research and development

relating to biomass production from rewetted peatlands, as envisaged in projects such as that in Belarus?

10. Wind farm developments appears to be a key component of Bord na Mona's peatland after-use strategy. The Environmental Protection Agency's *Bogland: Sustainable Management of Peatlands in Ireland* report states that wind farms and paludiculture, such as the production of reeds for biomass, should be encouraged on industrial cutaway peatlands. Can the two after-uses operate together, or in your opinion, are these uses mutually exclusive?
11. What government supports could help with the development of biomass initiatives on cutaway peatlands?

Do you have any other comments to make in relation to the rehabilitation of cutaway peatlands in Ireland, paludiculture regimes, and the supports which are necessary at government level to help make widespread peatland rehabilitation and sustainable use a reality?

Note: O'Halloran decided at the beginning of the interview to not answer the questions – instead, O'Halloran offered an unstructured interview, in which he described Bord na Mona's biomass business model in detail.

Interview 4: Questions for Thomas Egan, Land Project Manager at Bord na Mona

Could you briefly outline your job title and length of service at Bord na Mona, your area of expertise and your academic background please?

1. Donal Clarke writes that you have been involved at the Lough Boora Parkland project from its inception. Can you describe how the project was developed, and what were the costs associated with such a development? What were the main challenges in the development of the parklands?

2. Many after-uses have been trialled at Boora, but many have had limited success. Can you briefly describe each of these trials (eg willow, miscanthus, reed canary grass, alder, cranberries), and describe their respective outcomes?
3. Research has shown that birch can be used as biomass, and is suitable for cultivation on cutaway peatland. It also grows naturally on the cutaway. Is there an opportunity at Boora to harvest naturally occurring birch for use as a medium for co-firing with peat for the generation of electricity at power stations?
4. What after-use trials, if any, are taking place at Boora at present?
5. As admission is free, how does Bord na Mona pay for the upkeep of the parklands, and what economic opportunities are there at the parklands for the company in the future?
6. Has Bord na Mona explored the idea of eco-tourism at the Parklands?
7. Now that wind turbines technology has advanced to a point where they can be situated at inland and lowland locations, are there plans to develop wind farms at Boora? Can wind farms and amenity projects co-exist or do you believe they are mutually exclusive?
8. In your paper "*The Lough Boora Parklands*" project on cutaway bogland in West Offaly Ireland. Its ecological, economic and social benefit to that Region you mention that the parklands provide economic benefits to local communities. Can you describe these benefits?
9. Bord na Mona has welcomed artists to work at the Parklands. Would the company similarly welcome would-be ecopreneurs to establish green, sustainable businesses at the parklands?

10. Does Bord na Mona plan on replicating the Lough Boora Parklands amenity model to another cutaway peatland site in Ireland?

Lastly, have you any general comments you would like to make regarding the outcomes of the Lough Boora Parkland project to date? Do you envisage the model being used in other parts of Ireland, or will wind farm development become the predominant after-use option in the future?

Interview 5: Questions for Dr Florence Renou-Wilson, Research Scientist and Lecturer at University College Dublin

Could you briefly outline your job title, area of expertise and your academic background please?

1. In the *Bogland: Sustainable Management of Peatlands in Ireland* report you co-authored, you recommended that government policy should support paludiculture initiatives. Other than tax relief measures, how do you envisage this support being enacted?
2. At 12.5%, the corporate tax rate in Ireland is competitive with their European equivalents. Can you outline what tax relief measures would look like when supporting paludiculture programmes?
3. The *Bogland* report states that wind farms and paludiculture should be encouraged on industrial cutaway peatlands. Can the two after-uses operate together, or in your opinion, are these uses mutually exclusive? What would be the main challenges of a dual-use strategy?
4. Do you have environmental concerns regarding the widespread development of wind farms on cutaway peatlands?

5. Rehabilitation of cutaway and cutover peatland is the ideal after-use, but it is unlikely to be a generator of economic wealth for the landowner or local stakeholders outside of its tourism potential. Do you view the European Union Emissions Trading Scheme or other carbon credits schemes as being a source of income for companies and private landowners in Ireland who rehabilitate cutaway, as has been the envisaged in Belarus?
6. Research in Canada on peatland after-use is primarily focused on the cultivation of sphagnum moss grown on cutover peatlands. Whilst the overall environmental and substrate context in Canada may be different to Ireland, what lessons, if any, can be applied to Ireland from the Canadian experience to date?
7. Trials of reed canary grass have been conducted in Ireland on cutaway bogs. There seems to be a reluctance to initiate a similar scheme in Ireland in the future. Is it a case that our soil substrate is inadequate, or are there other issues at play in preventing reed-based trials in the future?
8. You and your colleagues found in your paper *The Potential of Birch Afforestation as an After-use Option for Industrial Cutaway Peatlands* that downy birch may be useful as a medium for biomass production when grown on cutaway bogs. Have the recommendations in this paper been acted upon in Ireland to date?
9. A National Peatlands Strategy is in the process of being established following your recommendation in the *Bogland* report. What changes to national policy, if any, do you believe its establishment will bring about?
10. It would appear that until more secure and reliable green energy solutions to our energy needs are developed in Ireland, continued harvesting of peat from Irish bogs is necessary, even though it would appear that this is not in the public's long-term interest from an environmental perspective. Do you agree with this hypothesis?

11. With unemployment still at unacceptably high levels in Ireland, and many young people choosing to leave rural areas in search of work, do you believe that green jobs and eco-enterprises could be created through the utilisation and rehabilitation of Irish cutaway peatlands?
12. The *Bogland* report recommends that the Public Service Obligation Levy be removed from the peat industry, and given to a new hypothetical institution which would manage and work to restore Ireland's peatlands. This new institution would have positive social and environment outcomes, but would it bring positive economic outcomes for the payers of the levy?

Have you any other comments to make on the present after-use of cutaway in Ireland, paludiculture regimes and Bord na Mona's continued activities in harvesting peat from Irish bogs?

Interview 6: Questions for Eamon Ryan, Leader of the Green Party

Could you outline your present job title, your area of expertise, your previous relevant employment and your academic background please?

1. What are the key European Union Directives and legislation which inform Irish policy associated with the use of cutaway peatlands?
2. There appears to be a reluctance to instigate a carbon credits trading initiative at Bord na Mona, which if initiated, could help fund cutaway peatland rehabilitation projects. Carbon credit schemes have been successful in Belarus and Germany, so why not in Ireland?

3. It would appear that the Renewable Energy Feed-in Tariff which you announced in 2010 does not provide a price guarantee for solar-generated energy. Why was this the case? Do you think this should be rectified today by the present government?
4. Bord na Mona has trialled the growing of various types of biomass on its cutaway peatlands in the past, but each of these trials has subsequently been deemed unsuccessful. Paludiculture, or the growing of biomass such as reeds on rewetted peatlands, has been successful in other countries such as Germany, however. Why do you think Ireland has not had success in this area to date?
5. Wind turbines installed on cutaway peatlands have proven to be a divisive issue in Ireland. What measures can be taken to appease communities living in close proximity to wind turbines?
6. Wind energy generation, cultivation of sphagnum mosses for horticulture, selling carbon credits from rehabilitated peatlands, berry production and biomass cultivation are the most common sustainable after-uses for cutaway and cutover peatlands across the world. What other after-uses do you think should be considered in the case of Irish cutaways?
7. What improvements in environmental policy would you suggest at European Union level?
8. What is your view on the present Irish government's environmental policy?
9. In your opinion, what can be done in Ireland by national and local government and state agencies to encourage the start-up of green businesses and the increase of green jobs?
10. What is your opinion of Bord na Mona's continued mining of Irish peatlands, considering it is accepted that their activities are resulting in the release of greenhouse gases into the atmosphere?

Have you any other comments to make, which I have not addressed above, which you feel are relevant to the question of what sustainable after-uses options are available to Ireland?

Interview 7: Questions for Hans Joosten, Professor in Peatland Studies and Palaeoecology at the University of Greifswald, Germany

Can you briefly describe your current occupation, expertise and academic background please?

1. Paludiculture is being used in countries like Germany and Belarus to produce reeds for paper, energy and other sustainable uses. Could a similar sustainable business model be applied to Ireland? Can reeds be produced in Ireland on cutaway peatlands?
2. Reed-growing trials have not been successful in Ireland's cutaway peatlands to date. Why do you think this has been the case?
3. Sphagnum moss is being cultivated in peatlands Canada and Germany for use as a replacement for white or moss peat. Could sphagnum moss be cultivated on Irish cutaway peatlands?
4. Rehabilitating cutaway and cutover peatlands can lead to the sale of carbon credits. This has been done in Belarus, as one example. Could Bord na Mona sell carbon credits for the work it has carried out on rehabilitated peatlands? What are the challenges of a carbon credits selling initiative?
5. What are the costs, challenges and drawbacks to operating a successful paludiculture regime?

6. Developing wind farms on its cutaway is the main focus for Bord na Mona in Ireland. How environmentally friendly is it to host wind farms on cutaway peatlands?
7. Can wind farms and paludiculture take place together on one site? What are the challenges of a dual-use strategy?
8. Bord na Mona continues to harvest peat from Irish bogs, though in the long term it will move towards more wind energy generation. Peat harvesting is deemed necessary as Ireland has no other choice for its electricity needs, other than to continue this activity. Do you believe that this should continue, or do you envisage another way for Ireland to secure another more sustainable source of energy in the short term?

Do you have any supplementary comments to make regarding suitability of paludiculture in Ireland, the activities of Bord na Mona, and other sustainable economic uses for Irish cutaway peatlands?

Interview 8: Questions for Mark Malone, representing the Rhode Parish Wind Turbine Action Group

1. Can you briefly describe the organisation you represent, its aims, objectives and support-base?
2. Can you describe the key concerns you have with wind farm development on cutaway peatlands in general in Ireland?
3. Can you describe how your organisation believes wind farms are environmentally unsustainable?

4. What are the factors which lead your organisation to believe that wind farms are economically unsustainable?
5. How would your community feel towards wind farms if they owned a stake in these developments? Would they feel as strongly against them if you shared in the profits?
6. According to the Intergovernmental Panel on Climate Change's recently published Fifth Assessment Report, it is clear that that mankind is responsible for recently measured climate change. It could be argued that wind farms are necessary to mitigate against further changes in global temperatures. What are your thoughts on this hypothesis?
7. Wind companies support local projects and initiatives through their Community Funding Schemes. What are your views on these funds?
8. What evidence is there to suggest that wind farms located in close proximity to property will adversely affect their prices?
9. Can you describe the health and other social concerns you have with wind farm located within a community?
10. What alternative cutaway after-uses does your organisation suggest, which are environmentally, socially and economically beneficial to all stakeholders concerned?
11. What is your view on the installation of solar panels on cutaway peatland in place on wind turbines?

Have you any general comments not covered above, which you would like to make regarding wind farm development in Ireland and/or on cutaway peatlands?

Appendix I: Peat moss

Peat moss is the lighter peat which is found near the surface of raised bogs (Clarke, 2010:85). It is formed by decayed sphagnum moss (Clarke, 2010:85). Peat moss is a poor fuel medium, but can be used for other purposes (Clarke, 2010:11). It is useful for animal litter and bedding (Clarke, 2010:11) as it can hold up to ten times its own weight in water (Clarke, 2010:85). In the 1940s, Dutch peat moss was used for conditioning soil in agriculture and in horticulture (Clarke, 2010:97).

The use of peat moss in horticulture began in Britain in the 1930s (Clarke, 2010:97). The new knowledge (Drucker, 2008:75) gained from peat moss use in horticulture in Britain presented Bord na Mona with an opportunity to innovate: no longer would peat moss be used only for animal litter. Peat moss use began to develop with positive results; using peat moss as a medium for mushrooms growing produced high yields in Britain in the early 1950s for example (Clarke, 2010:97). In 1949, Bord na Mona began exploring the use of peat moss in horticulture (Clarke, 2010:97).

Appendix J: Bord na Mona's financial assistance

Bord na Mona's debt in March 1991 was £188 million, with interest on this costing £22 million (Clarke, 2010:262). These figures had reduced to £166 million and £15 million respectively by March 1995 however (Clarke, 2010:262). Of this debt figure, Bord na Mona identified £120 million as being as a result of energy policy decisions taken in the 1970s (Clarke, 2010:262). Bord na Mona argued that if the government injected equity, Bord na Mona's annual interest payments would be reduced (Clarke, 2010:263). This would have the knock-on effect of meaning that Bord na Mona would not need as much money for its milled peat from the ESB (Clarke, 2010:263).

In May 1995 the government made the decision to invest £120 million into Bord na Mona in three tranches with the price of peat paid by the ESB similarly being reduced in three phases (Clarke, 2010:263). A threat soon emerged however; this injection of equity was delayed when some of Bord na Mona's horticultural competitors made a complaint to the European

Commission regarding the Irish state was subsidising the company (Clarke, 2010:263-4). Under the Energy (Miscellaneous Provisions) Act 1995, this equity was paid in the meantime (Clarke, 2010:264).

In December 1996, the European Commission ruled that no “state aid” was involved in the proposal to invest equity in Bord na Mona (Clarke, 2010:280). The injection of equity resulted in a 32% reduction in the price of peat for the ESB in relation to 1993 prices (Clarke, 2010:281).