Environmental Goods and Services Sector on the Island of Ireland

Enterprise Opportunities and Policy Implications

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InterTradeIreland Forfás

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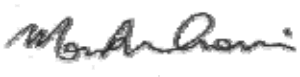
Foreword

The island of Ireland, in common with the rest of the international community, faces significant environmental challenges as it seeks to reduce its carbon footprint. However, these environmental challenges also open the door to new business opportunities.

This report provides significant baseline information on the growing environmental goods and services (EGS) sector, and identifies how the sector offers both Ireland and Northern Ireland potential for economic growth through the development of high-value 'green collar' businesses and jobs. In looking at the existing enterprise base, drivers of the EGS sector and international developments, the strongest possibilities for enterprise opportunities in a number of key sub-sectors are identified. Importantly, these opportunities exist both for indigenous companies to build on the emerging expertise across the island and for targeting growing mobile foreign direct investment in the EGS sector. Areas for North/South cooperation such as R&D supports, business-led networks and developing new markets on and off the island through green procurement or joint trade missions have also been identified.

The report also proposes the policy supports necessary to further develop an innovation-oriented and internationalised EGS sector, and outlines how government departments and agencies can help to make this happen. In ensuring that the framework conditions for investment in EGS are strong and that any impediments to growth for companies in the sector are removed, we hope that this report will help ensure that our resources - North and South - are optimised to mutually benefit and develop an internationally competitive EGS sector.



Martin Cronin

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Executive Summary

"The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco systems. This includes cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use."

(OECD/Eurostat agreed definition)

With a view to developing business opportunities within the environmental goods and services (EGS) sector on the island of Ireland, Forfás and InterTradeIreland have commissioned research in the area. This research has attempted to:

- estimate the size of the EGS sector on the island of Ireland;
- examine, for the all-Island market, the market drivers, and the strengths and weaknesses of each sub-sector;
- identify the most promising areas in the EGS sector where new opportunities are likely to occur; and
- identify key supports and framework conditions required and desirable to assist EGS companies including the potential to increase communication and collaboration within the sector and between firms and research institutes.

A steering group of officials from relevant Department (Enterprise, Trade and Employment) and agencies (Forfás, InterTradeIreland, Enterprise Ireland, IDA Ireland, Invest NI and Sustainable Energy Ireland) has met regularly since September 2007 to further this research. With their assistance, Forfás and InterTradeIreland have developed this study.

Key Findings

The size of the environmental goods and services market

The global EGS market as a whole is growing steadily and this trend is likely to continue. A number of studies have estimated that the value of the sector was in excess of $600 billion worldwide in 2005 and is likely to exceed $700 billion by 2010 and $800 billion by 2015[1].

Although the wide range of the activities that can be included in the sector can make data collection difficult, some figures have been calculated from background research. The EGS sector in Ireland is estimated to be valued at some €2.8 billion, with Northern Ireland accounting for an additional £624 million (€790 million) approximately. This all-island figure of €3.6 billion does not include the market for environmental goods and services in building and construction materials and is therefore almost certainly an underestimate.

1 ENDS Directory 2008, UK Centre for Economic and Environmental Development Global Market Estimate.

Profile of the sector

Besides attempts to quantify the size of the EGS sector, a profile of the EGS sector - both on the island and globally - has been drawn. To do this, some trends and characteristics have been identified from the global and domestic EGS markets.

Profile of the global EGS market:

- Firms in OECD countries are estimated to account for about 90% of the global EGS market, with Western Europe, the United States and Japan being to the fore in the import and export of environmental goods and services[2].
- At the same time, developing countries, in particular China and India are now seeing strong growth in the sector in response to environmental problems.
- Investment in the EGS sector worldwide has increased dramatically in recent years. Venture capital investment in the area of industrial and energy clean technology is now overtaking investment in areas considered core destinations for this capital[3].

Profile of the EGS market on the island of Ireland:

- A small number of major players exist in the EGS market on the island of Ireland[4]. The market is also seen to have a high proportion of small and medium-sized enterprises (SMEs) who have established a substantial business presence over the past ten years.
- There are also a number of subsidiaries of UK and EU parent companies offering environmental consultancy services and competing in key sectors such as waste management.
- To a large extent – but with a few notable R&D-intensive exceptions in certain sectors (such as waste and ocean energy) – the EGS market on the island of Ireland has displayed low R&D investment. Nonetheless, a growing number of companies on the island of Ireland have been successful in developing business models which have commercialised R&D-intensive technologies related to the EGS sector. Given Ireland's low base of R&D, the adoption and adaptation of such EGS technologies will continue to be important.

Key drivers of the sector

A number of drivers are seen to be facilitating growth of the EGS sector, some of which are interlinked. These include:

- Compliance with EU environmental directives and regulations.
- Rising energy costs.

2 Environment Business International, San Diego, California, 2003. See also Bijit Bora and Robert Teh, 'Tariffs and Trade in Environmental Goods', WTO Seminar, October 2004.

3 For example, industrial/ energy clean technology was ranked the fourth largest venture capital investment category (after Biotech, Software and Medical Devices and Equipment) in North America in quarter one of 2008 in the PricewaterhouseCoopers/National Venture Capital Association MoneyTree Report. Available at https://www.pwcmoneytree.com/MTPublic/ns/moneytree/filesource/exhibits/08-0486%20MoneyTree%20-%20Q1%202008%20final.pdf

4 Examples include NTR which own Greenstar, BioVerda and formerly Airtricity; One51 which owns Cedar and Techrec; DCC which owns Enva; and other key players such as Glen Dimplex and Kingspan.

- Climate change considerations.
- Green consumerism.
- Significant increases in public investment in environmental services and infrastructure.
- Increases in investment in energy and environment-related research and development.
- Green public procurement.

Strengths and weaknesses of the sector on the island of Ireland

As part of this study a strengths and weaknesses, opportunities and threats (SWOT) analysis has been carried out on the EGS sector on the island. Amongst the key factors identified in this SWOT analysis were the following:

- Key strengths: large public and private investment in environmental services and infrastructure, government commitment to regulatory enforcement, good access to natural energy sources, state enterprise agency adaptability (for example, strong experience in attracting foreign direct investment) and flexibility of companies operating on the island.
- Key weaknesses: the low starting base of the EGS sector on the island, the existence of regulatory uncertainty in some key sectors, low levels of EGS related research and development and limited green public procurement.
- Key opportunities: the rapidly growing global EGS market, potential emerging markets in Eastern and Central Europe and the proximity to the growing British market, growing environmental awareness in the public and private sectors and potential synergies between sectors which are strong on the island (e.g. ICT and sensors).
- Key threats: Failure to meet Kyoto/ renewable energies targets, conflicts of interest between regulators and regulated sectors (in particular the waste management sector), cuts in environmental infrastructure investment.

Potential enterprise opportunities

A number of sub-sectors with potential environmental goods and services opportunities have been identified from the research. While a wide range of enterprise opportunities are expected to arise in the growing EGS sector, the sub-sectors which are seen to have the greatest potential are:

- Renewable Energies
- Efficient energy use and management (including eco-construction)
- Waste Management, Recovery and Recycling
- Water and Wastewater Treatment
- Environmental Consultancy and Services

This study brings together a number of aspects of this research. Section 1 provides a summary of the research done and outlines the estimated size of the EGS sector on the island of Ireland, strengths and weaknesses of the EGS sector in Ireland/Northern Ireland, and market drivers of the sector and provides an overview of potential enterprise opportunities that may arise. Section 2 looks in more detail at these potential enterprise opportunities in assessing each sub-sector in terms of the current market, market drivers, barriers to growth and specific opportunities. Attempts are then made in Section 3 to draw some conclusions and recommendations to ensure that enterprises and State development agencies are well placed to take advantage of these opportunities.

Section 1: Profile of the Environmental Goods and Services Market and Sector

1.1 The Global Environmental Goods and Services (EGS) Market

Given that the environment goods and services sector covers a wide range of heterogeneous goods and services, analysing the exact value of the sector is quite difficult. Nonetheless, some estimates have valued the global EGS sector at more than $600 billion worldwide in 2005. In light of a range of significant drivers – for example, environmental regulation, rising energy costs and environmental consumerism - the global EGS market is expected to experience rapid growth in the medium term and is expected to exceed $700 billion by 2010 and $800 billion by 2015[5].

Firms in OECD countries are estimated to account for about 90% of the global EGS market with Western Europe, the United States and Japan being to the fore in the import and export of environmental goods and services[6]. At the same time, transition and developing countries - in particular China and India - are now seeing strong growth in the sector in response to environmental problems such as air and water quality, arising from their rapid industrialisation and urbanisation.

Investment in the EGS sector worldwide has also increased dramatically in recent years. Venture capital investment in the area of clean technology in recent times has even overtaken investment in areas considered core destinations for this capital. Investment has developed to such an extent that industrial/ energy clean technology was ranked the fourth largest venture capital investment category in North America in quarter one of 2008[7].

At a global and regional level, the sub-sectors which are considered to have the strongest growth potential are clean technologies and renewable energies. Dwindling sources and availability of potable water throughout the world are also proving to be a factor in aiding the development of the water/wastewater sub-sector.

Given the dynamic nature of the global EGS market and the fact that large global players are emerging in the sector, the potential for the enterprise agencies to target some of the mobile international investment for inward investment is recognised in the report.

5 ENDS Directory 2008, U.K. Centre for Economic and Environmental Development Global Market Estimate.
6 Environment Business International, San Diego, California, 2003. See also Bijit Bora and Robert Teh, 'Tariffs and Trade in Environmental Goods', WTO Seminar (October 2004).
7 PricewaterhouseCoopers/National Venture Capital Association MoneyTree Report, Q1 2008 US results. https://www.pwcmoneytree.com/MTPublic/ns/moneytree/filesource/exhibits/08-0486%20MoneyTree%20-%20Q1%202008%20final.pdf

1.2 The Environmental Goods and Services Sector in Ireland/ Northern Ireland

The EGS sector is an extremely diverse and wide ranging sector which is rapidly changing. Linked to the difficulties in defining the EGS sector there are very few published statistics available about its size. The most comprehensive study of the EGS industry in Ireland was carried out by Ernst & Young in 2004 (because Northern Ireland was aggregated into the UK figures, similar figures for the industry in Northern Ireland could not be extracted). By updating these figures to reflect growth in the sector since 2004 and incorporating data on the renewable energy sector, Forfás and InterTradeIreland estimate the value of the market in Ireland to be in the region of €2.8 billion in 2008[8]. Industry estimates, taken at the sub-sector level, estimate that the Northern Ireland market accounts for nearly £624 million (c. €800 million). This all-island figure of €3.6 billion does not include the market for environmental goods and services in building and construction materials and is therefore almost certainly an underestimate.

A best estimate suggests that there are more than 6,500 people directly employed in EGS companies in Ireland. Reliable data on the direct employment in the sector for Northern Ireland does not appear to be readily available. In light of the key drivers identified in this study such as compliance with EU environmental legislation and significant public and private investment in environmental services and infrastructure[9], it is expected that the size of the EGS sector and employment opportunities will continue to grow.

A small number of major players exist in the EGS market on the island of Ireland[10]. The market is also seen to have a high proportion of small and medium-sized enterprises (SMEs) who have established a substantial business presence over the past ten years. There are also a number of subsidiaries of UK and EU parent companies offering environmental consultancy services and competing in key sectors such as waste management.

To a large extent – but with a few notable R&D-intensive exceptions in certain sectors (such as waste and ocean energy) – the EGS market on the island of Ireland has displayed low R&D investment. Nonetheless, a number of companies on the island of Ireland have been successful in developing business models which have commercialised R&D-intensive technologies related to the EGS sector, Airtricity being one of the most notable examples.

8 The Ernst & Young report on behalf of the European Commission estimated the Irish environment market at €1,211 million in 2004. These figures are however drawn from outdated 2004 data and exclude the renewable and sustainable energy sectors. Given the dynamic growth of the sector since 2004 which was estimated by Forfás and InterTradeIreland to be in the region of 15% per annum for each sector since 2004 and incorporating data on the renewable energy sector which were estimated by EPS consultants as part of the background research to this report and data on the water sector from the Department of the Environment, Heritage and Local Government gives an estimate of €2,810mn for the Irish market in 2008. This is broken down as follows:

- Water/Wastewater Treatment €1000mn (based on Department of the Environment, Heritage and Local Government Water Services Investment Programme 2007 – 2009 capital costs)
- Waste Management €550mn.
- Renewable Energies €700mn.
- Environmental Services & Other Clean-Tech €560mn.
- Total Republic of Ireland €2,810mn.

9 Some examples of such investment include ESB's planned €22 billion expenditure in renewable energies to 2035 and NTR's ongoing investment in a number of renewable energies.

10 Ibid note 4.

1.3 Strengths, weaknesses, opportunities and threats of the EGS sector

A strengths, weaknesses, opportunities and threats (SWOT) analysis of the EGS sector has been developed taking account of stakeholder feedback and EGS-related baseline research. The table below summarises this analysis.

Strengths	Opportunities
Large public sector investment – for example in the waste management and water sectors	Regulatory compliance – EU and domestic
Government commitment to use fiscal and other incentives	Rapidly growing global market
Commitment to regulatory enforcement	Potential emerging markets in Eastern and Central Europe
Open economy facilitates imported know-how	Government targets in renewables and energy efficiency
Access to natural energy sources such as wind and wave	Business opportunity generated though green public procurement
Good project engineering capacity in Ireland	North/south alignment on infrastructure investment which could support EGS
All-island energy market	Adjacency to growing GB EGS market
State agency adaptability (strong experience in FDI)	Transition to carbon neutral economy
Environmental Protection Agency (although absent in Northern Ireland)	WRAP and Repak models could be used to drive innovation
Strong commercialisation of R&D where R&D investment has taken place	Growing environmental awareness and openness to change in public and business
Smart and flexible businesses which are able to adapt and commercialise domestically generated and imported clean technologies	Potential synergies between EGS and other sectors (e.g. ICT and sensors)
	Flexibility of a small, open market
	Rising energy and raw material costs
	Security of supply of energy and raw materials
Weaknesses	**Threats**
Lack of clear policy in certain sectors such as waste, biofuels, wind energy.	Failure to meet Kyoto targets
Low R&D starting base (according to Energy Research Council)	Cost of not meeting renewable energy targets
Lack of a dedicated enterprise policy to support EGS sector	Lack of government environmental focus
Poor knowledge base in key sectors such as energy	Scaled down infrastructural investment
Reliance on traditional goods and services	Weak buy-in from enterprise sector regarding climate change
Risk averse public procurement which embeds old technology	Conflicts of interest between regulators and regulated sectors (in particular the waste management sector)
Poor spatial planning with diffuse pollution sources	Potential reduction in cost of fossil fuels and energy costs
Lack of scale and fragmented market (lack of networks)	
Diffuse state support to EGS sector	
Lack of standards/verification in EGS sector	
Lack of FDI presence	
Difficulties due to two jurisdictions	

1.4 Key Drivers

A number of aspects are seen to be driving growth in the environmental goods and services sector. The main drivers are listed below:

- Compliance with EU environmental Directives and Regulations (such as the Integrated Pollution Prevention Control, Waste Electrical and Electronic Equipment, Restriction of Hazardous Substances, Energy End-use Efficiency and Energy Services and Water Framework Directives) is seen to be the main driver in setting the broad framework for demand for environmental goods and services.
- Rising energy costs are encouraging companies to consider energy efficiency initiatives and are significantly increasing opportunities in the renewable energy sector.
- Green consumerism – the making of consumer decisions based on environmental concerns - and the increase in societal and business demands for business to behave in an environmentally responsible way are also contributing to the growth of the sector.
- Significant increases in public and private investment in environmental services and infrastructure have been, and will continue to be, important in stimulating growth in certain sectors of the market (particularly energy, waste management and water supply).
- Increases in research and development investment are seen as fundamental to the identification and widespread application/ uptake of new and improved technologies relevant to the EGS sector.
- Green public procurement - the specifying of environmental criteria in public tenders can significantly increase the market for EGS and provide spin offs through the whole product chain.

Following the SWOT analysis and a general consideration of opportunities and key drivers, an overview was made of the growth prospects and sectoral capabilities and capacity of the sub-sectors with the highest potential. Section 2 of this study elaborates on these opportunities.

Section 2: Enterprise Opportunities

While a broad range of opportunities are expected to arise in the growing EGS sector, this section highlights the areas which are seen to offer the strongest opportunities available to the environmental goods and services sector on the island of Ireland. These opportunities have been developed following research into the strengths of the existing enterprise base here, areas that are expected to grow in the future in light of the drivers looked at in Section 1.4 and international investment trends. The opportunities are diverse and have been broadly categorised under the following headings:

1 Renewable Energies
2 Efficient energy use and management (including eco-construction)
3 Waste Management, Recovery and Recycling
4 Water and Wastewater Treatment
5 Environmental Consultancy and Services

2.1 Renewable Energies

Renewable energies are defined as products, systems and services for the generation and collection of energy from renewable sources such as biomass/bio fuels, solar, photovoltaic, wind, hydro, tidal and geothermal sources. Examples include the manufacture of equipment, design, construction, installation, management and operation of renewable energy facilities, including microgeneration.

Renewables and ICT

The technology (hardware and software) to optimise multiple renewable energy systems (solar, CHP, wind, heat pumps etc.) on a micro scale has been identified as an area of growth potential. This is an opportunity that is seen to apply across all the renewables sub-sectors and one of particular relevance to the strong ICT capabilities on the island of Ireland.

Marine (Wave and Tidal) Energy

The island of Ireland is one of the most favourable locations for wave energy in the world[11]. Some important developments in this area are currently happening here which may give rise to future enterprise opportunities - third level research expertise has been developed in the areas of turbine design, wave tank model testing and wave energy modelling and three wave energy prototype developers are currently in operation[12]. While tidal energy in Ireland is more limited geographically to where it can be applied, there are also significant developments (such as the world's first commercial tidal turbine in Strangford Lough) which may also provide opportunities for companies developing technologies to produce energy from tidal streams.

11 It has been estimated that the total wave energy resource could yield 48 Twh if all of the Irish coastline alone were developed. Source: http://www.oceanenergy.ie/market.html
12 Namely Ocean Energy, Hydam and Wavebob (who recently received an investment of €2m from Chevron).

Although marine energy is in its infancy at present, it is recognised that there is potential for the costs of this energy to be reduced considerably in the future. Significant public investment in R&D is now being allocated to the sector[13], and this will be important to making technologies in this sub-sector commercially viable and cost-competitive in the wider energy market.

In light of the strong natural advantages that exist on the island, the potential for early mover advantage exists in this sub-sector[14]. Furthermore, given that a large number of devices and designs are also currently being studied and/or developed internationally, there may be potential to attract mobile FDI.

Wind Energy

Wind energy is one of the most well established, cost effective and mature renewable technologies in the renewable energy market[15]. The wind industry is comprised of companies which provide wind turbines and companies to develop and manage wind farms. Companies on the island of Ireland have relatively little capabilities in the area of wind turbine design and manufacture. This is an extremely competitive market led by a number of large global players who supply the most efficient cutting-edge solutions for the utilization of the wind's power. These companies have invested heavily in the research and development of new turbine technologies.

Opportunities for businesses on the island of Ireland may however arise for technology-driven companies which can provide more efficient and innovative mechanical and software based components for wind turbine design and manufacture (such as software systems). There may also be opportunities for companies installing, maintaining small scale turbines and providing consultancy engineering services for the design, installation and management of wind farms.

One of the most significant and important drivers of growth in the industry is public and private sector investment[16]. The island of Ireland has a strong comparative natural advantage in wind, and this investment in wind energy is expected to be important in progress towards reaching greenhouse gas reductions targets. Furthermore, investment in wind generation capacity is continuing to grow internationally[17] and this is expected to continue to create new economic opportunities.

13 For example the Irish government is designating over €26 million for the sector over the next three years.

14 A Marine Institute & Sustainable Energy Ireland study in 2005 calculated that 1,900 jobs could be created by 2020 if Ireland continued to invest in marine energy technology. Source: Analysis of the Potential Economic Benefits of Developing Ocean Energy in Ireland, Marine Foresight Series No. 3, December 2005.

15 There is a distinction within the industry between land based and off-shore wind installations. Presently the market for on-shore wind is more advanced than that for off-shore. This is due to the higher costs, more complex operation and lengthy planning process involved in off-shore installations. The market for off-shore wind is expected to experience rapid growth in the coming years as the technology becomes more advanced and energy costs increase.

16 For example in 2008, ESB announced it was going to invest €22 billion with the aim of masking its business carbon neutral by 2035.

17 For example electrical generation capacity and output from wind in the IEA Wind member countries has increased from less than 5 GW in 1995 to nearly 75 GW in 2007. Source: IEA Wind Energy Annual Report 2007.

Solar Energy

Solar energy is an area of growth internationally, particularly in Photovoltaic (PV) systems where much research funding is currently being channelled (particularly in the U.S., Japan and Germany). There are three basic approaches in use to gain the maximum benefit of solar energy in buildings:

- Passive Solar
- Active Solar Heating
- Solar Photovoltaic (PV) Systems

The solar energy market primarily consists of PV systems, which generate electricity directly from solar energy, and solar systems which harness the thermal power of the sun for heating and cooling purposes. The market for PV technology is led by a number of strong multinationals and is extremely competitive, and as such companies on the island of Ireland are seen to have very little capabilities in this area. Nonetheless there is a need to make current solar cell technology cheaper to produce and more efficient, and opportunities may arise for companies involved in developing new PV technologies or for obtaining silicon more efficiently for use in the PV industry. Solar grade silicon is becoming an increasingly scarce resource and opportunities are emerging for recycling silicon. PV technology has a wide range of applications (e.g. remote off-grid power generation) and opportunities exist where new uses for existing PV technologies can be found.

Companies on the island of Ireland are becoming increasingly involved in the area of solar heating[18]. Significant opportunities exist for companies involved in the solar energy sector who can supply advanced solar systems that work more efficiently and which can be mass produced from cheaper materials.

Given the level of expansion and investment in the global solar PV industry, there are potential prospects for FDI. This study contends that the focus should be directed at attracting multinational companies in the solar industry to establish EMEA operations on the island of Ireland with back office services (design, treasury, supply chain). A review of the complete solar PV supply chain could be informative in this respect.

Geothermal Energy

Geothermal heat pumps utilize the heat stored beneath the earths' surface to provide indoor space heating are one of the most cost effective heating and cooling solutions available for single dwelling, commercial and district heating purposes. The use of geothermal heat pumps has become more widespread in recent years as the technology has become more advanced.

18 Two of the biggest companies involved in developing solar technology are Glen Dimplex and Kingspan.

Geothermal energy systems are among the most energy efficient and cost effective heating and cooling systems available, but initial capital costs of installing a Geothermal Heat Pump system are usually higher than other conventional central heating systems. Some companies on the island of Ireland are currently providing geothermal and air heat pumps and there are also some geothermal spring sources on the island of Ireland that could be further utilised on a local basis for space heating.

Bioenergy (Biofuels and Biomass)

Bioenergy is energy which is derived from renewable organic material otherwise known as 'biomass'. One area in which companies on the island of Ireland have significant capabilities is developing biomass as a sustainable source of energy. This bio-energy industry is developing rapidly and opportunities exist for companies right across the sector. The industry can be broken down into companies who process raw biomass material (e.g. municipal/commercial waste, agricultural waste, dedicated energy crops, food crops, wood waste, human/animal waste, wastewater sludge, etc.) into a fuel (e.g. wood pellets, refuse derived fuel, biogas, biodiesel and bioethanol) or energy (heat, power). The sector is also comprised of companies which develop/supply technologies and equipment used for processing biomass into fuel or energy (e.g. biomass boiler, anaerobic digestion systems, gasification units, etc.).

2.2 Efficient energy use and management

Eco-Construction

One of the key areas for improving energy efficiency and limiting energy loss is in the construction sector. Energy loss from buildings is one of the largest contributors to overall energy wastage. Eco-construction involves using technologies within the fabric of new and existing buildings for the purposes of minimising energy loss and maximising energy efficiency. The eco-construction sector has grown significantly over the past decade as new technologies for increasing building efficiency have been developed and stricter building regulations have been introduced.

Retrofitting buildings for energy efficiency is seen as the most promising area for future opportunities. While specific figures are unavailable for the size of the environmental goods and services market in the building and house construction sector, it is recognised that this sector has the potential to be very significant. Background research has estimated that forecast investment levels to 2020 in retrofitting buildings to comply with Building Energy Rating (BER) standards in Ireland could be worth up to €25 billion[19]. Similar figures are not available for Northern Ireland where the Energy Performance Certificate (EPC) scheme is now in operation.

19 This is a Sustainable Energy Ireland estimate based on average cost per household of €25,000. Although it is clear that not all houses would invest this amount, the forecast figure illustrates the potential for energy efficient building materials. There are some 2 million buildings/housing units in Ireland.

A number of companies are already providing products for the construction sector which increase building efficiency such as thermal heat insulation products and building integrated systems (including solar panels, geothermal and air heat pumps, underfloor heating systems, etc.) which facilitate the more efficient and sustainable use of energy in buildings. Supporting innovation and research and development in the products and services that will be needed to improve the energy efficiency of households and buildings will be important in the development of the sector.

It is recognised that there may be considerable opportunities for early entrants into the eco-construction business. Given that the compliance burden of reducing greenhouse gas emissions from the built environment will be applied across the EU, it is felt that companies with scale will have internationalising opportunities.

Energy Management/Efficiency Services

While current demand for energy management and efficiency products is low, rising energy costs and full roll-out of the BER/EPC system are expected to make this sector an area of potential high growth. Services such as the design and supply of energy saving systems for buildings across all sectors and BER/EPC verification, inspection and monitoring of buildings during construction are seen to be areas of opportunity.

Although foreign-owned companies are providing the majority of Energy Service Companies (ESCO) services on the island, it is felt that given the growing potential market, indigenous ICT-driven ESCOs are a clear area of interest.

Although there are currently few companies with scale that could grow and provide goods or services for the export market, export potential may emerge - particularly for energy management services - if sufficient scale can be built on the back of indigenous requirements.

Anaerobic Digestion (AD)

Under controlled conditions, anaerobic digestion is now a proven technology and is seen to have a place in the Irish and Northern Irish markets. Companies operating on the island of Ireland have developed their capabilities in this area. A number of companies now offer full turnkey solutions for the anaerobic digestion of wastewater sludge.

The major stumbling block for AD is that its financial return is insufficient to repay the investment outlay, but usual financial analyses ignore the environmental benefits. Nevertheless, in light of developments in alternative AD technologies that generate energy from waste via pyrolysis or produce a secondary energy carrier, e.g. gasification, the potential for future growth opportunities for anaerobic digestion here is noted.

Combined Heat and Power

Co-generation or combined heat and power (CHP) systems play a key role in meeting the energy needs of the commercial, industrial and domestic sectors and are a well established technology in the sustainable energy market. CHP systems are used to produce electricity and heat simultaneously from a single fuel source. Opportunities are seen to exist for companies who specialise in designing, building and installing combined heat and power (CHP) systems. Many companies involved in developing CHP systems could also build and design biomass boilers and district heating systems.

2.3 Water and Wastewater Treatment

Over the past decade significant investment has been allocated to upgrading water supply and wastewater treatment infrastructure on the island of Ireland. This market is expected to experience continued growth over the coming years due to the level of public investment in the sector, for example evident in the funding set out in the Water Services Investment Programme (WSIP) and National Development Plan (NDP) in Ireland and the Northern Ireland Water Strategic Business Plan (2007-10). This investment is aimed specifically at guaranteeing high quality water for consumers and protecting the aquatic environment but has also been essential for ensuring that Ireland and Northern Ireland meets their requirements under a number of EU Directives.

Indigenous companies have experienced significant growth as a result of investments made by the public sector in water services. The market as a whole is estimated to be the largest of the environmental goods and services sectors with a report compiled by Ernst & Young for the European Commission estimating the value of the 2004 water supply and wastewater treatment market in Ireland at €622m[20]. Some specific opportunities in the sector are looked at below.

Advanced water solutions

Although the domestic market for conventional water supply and treatment technologies may be nearing maturity, the market for advanced solutions is still in its infancy. Current problems with water quality (e.g. cryptosporidium) and resource security are forcing the sector to examine the role advanced technologies, such as membrane systems and ultra-violet (UV) treatment, can play. It is expected that the domestic market for these technologies will grow as the need to address these problems becomes more urgent.

Leak control, monitoring and supply networks

The need to conserve water and prevent groundwater pollution has created opportunities for companies involved in replacing leaking and failing water supply and wastewater collection

20 DG Environment Study on Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU Final report, August 2006.

networks. In general, distribution systems on the island suffer from high losses in water supply due to leakage from damaged and old pipelines and unknown and illegal connections[21]. Replacing and upgrading existing supply/collection networks is one of the key growth areas within the water industry. Updating supply networks is vital for ensuring security of supply but also for reducing treatment and pumping costs for water providers. Opportunities in this area are also emerging for companies developing more innovative and robust piping products which have a longer lifespan, a greater flow capacity, are easier to install and maintain and which are more resistant to corrosion. There is a developing niche area within the sector for companies supplying services and technologies for the monitoring and detection of leakages along networks.

Design-Build-Operate (DBO) of water/wastewater treatment plants

Opportunities exist for companies involved in the Design-Build-Operate (DBO) of water/wastewater treatment plants (including facilities for primary, biological and tertiary treatment as well as sludge processing and disposal). Given the presence of significant competition from large multi-nationals for DBO contracts, such opportunities exist for indigenous providers who focus on the design element of their business while out-sourcing plant construction and operation to remain competitive.

Processing wastewater sludge

Significant opportunities exist for companies providing advanced technologies for processing wastewater sludge. There are opportunities for companies developing technologies which can remove contaminants rendering the material less harmful, increasing its range of applications and final value. The wastewater produced from particular industrial contains valuable materials. Due to the rising costs of raw materials and the global depletion once plentiful resources there are opportunities for companies supplying technologies/processes which can recover valuable elements from wastewater. The high organic and energy content of wastewater sludge means opportunities exist for companies which can process this sludge into energy (through anaerobic digestion, incineration, gasification, pyrolysis) or who can recover nutrients (e.g. nitrogen, phosphorous) from it. There are also opportunities for companies offering a recycling service for wastewater sludge.

Integrated greywater recycling and rainwater harvesting systems

The need to conserve water in the residential and commercial sectors as a means of reducing water costs and ensuring supply has created opportunities for companies providing integrated greywater recycling and rainwater harvesting systems for use in commercial and residential building developments. There is a market demand for providers of complete turnkey solutions in this area. Opportunities also exist for companies developing more innovative systems which can process, capture and store greater quantities of water for reuse.

21 Unaccounted-for water (UFW) is the term given to losses in water supply distribution networks which cannot be accounted for through known usage. According to the recent Forfás study *Assessment of Water and Waste Water Services for Enterprise*, UFW accounts on average for 43 percent of the volume of treated drinking water produced in gateways and hubs in Ireland. This study is available at http://www.forfas.ie/publications/forfas080902/forfas080902_water_waste_water.pdf

Water analysis

The introduction of tighter and more stringent regulations regarding water quality is driving the market for water analysis technologies and services. Within the industry greater vigilance is required for the monitoring of potable water quality while in the wider scientific community monitoring instruments are needed to assess water quality in the natural environment. There are opportunities for companies developing equipment which can provide more accurate real-time data for a range of water quality parameters. There is also a demand for technologies which can monitor contaminants that are difficult to detect.

Prefabricated wastewater treatment systems

Companies have significant capabilities in the area of on-site prefabricated wastewater treatment systems used for everything from single dwellings to large commercial, residential and industrial developments. There are opportunities for companies which can provide a more efficient cost-effective system which requires a smaller operating area, produces a higher quality effluent and needs less maintenance (cleaning, emptying).

Odour control

One of the most problematic issues for wastewater treatment providers is odour control. There are opportunities for companies providing odour abatement and control solutions for wastewater treatment.

The above lists a range of potential opportunities for companies operating in the water sector. While these opportunities are expected to arise on the island of Ireland, it is also anticipated that developing markets including China, India and Eastern Europe have strong potential for opportunities largely due to the demand for modern water services in these regions.

2.4 Waste Management, Recovery and Recycling

Over the coming years compliance with environmental regulations and public demand for greener more environmentally sustainable solutions for waste will provide the key stimulus for growth in the sector. Unlocking waste as a source of energy and the need to recycle as a means of feeding the growing global demand for raw materials will also drive future growth in the sector. Waste-to-energy is set to become an important part of the island of Ireland's waste sector. Many in the industry now see the value of waste in terms of the energy which can be produced from it rather than the revenue which can be generated through collection and disposal.

Waste collection

In the area of waste collection there are opportunities for companies with the capability to provide innovative technologies and services for the more efficient and cost effective use of vehicles and labour.

As fuel costs rise more efficient waste collection and transportation will become increasingly important to management companies.

There are a number of engineering companies which supply vessels (bins, skips, bottle banks, etc.) for collecting and storing waste. There are opportunities for companies working in this area to provide sturdier, more space efficient containers which allow for the easier collection, weighing and transfer of waste. A key growth area within this industry is the integration of identification technology in containers allowing for the easy implementation of pay-by-weight and direct customer invoicing by waste collection companies. Opportunities also exist for these companies where they can provide innovative products designed for specific types of waste (e.g. medical, organic, WEEE, batteries, etc).

Waste transfer and disposal

In the area of waste transfer and disposal there are opportunities for companies providing a range of equipment and services. Despite the introduction of tighter waste management regulations, landfilling remains an important method of waste disposal and opportunities exists for companies providing equipment, technologies and consultancy services for new and existing landfill sites. The Design-Build-Operate (DBO) of landfills is a growth area within the industry especially in developing countries where landfills are reaching capacity and modern engineering practices are required to limit environmental degradation. Although indigenous companies lack the capability to compete with large multinational companies providing a DBO service there are opportunities for companies to provide innovative niche technologies and design services required for the construction, management and after-care of landfill sites.

The most significant opportunities for companies operating in the waste industry exist for those who understand that waste is a resource which has an inherent value outside that associated with collection/disposal. There are opportunities for companies which are capable of extracting the full value from waste either through recyclables trading or through some form of energy recovery.

Trading

The growing demand for virgin materials in the manufacturing sector, coupled with global increases in the price of natural resources (e.g. oil, aluminium) has created a strong market demand for recovered materials such as plastics, metal and organics. Although recycling is a widespread practice in the industry opportunities exist for companies which can carry this out more efficiently and on a larger scale producing a higher quality final material for recycling. The value of recoverables can only be fully realised if it can be processed (i.e. segregated, graded, cleaned, shredded, etc.) into a uniform fraction allowing a high quality bulk material to be produced. This is best exemplified by the price for recovered plastics.

Processing

Reprocessing is key to increasing the value of materials recovered from waste streams. Opportunities exist for companies which can recycle recovered material into a raw product allowing for its direct reuse in manufacturing. As Ireland lacks the infrastructure to reprocess recovered waste the bulk of this material is exported, predominantly to the UK, China, Germany and Denmark for recycling. Although it not yet economically viable to set up a facility for reprocessing certain materials such as paper and metals there are opportunities for companies working in the area of recycling different types of plastic including polyurethane (PU) and polyethylene terephthalate (PET) as well as low and high density polyethylene (LDPE, HDPE).

Waste-to-energy

Due to declining reserves of fossil fuels and the rising cost of oil and gas opportunities within the waste industry are emerging in the area of waste-to-energy. The prospects for waste-to-energy are supported by the need to find alternative outlets for waste as the use of landfills is progressively reduced. Renewable energy companies are becoming increasingly involved in the waste industry indicating the future growth potential for this sector.

Although incineration is the most well established technology for processing waste into energy, opportunities exist for companies providing innovative systems which utilize new and existing technologies, including gasification, anaerobic digestion and pyrolysis, to produce energy as well as a range of application fuels (e.g. gas, biomass fuel) and secondary products (e.g. compost) from waste materials.

There are also opportunities for companies with the capability to process waste into fuels which have a wider range of applications such as waste wood into wood pellets and biogas into a liquefied natural gas.

Recycling of organic waste

The recycling of organic waste through composting is a key growth area in the waste industry and is creating opportunities for companies providing equipment and services in this area. Opportunities exist for companies which can provide more efficient systems for composting which use less space, produce a higher quality final product and have a shorter processing period. The development of the composting industry has created opportunities for companies to provide ancillary services and equipment to the main operators in it.

Waste processing equipment

There are a number of engineering companies operating on the island of Ireland involved in the area of providing waste processing equipment (compactors, shredders, balers and crushers).

Although this is an extremely competitive area - both nationally and internationally - opportunities exist for companies who have the capability to develop new innovative technologies for processing more specific types of waste.

Generating economies of scale is seen as a critical success factor to companies operating in this sector overall and background research has pointed to the potential of further consolidation within the sector. While the sector is seen to offer mainly domestic opportunities some potential may exist for indigenous companies to internationalise, for example through outward direct investment or joint ventures. Such opportunities may particularly arise in other EU member states who like Ireland and Northern Ireland, are looking to comply with ever stricter EU regulations and targets.

2.5 Environmental Consultancy and Services

Environmental consultancy and services are defined as services to provide assessment and advice relating to environmental issues. Examples include environmental audits, environmental management systems and training, life cycle assessment, environmental impact assessment, advice on bio-diversity, environmental regulations and corporate environmental responsibility. The sector is an entirely new business area driven primarily by increasing levels of compliance with national and EU legislation.

Environmental consultancy

Consultancy opportunities such as carbon offsetting, energy audits, environmental impact assessments, integrated pollution prevention and control (IPPC) licensing, waste permits, water evaluation chemical analysis and energy retrofitting services are all expected to provide enterprise opportunities. Although issues of scale and limited internationalisation are currently affecting smaller indigenous consultancies, expert services in the international environmental services market are expected to be important areas of growth and are likely to be an area of strong opportunity. This may especially be the case where a harmonised approach to legislation throughout Europe could provide the possibility for expansion in the future. Ireland has a strong domestic record in a number of legislative areas[22] which may be an advantage when it comes to internationalising.

Waste consultancy

More stringent environmental regulations regarding the handling, transport, storage, treatment and disposal of waste are being continuously introduced. A services sector has been established which provides technical assistance for waste companies who must meet these regulations and the specific terms of their operating licences. Such companies are also becoming involved at the design stage of many products to ensure waste minimisation.

22 Such as Integrated Pollution Control (IPC) licensing, ISO14001, Strategic environmental assessment, Waste Electrical and Electronic Equipment Directive (WEEE) directive and the REACH directive.

Air pollution and control

Niche opportunities are also seen to exist in a number of other environmental service areas. EU Directives in air pollution and control are limiting and controlling the concentrations of pollutants in the air and driving opportunities in this sector. Odour control is seen as a niche opportunity within this sector and such opportunities may lie in overseas markets looking to comply with air quality legislation. The noise and vibration control sector has seen growth in recent times, particularly as the transport network on the island of Ireland has been developed. Continued construction-related opportunities exist in the areas of acoustic barriers on planned motorways and highways and further developments in the mining and quarrying sector may offer some potential enterprise opportunities.

Soil remediation

The soil remediation sub-sector is currently valued at €30- €40 million annually in Ireland and with an approximate market value of €16 - €18 million in Northern Ireland. The eventual implementation of the impending Soil Framework Directive and investment plans are seen as the main drivers. The key area in this sub-sector is likely to be consultancy services on the treatment and reuse of soils and remediation technology providers.

Section 3: Conclusions and Recommendations

3.1 Headline conclusions of the study

The size of the environmental goods and services (EGS) market is significant and growing

The global EGS market as a whole is growing steadily and this trend is likely to continue. A number of studies have estimated that the value of the sector was in excess of $600 billion worldwide in 2005 and is likely to exceed $700 billion by 2010 and $800 billion by 2015[23].

Although the wide range of the activities that can be included in the sector can make data collection difficult, some figures have been calculated from background research. The EGS sector in Ireland is valued at some €2.8 billion, with Northern Ireland accounting for an additional £624 million (€790 million) approximately. A best estimate suggests that there are more than 6,500 directly employed in EGS companies in Ireland, with no direct employment data available for Northern Ireland. In light of the key drivers identified in this study, it is expected that the size of the EGS sector and employment opportunities will continue to grow.

Indigenous EGS companies are generally small but are growing

A small number of major players exist in the EGS market on the island of Ireland[24]. The market is also seen to have a high proportion of small and medium-sized enterprises (SMEs) who have established a substantial business presence over the past ten years. There are also a number of subsidiaries of UK and EU parent companies offering environmental consultancy services and competing in key sectors such as waste management.

To a large extent – but with a few notable R&D-intensive exceptions in certain sectors (such as waste and ocean energy) – the EGS market on the island of Ireland has displayed low R&D investment. Nonetheless, a growing number of companies have been successful in developing business models which have commercialised R&D-intensive technologies related to the EGS sector.

Opportunities exist for companies operating on the island to internationalise

As the majority of EGS companies are satisfying demand on the island, it will take a major effort over several years to develop internationalising activity in the EGS sector. The task of growing exports should be greatly facilitated by the emergence of Britain as an adjacent, large, growing and dynamic market where investment in the EGS sector is expected to grow by nearly 100% to £46 billion (€58 billion) by 2015[25]. This suggests that the priority should be to secure an ambitious market share of this EGS market as a first step for potential exporters from the island of Ireland. Potential has also been identified in some sub-sectors for expansion into

23 ENDS Directory 2008, UK Centre for Economic and Environmental Development global market estimate.

24 Examples include NTR which own Greenstar, BioVerda and formerly Airtricity; One51 which owns Cedar and Techrec; DCC which owns Enva; and other key players such as Glen Dimplex and Kingspan.

25 UK Department for Business, Enterprise & Regulatory Reform projections.

the broader EU market where Members States will be required to comply with a wide range of environmental legislation.

While there is currently limited FDI presence in the EGS sector, potential exists to develop this base

The EGS sector is currently showing a limited presence of FDI investment on the island of Ireland. Nonetheless, given the growth in global mobile investment in the sector as a whole it is felt that potential exists for the relevant agencies on the island of Ireland to attract FDI investment in a number of niche areas. The strong ICT base, green image and past experience in attracting FDI investment in specific sectors are seen to be of particular advantage in this respect.

A number of EGS sub-sectors have been identified as having growth potential

The sub-sectors which are seen to have the greatest potential are

- Renewable energies (in particular solar, wind and wave);
- Efficient use and management of energy[26];
- Waste Management, Recovery and Recycling;
- Water and Wastewater Treatment ; and
- Environmental Consultancy and Services.

A number of the sub-sectoral business opportunities will be based on the innovative application of information and communication technologies (ICTs). Given the historical investment which has developed a competitive advantage in ICT on the island of Ireland, leveraging this base is seen to be an important opportunity.

Enterprise policy has a role to play in developing the sector

In the EGS sector, the main role enterprise policy has to play is in ensuring the framework conditions for investment in EGS are strong and that any impediments to growth for companies in the sector are removed. In certain cases, support for companies wishing to internationalise or developing technologies may be called for. A range of “soft” indirect supports are currently available from the development agencies, North and South, for growing companies here and such supports are equally available to companies within the EGS sector.

26 A separate assessment has been carried out of the eco-construction sector as many of its products, insulation and building materials could be categorised as environmental products. It is important to bear in mind that building and house construction opportunities, like some of the other sub-sectors, will cut across a range of activities such as energy efficiency and renewable energy.

3.2 Foreign Direct Investment: Key Messages

Like all inward investment in advanced manufacturing and next generation services, factors such as competitive tax rates, a stable economic environment and good physical and technological infrastructure will be important in attracting inward investment in the EGS sector. Other factors which are seen to also be particularly important for EGS foreign direct investment include:

- Public commitment to investment in EGS-oriented research and development. Recent developments in environment and energy-related research investment on the island of Ireland (such as expanding the remit of Science Foundation Ireland to include sustainable energy and energy-efficient technologies) are important stimuli in this respect and this emphasis should continue. There is potential for North/South collaboration in the area of environment and energy-related R&D.
- The availability of key skills which are relevant and favourable to the EGS sector.
- Information and communication technologies (ICT) capabilities. The strong ICT base which exists on the island of Ireland is a key selling proposition in this respect.
- The protection of the intellectual property (IP) assets of the new energy technologies.
- The country's image in environmental performance. The island of Ireland's image as a 'green island' is seen as a significant promotions tool in this respect.

Although there is currently limited evidence of international companies operating out of the island of Ireland to service international EGS opportunities, the potential to secure inward investment in this area is expected to grow. For example, planned increases in investment in the environmental goods and services sector in Britain and investment needed throughout the EU to comply with the EU's climate change and renewable targets are expected to bring opportunities to target U.S. and European companies which would be looking to service the British and European markets.

Identified FDI Opportunities

Renewable Energies

- Wind
  - Given the foreseeable growth in the global wind industry, potential FDI activity should be proactively sought.
- Solar
  - The solar Photovoltaic (PV) industry appears (gauging from the level of expansion and investment) to seen to have strong prospects for FDI. At present, much of the current global solar PV investment appears to be concentrated on the flow of investment between Germany and the U.S.[27] Consideration could be given by the agencies to identifying the strategic components or companies that could kick start the industry on the island.

27 Japan and the US are currently the world leaders in PV production although by 2007 there were 44 major production plants in the EU, almost half of them in Germany. Since 1999, production growth in Germany has averaged 50% per year.

- Marine Energy
  - Ireland as an island has comparative natural resource advantages and potential first mover advantage in wave and tidal energy. Important developments are happening (in terms of prototypes and research) and government investment in wave energy is growing. These significant selling points could be targeted at identified potential global investors in the sector.

Efficient use and management of energy

- The global industry in industrial/ energy clean technology is very diverse but there is heavy investment, innovation and venture capital activity currently happening worldwide in the sector. A number of the main global players in the sector which could be tracked have been identified in the background research to this study.
- Government investment in efficient energy use and cleaner technologies sends a clear signal to prospective investors of the commitment in the future.

Recommendations

- In light of the limited development of the EGS sector on the island of Ireland, this study recommends that a targeted approach be taken to attracting FDI in niche areas with the highest potential. These are:
  - Renewable Energies (particularly wind, solar and wave energies); and
  - Efficient use and management of energy

  The relevant enterprise agencies could collaborate to identify areas within the supply chain of renewable energies and energy efficiency where opportunities for FDI could be realised. The EGS sector is a relatively new industry and the profile and size of companies operating in the sector may be different from other traditional FDI sectors operating on the island. As such, it is recommended that a tailored approach should be taken to realising these opportunities for FDI.
- The island of Ireland possesses significant ICT capabilities. Given the contribution ICT can make to sustainable environmental management, key sectors where ICT applications can be used to reduce energy use or materials or produce energy more efficiently should be identified and prioritised by the development agencies. The potential for continuing the development of the nanotechnology sector here is seen as important in this respect, particularly given that the ability to detect environmental impacts by new sensor systems – many made possible by nanotechnology - means that regulations for the foreseeable future can be set and enforced more precisely than ever before.
- A significant number of companies using emerging technologies in the global EGS market (particularly in the U.S.) have limited international activity at present. For companies looking to service international markets, opportunities for headquartering of Europe, Middle East and Africa (EMEA) operations as well as back office services (design, treasury, supply chain) exist in the EGS sector.

The enterprise agencies need to continue to track and target mobile investment in the EGS sector, particularly in companies investing in the key identified areas. Strong experience which has been developed in attracting FDI investment in specific sectors - such as Financial Services and Medical Devices – can be built on in this respect.

3.3 Indigenous Enterprise: Key Messages

Water and Wastewater Treatment, Waste Management Recovery and Recycling, Environmental Consultancy, Efficient Use and Management of Energy (including Eco-construction) are seen to be the main areas of opportunity for indigenous enterprise.

- The imminent large scale of investment in the water sector on the island of Ireland in combination with the development of new business models in the sector should be seen as a proving ground for indigenous companies and a stepping stone to export markets. Recovery and treatment of current waste streams are seen to be the priority areas which can be developed.
- The challenges faced in waste management on the island of Ireland are expected to provide considerable opportunities for enterprise here.
- Environmental consultancy opportunities are expected to grow significantly. In particular, growing awareness of the benefits of cleaner technologies and processes (CTP) can drive such consultancy opportunities.
- Efficient Use and Management of Energy services are similarly seen to offer significant potential and it is felt that export potential may emerge if sufficient scale can be built. In particular, retrofitting buildings for energy efficiency in response to Building Energy Rating (BER)/ Energy Performance Certificate (EPC) standards is seen to offer promising future opportunities for the domestic construction sector.

Other opportunities include:

- In individual components of the wind supply chain[28], there is potential for indigenous companies to secure supply contracts or to build links with global investors.
- Opportunities also exist in developing biomass and biofuels from waste, for example in building on the boiler manufacture tradition here to develop biomass boilers.

Recommendations

- In light of the limited development of the environmental goods and services sector on the island of Ireland, the strengths of the existing enterprise base here and opportunities that are expected to arise in the future, this study recommends that a targeted approach be taken to focus on niche areas with the highest potential. In terms of indigenous enterprise, it is recommended that the agencies prioritise the following sub-sectors:

28 Research has identified that there are a number of discrete components and steps involved in the wind supply chain, broadly represented thus: planning – EIA – R&D – turbine – turbine rotor – gearbox – induction generator – transformer – installation – commissioning – maintenance. While limited potential is seen to exist in some of these steps (such as gearbox or turbine manufacture) the potential for enterprise opportunities may arise in others.

- Water and Wastewater Treatment.
- Waste Management Recovery and Recycling.
- Environmental Consultancy.
- Efficient Use and Management of Energy (including Eco-construction).
- Renewable Energies.

- In terms of international opportunities in the EGS sector, the enterprise agencies could investigate supply chain/ linkages/ introduction opportunities for indigenous firms in the above main sectors.
- Given the scale of investment planned and its proximity, Britain is seen as a main target for the EGS sector on the island of Ireland. As well as this, in light of the projected levels of investment in Europe as governments and businesses set out to comply with the EU's climate change and renewable targets, targeting opportunities in the EU market – particularly in recent accession states who are adapting to EU Directives - is also seen to be a priority.
- As noted above, strong capabilities exist here in the ICT sector which is seen to have a significant role to play in sustainable environmental and energy management across a range of sectors. It is thus recommended that the agencies continue to work with the existing base of indigenous ICT companies to look at diversification into EGS applications and fostering new high potential start-ups in this area. Linking with the active nanotechnology research base on the island of Ireland could also be important given the potential for nanotechnologies to improve the environmental performance and sustainability of products.
- Significant efforts are currently happening to increase the commercialisation of research in publicly funded research institutions across all sectors on the island of Ireland. Such initiatives should be cognisant of the potential to build on the research undertaken in the EGS sector.
- All-island business-led networks could be utilised as a tool for internationalising and building scale in the indigenous EGS sector, particularly in priority technologies and products.
- Market intelligence at sub-sector level is seen to be important in developing export potential. The enterprise development agencies may have a role to play in developing this, for example by providing access to international networks, developing joint North/South trade missions, building on their current information base or assessing spending plans of EU countries in implementing EU legislation (in areas such as waste and water) with a view to identifying new business opportunities and informing these sectors on the island.
- The island of Ireland's image as a 'green island' is seen as a significant promotional tool for indigenous companies and should be developed further.

3.4 Policy Recommendations

Public Procurement

The National Development Plan and the Investment Strategy Northern Ireland both recognise the importance of long-term sustainable development considerations underpinning policy planning and implementation. Full implementation of the investment commitments contained in these and other strategy documents in areas such as environmental services and waste management investment, promotion of renewable energy and water services is called for.

The public procurement for these investment plans potentially has a very important role to play in fostering and promoting the development and adoption of new environmental goods and services. Under current regulations, competing tenders are evaluated on a range of criteria, including price, but also including a range of other qualitative and quantitative criteria (depending on the nature of the work). By also including considerations of which products, services or works are the most suitable in terms of environmental impact, public procurement could help to facilitate the commercial viability of an innovative environmental good or service and help to attract investment. Each of the European Union's Member States has been requested to prepare a "Green Procurement" Policy statement setting out specific green procurement targets. In Ireland, the Department of the Environment, Heritage & Local Government is currently preparing this National Action Plan on Green Public Procurement, while Northern Ireland recently launched guidance for buyers and suppliers on sustainable procurement. These documents offer an opportunity for North/South policy alignment in an important driver for the EGS sector.

Skills

Skills shortages have the potential to impede growth of the sector. The supply of skills appropriate to the EGS sector needs to be enhanced, for example in areas such as science, management and installation and maintenance of new environmental technologies. These skills are important across all EGS sub-sectors.

The education system will be central to developing the necessary skills to assist the future growth of the sector. One key area of potential skills shortage that could impede the growth of the sector relates to environmental engineering. It is recommended therefore that programmes which promote engineering as a career choice should be cognisant of the increased opportunities offered in the environmental engineering discipline[29].

29 One example might be the Science, Technology and Engineering Programme for Schools (STEPS to Engineering) Programme which is run by Engineers Ireland and Discover Science.

In order to ensure that an adequate and appropriate supply of skills is available to the sector, it is important that we understand both the skills needs of enterprise, as well as the capacity of the education and training system to meet these needs. Further actions, including the incorporation of environmental considerations into continuing professional development programmes, encouraging education and training on the benefits of a life-cycle assessment[30] in private and public investment (particularly for green public procurement) and the provision of supports for improved training and development in the environmental industry, can enhance awareness about the importance of sustainable development, as well as boosting the stock of appropriate skills. Such initiatives could be developed in conjunction with a range of bodies including national training authorities[31], business-led networks, industry bodies and business representative associations.

Investment in R&D

Environmental research is central to the growth of the EGS sector. Given that the island of Ireland is starting from a lower base than a number of competitor countries, it is important that EGS-related and applied research which is targeted at specific areas of opportunity should continue to be prioritised for public investment[32]. In Ireland, Science Foundation Ireland's remit has been recently extended to include sustainable energy and energy-efficient technologies and reaching planned investment targets in this area will be important in enhancing the knowledge and business potential of the EGS sector.

Environmental Legislation Implementation and Market Structures

The recent past has seen a dramatic increase in the amount of environmental legislation. Consistent enforcement and implementation of this legislation is central to driving the EGS sector. Timely enforcement of environmental legislation allows for certainty that is needed for enterprises to invest in potential opportunities. It is thus recommended that the two governments should ensure that they set out and adhere to well-defined timetables for the implementation of environmental legislation, as any delay can undermine investment and damage confidence in the direction of policy.

30 Life Cycle Assessment (LCA) is an internationally standardised methodology (ISO 14040 ff) which helps to quantify the environmental pressures related to goods and services (products), the environmental benefits, the trade-offs and areas for achieving improvements taking into account the full life-cycle of the product.

31 For example, FAS has an Environmental and Construction Training Unit which offers programmes catering for both the public and private Sector.

32 One example would be the EPA's Science, Technology, Research and Innovation Programme (STRIVE) programme. The Irish Energy Research Council has also been working on a strategy for Irish Energy Research which proposes energy research activity in the following fields:

- Ocean Energy
- Grid / Infrastructure
- Energy in Buildings
- Energy in Transport
- Sustainable Bioenergy

In the waste management sector, it is critical that policy and regulatory certainty is provided to incentivise private investment in waste infrastructure in line with public investment. In Ireland, a decision on the future regulatory structure for the waste sector needs to be made quickly which would clarify relative roles and responsibilities in the regulation and management of the waste sector at national, regional, and local level and the review of waste policy recently initiated by the Department of the Environment, Heritage and Local Government needs to be completed as speedily as possible and its outputs progressed quickly.

Similarly, the development of infrastructure to maximise the use of renewable energies in the context of the single electricity market is central to the growth and development of the renewable energy sector on the island of Ireland. Current developments which are looking to remove technical, regulatory and economic barriers to develop renewable energy generation are seen to be of key importance and should be prioritised.

In terms of regulatory compliance and awareness, companies may not be aware of which environmental regulation currently affects them. Existing information on what is required of companies to comply needs to be strongly promoted. There is potential for North/South coordination on any awareness-raising efforts.

Fiscal Instruments

By integrating the real costs of environmental degradation and the benefits of environmental improvements directly into the incentive structure of producers and consumers, fiscal instruments such as taxes and subsidies can directly affect the provision of environmental goods and services. These can take the form of general enterprise policy instruments such as the R&D tax credit or specific measures such as capital allowances which promote the use of new and clean technologies[33].

Given the positive externalities, the often high degree of uncertainty which can be associated with environmental goods and services and the large-scale of investment that is often required, fiscal instruments are seen to have an ongoing role to play in developing the EGS sector. In particular, it is recommended that general measures to support environment research and technology on the island of Ireland continue to be supported.

Access to Finance

The EGS market on the island of Ireland includes a significant number of specialised start-ups and small firms. Such firms face difficulties in accessing start-up and growth finance common to all small firms. Given this industry structure and the fact that projects in the EGS sector are characterised by high levels of uncertainty and depend on a regulatory framework beyond their control, general measures (such as the Business Expansion Scheme in Ireland and the

33 An example in Ireland would be the tax initiative for Energy Efficient Equipment which was introduced in the Finance Act 2008.

HALO business angel networks, North and South) which improve seedcorn financing and remove market failures in the access to finance for such firms continue to be important.

In light of the recent difficulties experienced in financial markets, continuous monitoring of the availability of finance for firms generally – including firms operating in the EGS sector - is seen as important.

Business Networks

Continuing to grow the scale of companies operating in the EGS sector has been identified as an issue in this study. Collaborative business networks organised on an all-island basis can have a role to play in assisting companies building up scale and capacity. Given that many companies operating in the EGS sector on the island of Ireland are currently not exporting to any great extent, networks could prove important in helping indigenous companies internationalise.

The potential of business-led and project specific business networks in the EGS sector could be examined by the enterprise agencies. Potential sub-sectors could include wave energy, clean technologies, energy efficiency and management, construction, waste and water.

Bridging the Information Gap

As seen from a number of sectors looked at in this study, information on the EGS sector is often difficult to secure. The wide range of goods and services that can be encapsulated into the sector can often make data collection complicated and comparisons difficult. Nonetheless, a group of measurable goods and services and industrial and service activities can be identified as forming the core of the environment goods and services sector. There is a need to develop indicators and statistical systems on the EGS sector in such measurable areas which would allow a more in-depth analysis of the sector[34].

At the company level, accessing information on exporting is important to helping indigenous companies internationalise and scale their businesses. Expertise that currently exists within the agencies is seen to be quite strong and consideration could be given to promoting this more to companies with a greater emphasis placed on the EGS opportunities aspects of this information. As well as this, information on internationalising opportunities and access to international networks of the enterprise development agencies could be leveraged more by companies operating in the EGS sector.

34 The new version of the European industrial activity classification - NACE Rev.2 – is an important step forward in this respect as it includes new sectors relevant to the EGS sector such as Water Supply, Sewage, Waste Management and Remediation. This new categorisation is to be phased in between 2009 and 2011.

Agency Collaboration

As the EGS sector has continued to grow, the involvement of public agencies and organisations has similarly developed[35]. In order to exploit fully the enterprise opportunities that are arising in the EGS sector, it is recommended that structured collaboration should continue between the relevant agencies to ensure a smooth transition for companies or research ideas to access the market.

3.5 Concluding Remarks

This study aims to identify new areas of business opportunities within EGS sector on the island of Ireland so as to ensure that enterprises and State development agencies are well placed to take advantage of these opportunities. Overall, this study provides an analysis of the current situation in the EGS sector on the island of Ireland and is seen as a point from which activity in the sector can be further developed.

Although it is difficult to define specific categories within the environmental goods and services sector, a range of different sub-sectors which are seen to have the strongest potential have been looked at and conclusions have been drawn as to whether each sector has opportunities to grow domestically or internationally. From this sectoral analysis, a number of high-level messages and recommendations have been developed for the foreign direct investment sector and the indigenous enterprise sector.

The low base of development in certain EGS subsectors on the island of Ireland is acknowledged and it is thus recommended that specific areas should be targeted in an effort to build the EGS sector here. These specific areas are based on identified opportunities that are expected to arise and on the strengths of the existing enterprise base here. The importance of a supportive policy and regulatory environment for the EGS sector is seen as central to the development of the sector overall and this study has identified a number of areas where policy can play a role in setting the framework conditions essential to securing FDI, unlocking investment, raising the level of research, development and deployment and convincing entrepreneurs that the EGS sector is a growth area of the future.

35 In Ireland for example, a range of agencies such as Science Foundation Ireland, Sustainable Energy Ireland, Enterprise Ireland, IDA Ireland and the Marine Institute are all involved in the environmental goods and services sector.

Appendix 1: Overview of main EGS sub-sectors

Sub-sector	Current size of Irish market[36] €million	Growth Potential - Island	Current Sectoral capability/ capacity	Export Potential	Main Driver	Main Barrier	Comment
Renewable Energies	€700m	HIGH	LOW	HIGH	EU RE targets	Lack of first mover advantage in wind and solar	▪ Low capacity relative to competitors ▪ Marine energy has potential for first mover advantage
Efficient energy use and management (including eco-construction)	Not known	HIGH	MEDIUM	MEDIUM	Energy and materials costs	▪ Asset rating emphasis (not operating performance). ▪ Knowledge and skills deficits	▪ Current demand is low due to poor awareness but rising energy costs will change this. ▪ Irish companies are operating successfully in UK market
Waste Management, Recovery and Recycling	€560m	HIGH	MEDIUM	LOW	Regulatory compliance	Lack of clear government policy	▪ There is greater potential for higher value recyclables ▪ Achieving economies of scale is a critical success factor

36 Given the difficulties in defining the sector, detailed on the EGS market as a whole is difficult to come by. No data was available for Northern Ireland apart from population pro-rata calculation from the UK's Department of Trade and Industry report on the sector which is not seen to be very reliable. The most comprehensive study of the environmental goods and services industry in the Republic of Ireland was carried out by Ernst & Young on behalf of the European Commission which estimated the Irish environment market at €1,211 million in 2004. These figures are however drawn from outdated 2004 data and exclude the renewable and sustainable energy sectors.

In light of the dynamic growth of the sector since 2004 which was estimated by Forfás and InterTradeIreland to be in the region of 15% per annum for each sector since 2004 and incorporating data on the renewable energy sector which were estimated by EPS consultants as part of the background research to this report and data on the water sector from the Department of the Environment, Heritage and Local Government gives an estimate of €2,810mn for the Irish market in 2008. In Ireland for example, a range of agencies such as Science Foundation Ireland, Sustainable Energy Ireland, Enterprise Ireland, IDA Ireland and the Marine Institute are all involved in the environmental goods and services sector.

cont'd Waste Management, Recovery and Recycling,	€560m	HIGH	MEDIUM	LOW	Regulatory compliance	Lack of clear government policy	▪ The level of infrastructural investment committed should support new environmental technologies
Water and Wastewater Treatment	€1,000m [37]	HIGH	MEDIUM	HIGH	Regulatory compliance	Under investment in new technologies	▪ Very significant public investment commitment in should be used to leverage capacity to deploy new technologies
Environmental Consultancy and Services	€400m	MEDIUM	HIGH	LOW/ MEDIUM	Regulatory compliance	Fragmentation and ownership structure	▪ Supporting interationalising opportunities of indigenous firms seen as a priority.
Total	**€2,810m (excluding eco-construction)**						

37 Based on Department of the Environment, Heritage and Local Government Water Services Investment Programme 2007 – 2009 capital costs only.

Appendix 2: Project Steering Group

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