



The Case for Locating the UK Green Investment Bank in Edinburgh

March 2011

On behalf of

The Edinburgh Green Investment Bank Group

"A properly funded Green Investment Bank with real borrowing powers could play a really positive proactive role in speeding the urgent transition to a low carbon future. There are many sensible arguments for locating such a bank in Edinburgh – where it will be 'closer to the action' and able to exploit an impressive concentration of skills and expertise in clean energy and finance." Friends of the Earth

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1 Executive Summary

This Business Case poses two questions:

- Why is the location of the Green Investment Bank important?
- Why is Edinburgh the right location, for the future of the industry and the successful development of clean energy in the UK?

The answers to these questions lie not simply in the scale of the clean energy investment challenge but also in the unique combination of factors, technological, financial and commercial – that need to be addressed to meet targets and deliver a resilient and viable industry.

This Business Case understands the “pull” of London as a location, but concludes that a unique opportunity exists to enable the GIB to play its role effectively by plugging into an existing and growing renewable energy hub, centred on Edinburgh.

Successful commercialisation of this sector is essential to the timely delivery of Government policy objectives. This can only be achieved through effective collaboration between industry and finance.

The sponsors of this report believe that the location of the Green Investment Bank is a vitally important piece of the jigsaw. Location matters because successful commercialisation depends on effective collaboration and partnership between industry, technology and know-how and finance.

Putting the GIB in the right place presents a unique opportunity to create a locational driver for developing a low

carbon technology “virtuous circle”, where finance can be used intelligently to drive the industry towards commercialisation. If we accept that the pace of development needs to be driven hard to meet policy targets, this kind of opportunity should not be missed.

Clean energy is a sector which unusually combines the characteristics of **early stage deployment risks** and **capital intensity**. For this reason, it is even more important that industry and finance work closely together to disseminate knowledge and best practice in order to achieve commercialisation and standardisation to reduce risk.

The Chancellor’s formal budget announcement has clarified the GIB’s initial capitalisation of £3bn, which may seem small relative to the investment requirements of the industry, but if the GIB can deploy its resources intelligently, it can achieve a positive “ripple effect” that goes well beyond the bare capital resources of the Bank. It can do this by developing a deep understanding of and a close partnership with the sector.

In order to accelerate commercialization, achieve leverage and maximize value for money for the public sector, GIB will need to be able to play an interactive role to ensure the flow of information between industry and financial markets and provide “smart” finance that effectively addresses market failures that exist in policy objectives. It can best do that by being close to where the action is, to deliver a clustering effect, accelerate commercialization and reduce risk, creating a “virtuous circle” between the supply chain, technology development and finance.

Edinburgh is ranked as the fourth largest financial centre in Europe in terms of equity assets. Assets under management in Scotland in 2009 totalled £445 billion and assets under administration in the region of £1.3 trillion.



Edinburgh is the only location in the UK which can bring finance and the clean energy industry together in a single location. Because of the rapidly developing clean energy hub, Edinburgh and Scotland are a magnet for inward investment in the clean energy and related sectors. The surrounding region has a deep concentration of higher education and research establishments, with a major concentration of leading edge R&D in the clean energy and related sectors.

This concentration of know-how makes Edinburgh the ideal location for an institution focused on clean energy investment.

To support successful commercialisation, it is important that the GIB is closely connected to where the action is. This creates the “virtuous” circle that we consider is vital to the successful commercialisation of low carbon energy. The attraction of Scotland as a base for clean energy development is clearly shown by the decisions of major global Original Equipment Manufacturers to locate here, such as Gamesa, Mitsubishi, Siemens and, most recently, the Korean engineering company, Doosan Power Systems.

Edinburgh’s industrial hinterland has an unrivalled concentration of industry skills and experience, **both in clean energy and in oil & gas**, which achieves the concentration needed to support effective commercialisation. There is already a “critical mass” of activity that can be harnessed to enable the GIB to make a real difference to the sector. This is demonstrated not just in the scale of the industry itself, but in the support services that have built up around it and the specialist educational and research capabilities that have developed to support it.

Edinburgh also has a **financial services sector** that is both broad and deep. The city operates globally as an international financial services centre – the only location outside London to do so. This means that the financial know-how

needed to deliver effective commercialisation is not lost by locating the GIB outside London.

The project finance capability in Scotland, combined with its long-standing expertise in the oil and gas markets are critical factors in facilitating the process of “main-streaming” the low carbon energy sector for investors.

Locating the GIB in Edinburgh therefore provides the opportunity to move up the learning curve quickly for the clean energy sector drawing on the emerging renewables hub, where strong examples of collaboration and partnership are already being seen, such as the **Centre for Engineering Excellence in Renewable Energy**.

Nowhere else in the UK is the same combination and diversity of financial skills and assets co-located with an industrial hinterland heavily focused on conventional and renewable energy technologies, covering the whole span between leading edge and early stage through to the asset-intensive capital and infrastructure elements of the industry.

A location outside London will also serve the geographical spread of the clean energy sector across the UK, but in Edinburgh it will be without losing the benefits of a major financial centre. The risk of regionalisation of the clean energy sector, would be avoided, which could happen if the GIB were located anywhere else outside London.

Edinburgh’s positional advantages are unique – it is both at the heart of a “super region” of clean energy activity and readily accessible to the rest of the UK, as well as globally. As the “go to” location for clean energy in the UK, it is also the natural location for the Green Investment Bank.

The signatories to this business case believe that Edinburgh represents a unique opportunity for the clean energy industry.



2 The Green Investment Bank

Investing in the low carbon economy is a key element of the Government's plans¹. The Green Investment Bank ("GIB") is expected to play a pivotal role in meeting the investment need. The Chancellor's formal budget announcement also sets a clear timeline: operational from 2012, and able to borrow, subject to the position on the national debt, by 2015 / 2016. The initial capitalisation of £3bn may seem small relative to the investment requirements of the industry, but if the GIB can deploy its resources intelligently, it can achieve a positive "ripple effect" that goes well beyond the bare capital resources of the Bank.

This will be a new institution designed to meet a new challenge – a challenge that has fundamental implications for the UK's economic, environmental and social future.

The need for the GIB is set against a background of a rapidly increasing investment requirement for renewable energy technologies, entailing a doubling of investment required in the coming decade, compared with the previous 10 years and an overall requirement in excess of £200bn to 2020.

This report makes the case for Edinburgh to be the UK location for the GIB because this makes the most sense in the context of the industry's requirements and the Government's overarching policy objectives.

In its June 2010 report², the Green Investment Bank Commission argues "for the establishment of the Green Investment Bank to work as part of overall Government policy to open up flows of investment by mitigating and better managing risk (rather than simply increasing rewards to investors)". It goes on to stipulate that the GIB's mandate should involve:

- "Identifying and addressing market failures limiting private investment in carbon reduction activities".

The Government further clarified the objectives of the Green Investment Bank in the October Spending Review³:

"The new institution will make a radical new contribution to financing green infrastructure through having an explicit mandate to tackle risk that the market currently cannot adequately finance. It will catalyse further private sector investment, aiming to facilitate the entrance of new types of investor into green infrastructure so that the impact on the finance gap for low carbon investment is many times the scale of the public contribution. It will make its investment decisions independent from political control and will employ private sector skills and expertise."

It is clear that the GIB's role will not simply be to provide commercial finance on similar terms to other funders in the sector. It needs to address market failure such as early stage, relatively high risk segments of the market, or areas where capital will not be deployed with sufficient speed to meet public policy objectives, focusing on areas of greatest need. To do this, GIB requires broad and deep sector knowledge and working relationships in order to deploy capital as effectively as possible.

¹ http://cdn.hm-treasury.gov.uk/sr2010_complereport.pdf

² "Unlocking investment to deliver Britain's low carbon future"

³ http://cdn.hm-treasury.gov.uk/sr2010_complereport.p



Commercialisation is fundamental to the effective delivery of the UK's decarbonisation strategy. National and supra-national targets will only be met if a range of technologies can be effectively and rapidly commercialised. Finance needs to be deployed smartly in order to smooth the path to commercialisation, and the GIB should be a key interface between the industry and the financial markets, as well as and internationalising the opportunities that this sector presents in the UK. Part of the GIB's role will be to attract international utilities and new entrants such as global corporates in order to delivering greater competition on pricing through investment, and highlight the global opportunities that will appeal to international investors.

This is a sector which unusually combines the characteristics of early stage deployment risks and capital intensity. For this reason, it is vital that industry and finance work closely together to disseminate knowledge and best practice in order to achieve commercialisation and standardisation. The Green Investment Bank is intended to play a central facilitating and enabling role, and act as the interface between the investment need and the financial markets.

The central argument of this Business Case is that successful commercialisation of this sector can only be achieved through effective collaboration between industry and finance, and that part of achieving this lies in putting the GIB in a location where it can perform a proactive role.

The next four chapters focus on components which are essential to effective commercialisation. These elements come together in Edinburgh as a location, effectively as parts of the "commercialisation jigsaw" for clean energy and related technologies.

The final three chapters discuss other benefits deriving from Edinburgh as a location.

Determining the optimum location of the GIB should take account of a combination of factors. We consider, for the reasons set out in this business case, that Edinburgh represents the best combination of industry, financial and locational factors and is therefore the ideal location for the GIB.



3 Financial Capability

Edinburgh has a financial services sector that is both broad and deep. The city operates globally as an international financial services centre – the only location outside London to do so. The range of financial services capability covers the spectrum of risk that is needed to bridge the financing gap in the clean energy sector, from early stage high risk capital to large-scale, low risk asset-backed financing. The sector in Edinburgh and its support sectors have a long and successful track record in financing large scale infrastructure projects and clean energy projects. This capability clearly shows that the Edinburgh financial community can deal with both ends of the spectrum – high risk, high return investment, commoditised asset lending and points in between.

3.1 Overview

Edinburgh is ranked as the fourth largest financial centre in Europe in terms of equity assets. The sector in Scotland employs nearly 86,000 people directly (of whom 38,000 are in Edinburgh) and over 70,000 in support companies⁴. Eight of the world's 10 largest banking companies by assets have a presence in Edinburgh. The Scottish financial sector continues to perform strongly despite the aftermath of the credit crunch, with the most recent GDP data showing that there was an increase in financial services output of 0.5% in the most recent quarter,

⁴ Source: Scottish Development International

compared with a decline of 0.8% for the UK financial services sector as a whole. This shows a level of resilience in the sector, although output is still significantly down from the peak in 2007.

The sector covers the whole range of financial services, including retail and wholesale banking, insurance, pensions, fund management, private equity, corporate finance and asset servicing. It has capability both at the high risk early stage end of the clean energy sector, as well as the pension funds who are seen as a long term solution to the asset-intensive, lower risk end of the market.

Financial services contribute around £7bn to Scottish GDP⁵. Around 33% of the workforce in Scottish financial services are graduates with a Higher Education degree or postgraduate level qualification⁶.

Scotland is strong in the provision of general academic courses and research in support of financial services. Examples include:

- the Chartered Institute of Securities and Investment Centres of Excellence at Edinburgh and Glasgow Caledonian Universities; and
- the **Scottish Financial Risk Academy** (SFRA) of Heriot-Watt University and the University of Edinburgh, which is the UK's first partnership between industry and academia established to investigate quantitative financial risk management.

⁵ Source:
<http://www.scotland.gov.uk/Publications/2007/03/27122425/5>

⁶ Source: idem



3.2 Banking Capability

Edinburgh has a banking community with the strongest base outside London in the UK. Banks with a base in Edinburgh include a large number who are major players in the clean energy sector and have a strong legacy in project finance. This brings with it a highly experienced professional workforce, both in banking and in the professional services that support it. The level of interaction between the banking communities in London and Edinburgh is significant and reciprocal, as representatives of the UK's two major banking centres interact on a wide range of projects and corporate deals. Banking groups with a significant representation in Edinburgh are listed at Appendix A.

3.3 Asset Management / Asset Servicing

Around 13% of total UK assets under management are managed in Scotland, primarily in Edinburgh. Assets under management in Scotland in 2009 totalled £445 billion⁷.

Scotland's asset management community, most of whom are based in Edinburgh, employs over 3,300⁸ people in Scotland. Key investment managers based in Scotland are set out in Appendix A:

Scotland is now considered to be one of the largest asset servicing centres in Europe, with assets under administration in the region of £1.3 trillion⁹.

Major global asset servicing companies with a base in Scotland include: Bank of New York Mellon; BNP Paribas; Citi; HSBC Securities JP Morgan, Morgan Stanley, and State Street Corporation and

⁷ Source : Investment Management Association

⁸ <http://www.sfe.org.uk/about-industry/investment-managers/>

⁹ Source: Asset Management and Asset Servicing, Deloitte, May 2009

they employ nearly 4,000 people in Scotland¹⁰. The European Asset Pricing Hub of JP Morgan is located in Edinburgh, as is its UK Centre of Excellence for collective scheme fund accounting.

Edinburgh's financial centre has a strong international profile and is regarded as second only to London in its capability to transact across borders.

3.4 Project Finance

Scotland has a strong track record in financing infrastructure projects. To date, 119 project finance deals have closed in Scotland, using a variety of public-private partnership structures, across a range of sectors, including transport, health, education and waste, with an estimated capital value of £6.396bn. They account for approximately 10% of the UK PFI market.¹¹

Scotland has a history of early adoption in the project finance market, for example:

- The first bundled schools project (Falkirk Schools);
- The first bond-funded PFI project (M74);
- The first standardised contract structure for PPPs

Scotland looks set to continue this innovation through the creation of Tax Incremental Finance ("TIF") structures as part of Edinburgh's Waterfront regeneration. The Edinburgh TIF scheme will be the first of its kind in the UK. It will allow investment in infrastructure for identified areas and recovery of the financing cost through the allocation of revenues from business rates, and this mechanism is expected to be a key tool in providing the supporting investment for low carbon energy initiatives. An important benefit is its ability to achieve

¹⁰ Source: <http://www.sfe.org.uk/about-industry/asset-servicing/>

¹¹ Source: Scottish Futures Trust / Partnerships UK



“leverage” – i.e., gearing up public sector money with a multiple of private sector funds. Planners claim the £84m venture on Edinburgh’s waterfront has the potential to unlock £660m of private investment and create up to 4,900 jobs.

The development of the project finance industry in Scotland over the last decade and a half has enabled professional services firms such as accountants, lawyers and technical consultants to develop strong practices, using Scotland as a base to expand into other parts of the UK and further afield. More recently, the growth of the low carbon energy industry has provided a natural growth market with skills developed in the PPP sector easily transferable into this new market.

Following the incorporation of Execution Noble into Espirito Santo Investment Bank, Edinburgh is now home to one of the recognised world leaders in financial services to the renewable energy sector.

The project finance capability in Scotland, combined with its long-standing expertise in the oil and gas markets are, in our view, critical factors in facilitating the process of “main-streaming” the low carbon energy sector for investors.

3.5 Life and Pensions Sector

Scotland has a strong representation in the life assurance industry. In 2008, 14,400 people were classified as being employed within the industry in Scotland, representing 24% of all employment in the industry in Great Britain. Edinburgh accounts for more than two thirds of life insurance employment, with much of the balance being in Glasgow.¹²

Edinburgh headquarters four major insurance companies: AEGON UK; Bright Grey (a division of Royal London); Scottish Widows and Standard Life, and the Central Belt is the operating base for

¹² Source: Oxford Economics, Competitive Position and Rationale for Public Policy – Life & Pensions Sector, December 2010

a number of others, including Aviva and Prudential.

A list of life and pensions companies with a major presence in Scotland is included in Appendix A.

3.6 Private Equity

Private equity is a vital ingredient to enable risk to be taken at earlier stages of development of projects and technologies. It is a broad term and the size of investment can be very large. Scotland has a thriving private equity industry, as well as Europe’s best developed “business angel” network, providing risk capital at the smaller end of the scale. Some of the major private equity firms with a strong Scottish base are listed in the table in Appendix C. Early stage investment remains critical to the effective commercialisation of clean energy, and GIB needs to recognise that there is potential for market failure at the smaller end of the scale as well as in the implementation of large capital-intensive projects. Early stage funding often requires an element of participation from the public sector, and for this reason Scottish Enterprise’s Scottish Co-Investment Fund has been established, with a number of the above firms as partners. This aims to provide matched public –private equity investment. A list of SCIF partners is included in Appendix D.

Scottish Enterprise contributes to a “cluster effect” of bringing together investment and know-how to support commercialisation. It has a long track record of investing in innovative energy technology. This includes:

Aquamarine Power which has successfully deployed its Oyster wave energy converter at the European Marine Energy Centre in Orkney;

Green Ocean Energy which is engineering and testing its Wave Treader device designed to attac



the transition piece of an offshore wind turbine thereby providing combined wind and wave energy;

Sigma Offshore works primarily in the offshore oil and gas industry, and has developed the Smart Mooring System, a clever new low cost system for mooring Floating Production, Storage and Offloading and FSO vessels over oilfields whilst oil is produced from the reservoir and transferred onboard the vessel.



4 Industrial Concentration

Scotland has an unrivalled concentration of skills and experience, both in clean energy and in oil & gas. This will continue as the clean energy industry expands. The North East of England is part of Edinburgh's clean energy "hinterland" and will make a key contribution to delivering critical mass in the sector. The industry capacity is demonstrated not just in the scale of the industry itself, but in the support services that have built up around it and the specialist educational and research capabilities that have developed to support it. This concentration of know-how makes Edinburgh the ideal location for an institution focused on low carbon investment and creates a virtuous circle for technology, supply chain and finance.

4.1 A Leader in Clean Energy

Scotland is the location for a very significant proportion of the UK's extensive renewable energy, oil and gas resources. The vast majority of the UK's oil production and over half of its gas production come from fields based in the continental shelf around Scotland¹³. Renewable energy in Scotland is also based on strong foundations, with a quarter of the European offshore wind and tidal resources and 10 per cent of the European wave resource and Europe's largest offshore storage capacity for

¹³ Source: Scottish Government Energy Sector Key report, May 2009

carbon emissions¹⁴, with the Longannet project taking an early lead in the development of this sector.

Scotland has the highest tidal reaches anywhere in the world. It also has unrivalled deep sea experience and expertise.

As a result, a distinguished corporate energy base has built up in Scotland, with world leading technological and research resources in a wide range of energy specialisms.

This has led to a number of commercialisation "firsts" in the clean energy sector. For example, the Crown Estate's agreements for lease for wave and tidal projects with a potential capacity of up to 1,600 MW in the Pentland Firth and Orkney waters. This followed a competitive leasing round for demonstration and commercial scale project sites, and re-tendering of a particular site.

Edinburgh in particular is home to two potentially "game-changing" wave companies:

Aquamarine Power, whose Oyster wave power technology captures energy in near-shore waves and converts it into clean sustainable electricity. Essentially Oyster is a wave-powered pump which pushes high pressure water to drive an onshore hydro-electric turbine; and

Pelamis, whose Wave Energy Converter is a semi-submerged, articulated structure composed of cylindrical sections linked by hinged joints. Several devices can be connected together and linked to shore through a single seabed cable. Each device has a rated capacity of 750kW.

The Pentland Firth and Orkney waters was the first area to be made available for commercial scale development of wave

¹⁴ Source:
<http://www.scotland.gov.uk/Publications/2010/11/15085756/6>



and tidal energy in the whole of the UK and are believed to represent the largest planned development of wave and tidal energy worldwide. The leasing round received a Landmark Renewable Deal of the Year award in September 2010.

Edinburgh is becoming a hub for the clean energy industry in the UK not just because of the critical mass building up in Scotland, but also Northern England, where there are increasing levels of sector development.

The Energy Sector in the North East of England has key strengths in the Renewable Energy & Environmental Technologies sector and in the nuclear industries¹⁵.

Major players who are part of the renewable energy and nuclear sectors in the North East are listed at Appendix E.

Why should this matter to the location of funding for projects in the sector? Finance is global and readily accessible. There are a number of reasons:

Existing Network of Professional Services

Around this industrial clean energy capability a sophisticated network of professional firms has developed, providing advice on all aspects of the supply chain for the implementation of clean energy projects. The services provided are not only legal and financial in nature, but include a complex array of technical consultancy services, which are used by all industry players, whether or not they are sourcing third party finance. The clean energy sector consists of arrays of process chains and networks, and consultancy firms plug gaps by enabling developers and other principals to outsource parts of these processes as required.

¹⁵

<http://www.onenortheast.co.uk/page/business/energy.cfm>

Knowledge Clusters Will Help The Clean Energy Sector Develop

The clean energy sector is still at an early stage of development, so the learning process that enables companies and funders to move from a bespoke, pilot-based approach to a form of standardization will continue to be important for the foreseeable future. The industry is not yet at a stage of commoditization. This means that financial markets need to be able to access a deeper level of industry knowledge than would otherwise be the case. The existence of and access to knowledge clusters is therefore highly important to finance at this stage.

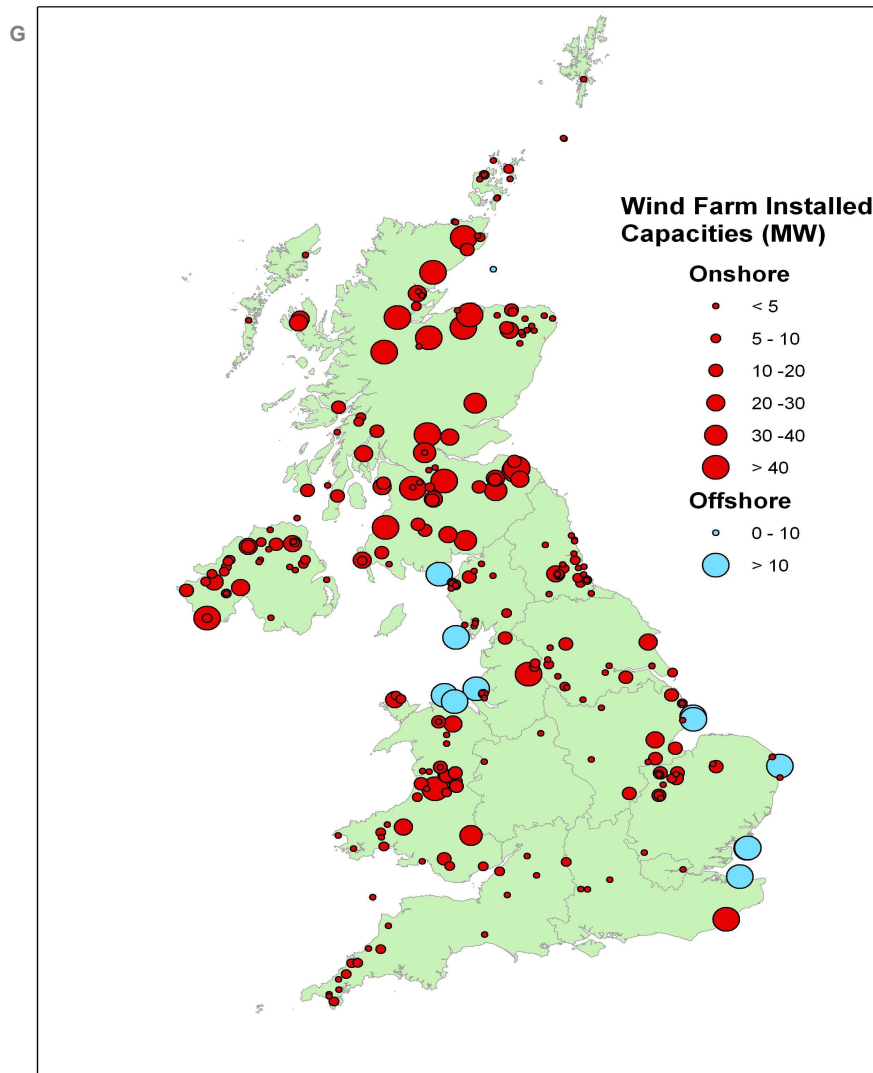
“Intermediation” Role of the GIB

In order to accelerate commercialization, achieve leverage and maximize value for money for the public sector, GIB will need to be able to play an interactive role to ensure the flow of information between industry and financial markets and provide “smart” finance that effectively bridges the gaps that exist in delivering policy objectives. It can best do that by being close to where the action is, to benefit from a clustering effect, accelerate commercialization and reduce risk.

For example, the map below illustrates the concentration of onshore wind activity in the north of the UK¹⁶.

¹⁶ DECC, as at 31.12.2009





Renewable energy project activity in Scotland is already very substantial and are summarised in Appendix G (rounded, in MW)¹⁷:

The figures exclude projects in scoping and amount to nearly 13 GW of capacity.

It is also worth noting that all of the 14 UK projects that have recently applied

for funding from the EU's New Entrant Reserve (NER) scheme are located in Scotland or the North of England.

The fund, worth between EUR4.5 billion and EUR9 billion, is to support carbon

¹⁷ Source:
http://www.scottishrenewables.com/static/uploads/energy_database/110223_energydatabase_summary.pdf

capture and storage (CSS) and innovative renewable projects across the European Union.

Edinburgh is also close to two of the main testing centres, EMEC (Orkney) and NAREC (Tyne & Wear).

4.2 Offshore Conventional Energy

The concentration of energy capability in Scotland is built on oil and gas expertise developed over the last four decades. A sizeable majority of the UK's oil production and around half of its gas production comes from fields based on the continental shelf around Scotland and Scotland's share of the North Sea resource is estimated at 83%.



It has been estimated that 145,000 jobs are provided in Scotland by the oil & gas industry, representing around 43% of the UK total.

According to the Oil & Gas UK 2010 Economic Report¹⁸:

“over the last forty years, exploration for and development of the UK’s oil and gas reserves have created an indigenous supply chain with an unrivalled range of products, services and expertise. The capability of this supply chain continues to grow as new fields, with more difficult reservoirs, are developed and the operating lives of many mature assets are prolonged in one of the more demanding oil and gas provinces in the world.”

The development of a skilled supply chain is illustrated by the strength of Scottish exports in the Oil & Gas sector.

The Scottish Council for Development and Industry (SCDI) has tracked the growth of international sales and exports combined by Scotland’s oil and gas supply chain companies during the last decade. The latest survey for 2008-9 showed that:

- international activity has risen from £1.8 billion in 2000 to £6.6 billion in 2008;
- in 2008, international activity accounted for more than 42% per cent of total Scottish oil and gas supply chain sales, compared with 27 per cent in 2000;
- sales via overseas subsidiaries increased in 2008 by 22% compared to 2007 of which 93% were from services;
- the top five international markets for direct exports and subsidiaries’ sales combined were the United States, Canada, Angola, Russia, Norway;

¹⁸ Oil & Gas UK Economic Report 2010

- sales activity from the oil and gas supply chain was recorded in 109 different country markets.

Given the significance of offshore development in the clean energy sector, the skills built up in the oil and gas sector are likely to prove critical to the successful commercialisation of wave and offshore wind in particular.

4.3 Case study: Wood Group

Some companies that service the oil and gas industry are beginning to see the commercial opportunity of diversifying into low carbon energy, such as the Aberdeen-based **Wood Group**¹⁹. Its geographical spread of activity takes it across the globe, as well as the rest of the UK.

Wood Group is an international energy services company with approximately \$5.1bn revenue, employing approximately 29,000 people worldwide and operating in 50 countries. The Group has three businesses providing a range of engineering, production facilities support, and industrial gas turbine overhaul and repair services to the oil & gas and power generation industries worldwide.

Its involvement in the clean energy sector has grown rapidly, and activity currently includes:

- Construction of Wave Hub, the marine demonstrator project off the coast of Cornwall;
- The acquisition of a significant equity stake in Sgurr Energy, one of the renewable energy industry’s leading technical consultancies;
- The award of an offshore wind-farm services contract for Sheringham Shoal in 2009 and another services contract for a US

¹⁹ <http://www.woodgroup.com/products-services/view-by-market/renewables/Pages/default.aspx>



onshore wind-farm in Idaho in 2010.

4.4 Carbon Capture & Storage (“CCS”)

Scotland looks set to become the key location for the development of CCS. A study identified the CCS capacity in Scotland as greater than the Netherlands, Germany and Denmark combined, and the potential storage capacity to accommodate industrial emissions for the North East of England and Scotland for the next 200 years.

The key CCS project in the UK at the present time is at Longannet, Fife, which started testing in 2009 and is scheduled to achieve a full CCS demonstration project by 2014²⁰. Key competencies and supply chains are likely to build around this market leading project.

Carbon capture and storage will be a coastal technology and the east coast of Scotland appears to be ideally suited, with sandstone formations providing saline aquifers that are likely to provide more than 95% of potential CO₂ storage under the North Sea²¹.

4.5 Clean Energy Support Services

Around the project experience and capability in the sector, a cluster of expert professional services firms have developed, in the technical, financial and legal disciplines focusing on the clean energy sector .

The “clustering effect” that is already taking place in the clean energy sector in Scotland is illustrated by the membership list of the Scottish Renewables Forum,

²⁰ http://www.scottishpower.com/PressReleases_1876.htm

²¹ <http://www.sccs.org.uk/MorayFirthJune2010.pdf>

which shows 45 firms as “consultants” (covering a range of technical disciplines) and 33 firms listed as legal or financial advisers (with a predominance of legal firms). Many of these such as the major legal firms and leading specialist consultancies in the sector.²²

Banks and investors in this sector are therefore supported by a full range of services who have strong Scottish roots, as well as broad and deep experience in structuring and documenting major innovative financial transactions, with specialist capability in this sector.

Recognising Edinburgh’s role as an emerging hub for clean energy and low carbon technologies, the Scottish Low Carbon Investment Project was established last year for Government, international finance, utilities and developers to engage directly on investment opportunities. A conference in September 2010 brought together international players to debate and identify the risks, rewards, opportunities and challenges, covering major offshore developments, infrastructure, energy efficiency and “venture size” opportunities. Around 550 delegates attended, representing around 400 organisations and businesses from around the globe, including Europe, North America and Asia .²³

The locational pull to Scotland within the clean energy sector is also illustrated by the frequency with which Renewable UK (formerly BWEA - the principal national renewables trade body) locates its annual conference in Scotland, and the fact that All-Energy, the UK’s largest clean and renewable event, is based in Aberdeen. All-Energy attracted over 7,000 delegates and 450 exhibition stands in 2010²⁴.

²² Source: SRF

²³ Source: Scottish Enterprise

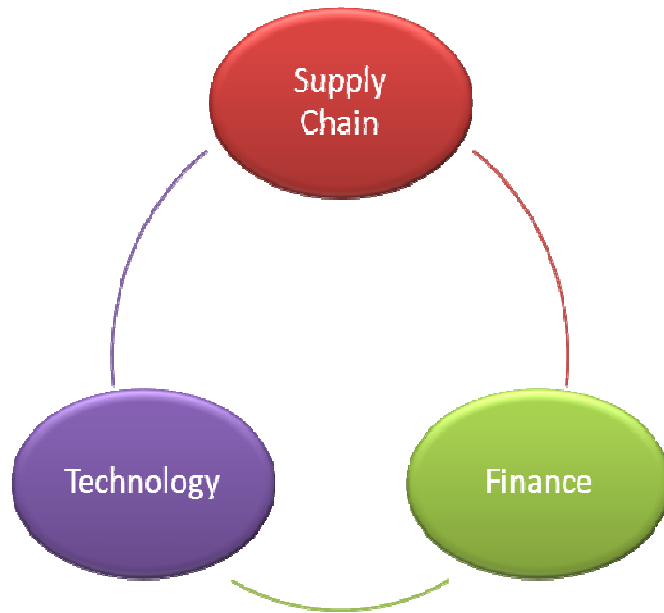
²⁴ http://www.all-energy.co.uk/About_All-Energy.html



4.6 Conclusion

Putting the GIB in the right place presents a unique opportunity to create a locational driver for developing a low carbon technology “virtuous circle”, where finance can be used in a smart way to drive the industry towards commercialisation. If we accept that the pace of development needs to be driven hard to meet policy targets, this kind of opportunity should not be missed.

Fig: The “virtuous circle”



5 Education and Research & Development

Edinburgh and the surrounding region has a concentration of higher education and research establishments, with a major focus on leading edge R&D in the clean energy and related sectors.

5.1 Universities

Edinburgh and Central Belt Scotland has a high concentration of high performing universities and research establishments supporting various aspects of the clean energy agenda. There are 11 universities within just over an hour's travel time from Edinburgh:

- 4 in Edinburgh (Edinburgh, Heriot-Watt, Edinburgh Napier, Queen Margaret);
- 3 in Glasgow (Glasgow, Strathclyde and Glasgow Caledonian);
- 2 in Dundee (Dundee and Abertay);
- Stirling;
- University of the West of Scotland (Hamilton / Paisley); and
- St. Andrews

Edinburgh Science Triangle²⁵, a collaborative partnership between a large number of stakeholders, has produced a report into the research capability in energy and clean technology within the Edinburgh Region.

²⁵ <http://www.edinburghsciencetriangle.com/>

This illustrates the strength and diversity of energy and clean technology research in the area, particularly in the fields of:

Engineering and geoscience

Exploration and extraction

Carbon capture & storage

Marine, solar and wind power

Fuel cells and hydrogen.

5.2 Institutes

The **Institute for Energy Systems (IES)** of the University of Edinburgh conducts multi-disciplinary research into energy systems, with a research grant portfolio of £10 million and approximately 80 staff and postgraduate students. The research objectives of the IES include developing new, higher-performance wave energy converters and developing sophisticated control systems for marine energy converters that will increase the electricity generated by the converters and reduce damage resulting from storms. The IES has produced a number of leading renewable energy spin-out companies, including Pelamis Wave Power, the developer of the world's first commercial-scale wave energy converter.

The **Scottish Institute for Solar Energy Research (SISER)** was established at Heriot-Watt University in 2010 in order to promote research collaborations in the field of solar technologies and develop new solar technologies. SISER is made up of two dozen academics, researchers and graduate students from seven Scottish universities, including the University of Edinburgh and the University of St Andrews. The initial research objectives of SISER include developing flexible, thin-film solar cells and photovoltaic powered water treatment systems.



The **Energy Joint Research Institute** (Energy JRI) is a collaboration between Edinburgh and Heriot-Watt Universities. The JRI in Energy combines research activities that map all the way down the renewable energy supply chain from wind, hydro, marine and solar energy sources, through their conversion to electricity, to their power systems delivery and end-use, with those that characterize and better manage hydrocarbon resources, develop cleaner coal and gas technologies, and reduce and store energy by-products in environmentally better ways.

The aim of the JRI is to engage the relevant disciplines in these areas and create new technologies or improve those existing to assist society to meet its energy needs in an environmentally, financially and socially affordable manner without reduction in security of supply.

The **Biofuel Research Centre** of Edinburgh Napier University conducts research into the development and production of biofuel, and provides advice to small and medium-sized businesses working to convert existing boiler facilities to biofuel. Edinburgh Napier University is also home to the Scottish Energy Centre, which has research interests including biomass, fuel cells, hydro, solar energy, and wind power.

The **Scottish Carbon Capture and Storage Centre** is the largest CCS research grouping in the UK, co-funded by the University of Edinburgh and Heriot-Watt University, as well as a number of public sector bodies and Scottish Power.

One of the key successes of the Scottish research and development field has been in collaborative partnership working cemented through bodies such as the Scottish Research Partnership and one of its five themes being energy.

5.3 Case Study: Artemis Intelligent Power (“AIP”)

AIP is an excellent example of the research capability in the region directly leading to commercialisation in clean energy.

AIP was established in 1994 as a spin-out from the University of Edinburgh consisting of a team of engineers and technicians specialized in hydraulic system development. In addition to its hydraulic power drive technology the company also holds many patents and trademarks in the UK and other countries, including for its core technology of high-capacity, high-speed, digital-controlled valves. AIP has 25 employees.

In December, 2010 **Mitsubishi Heavy Industries Ltd.** (“MHI”) reached an agreement to purchase AIP's entire equity. Through the acquisition, MHI aims to secure the unique hydraulic power drive technology owned by AIP. By applying the technology to its wide range of products, including energy systems such as wind turbines and engines used for power generation as well as railroad- and ship-related products, MHI intends to achieve further product sophistication and differentiation.

The initial target will be the Round 3 32-gigawatt (GW) offshore wind park programme. With support from the UK Government as well as from local business partners, MHI will develop new wind turbines incorporating AIP's hydraulic drive technology and ramp up its entry into the offshore wind farm market.

A table of the low carbon and environmental research centres at Central Belt universities is included at Appendix A.



6 The International Dimension

Edinburgh and Scotland are a magnet for inward investment in the clean energy and related sectors. The surrounding region has a deep concentration of higher education and research establishments, with a major concentration of leading edge R&D in the clean energy and related sectors.

To support successful commercialisation, it is important that the GIB is closely connected to where the action is. This creates the “virtuous” circle that is vital to the successful commercialisation of low carbon energy. The attraction of Scotland as a base for clean energy development is clearly shown by the decisions of major global corporates to locate here.

6.1 Overview

Much of the international focus on the UK in the clean and conventional energy sectors is concentrated in Scotland. Some of the recent announcements include:

A \$10m deal announced by Vice-Premier Li Keqiang in January 2011 to use Scottish technology at a new renewable energy conversion plant in China.

An apprenticeship programme announced in November 2010 with **Siemens**, designed in collaboration with Repower, RenewableUK, Weir Group and City & Guilds College, based at Carnegie College, Fife.

An announcement in December 2010 that **Mitsubishi** Power Systems has chosen Scotland as the location for its UK research and development centre, creating a Centre for Advanced Technology in Edinburgh at an overall cost of £100m.

In January 2011, **Gamesa** announced its intention to establish its offshore wind R&D centre in Glasgow, together with an MOU to support development around manufacturing, logistics and operations & maintenance (O&M), conditional upon development of offshore wind projects in the area and as part of a bid to the Scotland’s National Renewables Infrastructure Fund for support.

In March 2011, energy engineering giant **Doosan Power Systems** announced its intention to locate a research and development centre at its current site at Westway in Renfrew.

The move will initially create up to 200 jobs and subject to further discussions, a second phase would see the establishment of assembly and manufacturing facilities.

Doosan plans to invest up to £170 million in Scotland in the next 10 years. It expects its offshore wind plans to generate 1700 new jobs.

6.2 Case Study: Centre for Engineering Excellence in Renewable Energy

As this document points out, putting the GIB in the right place presents an opportunity to create a locational driver for creating a low carbon technology ‘virtuous circle’. The power of the locational driver is not theoretical, as the current example of the **Centre for Engineering Excellence in Renewable Energy** in Glasgow demonstrates.



SSE, the UK's leading producer of electricity from renewable sources, in partnership with the University of Strathclyde, the UK's leading university in power engineering and energy research, selected Glasgow as the location for CEERE in October 2009. The purpose of CEERE is to manage the development, design, engineering, project management, procurement and asset monitoring of renewable energy developments.

Just nine months later, in July 2010, SSE and Mitsubishi entered in to a strategic agreement to co-operate on low carbon energy developments across a range of technologies, including offshore wind farms, advanced technology for smart electricity grids and low carbon vehicles, carbon capture and storage and high-efficiency power generation. Following the agreement with Mitsubishi, new highly-skilled engineering jobs are being created at CEERE.

Six months after that, in January 2011, SSE entered into a Memorandum of Understanding with Siemens Wind Power, Siemens Transmission and Distribution, Subsea 7, Burntisland Fabrications and Atkins, under which the companies will form an alliance to collaborate on offshore wind programmes, with the aim of securing substantial reductions in the cost of delivered power from offshore wind farms. In due course, the companies will co-locate activities covered by the new agreement in CEERE.

6.3 Key Players

A number of global clean energy companies already have a UK base in Scotland, including:

EDF Energy: Renewable energy activities managed from East Kilbride

EDP Renovables: Portuguese utility largely based in Edinburgh

Falck Renewables – Italian co-venture has UK control centre based in Inverness

Logan Energy: UK subsidiary of the American fuel cell company of the same name, with its European headquarters in Edinburgh

Mitsubishi Electric Air Conditioning Systems: a subsidiary of the Japanese Mitsubishi Corporation, with an air source heat pump manufacturing plant in Livingston

PNE Wind: UK subsidiary of German company PNE Wind AG headquartered in Edinburgh

Repower: UK headquarters of Europe's tenth largest wind turbine manufacturer

RWE npower renewables: Substantial operating base headquartered outside Perth

ScottishPower Renewables: subsidiary of Iberdrola group, now leading all renewable energy development for this Spanish utility.

Talisman Energy: Aberdeen-based European headquarters developing the Beatrice Offshore Wind Demonstration Project, world's first deep-water offshore wind farm.

Vattenfall: Europe's largest generator of renewable heat - UK operations headquartered in Edinburgh

Scotland is also home to two of the UK's major utilities:

Scottish & Southern Energy, which is the biggest UK diversified energy company located just north of Edinburgh and developing a wide range of renewable technologies including wind, AD, marine as well as traditional power and energy efficiency. In 2009 / 2010, 51% of the



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Group's capital expenditure was in renewable energy and 25% in power systems. The company plans to invest around £1.5 - £1.7 billion per year between 2010 and 2015, the principal focus of this investment being renewable energy.

Scottish Power, based in Glasgow, which is part of the Iberdrola Group, one of the five largest energy companies in the world, with a turnover of €30,431m in the financial year 2010. The group has 9 GW of installed wind power supply and 31% of its global generating capacity is in renewables, with a further 17% in nuclear.

There are also operational bases for **Statkraft** (Norwegian renewable energy specialist); and **Royal Haskoning** (Dutch RE developer)

There are strong linkages with Scandinavia, and these are highly significant in the clean energy sector, for a number of reasons. Projects include the planned interconnector with Norway .



7 Proximity and Connectivity – Serving the UK

Edinburgh's positional advantages are unique and twofold – both at the heart of a “super region” of clean energy activity and readily accessible to the rest of the UK as well as globally.

7.1 The Central Belt - Edinburgh / Glasgow / Dundee “super region”

It is important to see Edinburgh in the context of the Central Belt of Scotland, which broadly runs along the M8 / M9 corridors and up the East Coast to Dundee, with an estimated working age population of 2.3m within one hour's drive time²⁶. Centre to centre, Edinburgh and Glasgow are within 49 minutes by train.

This is effectively a geographical super-region, triangulated by three cities, Edinburgh, Glasgow and Dundee, all of whom are major players in the clean energy sector.

The concentration of clean energy activity in Scotland has led to the development of a cluster of professional services firms within a radius of Edinburgh. This locational concentration creates the conditions for effective knowledge sharing and rapid learning to be assimilated and applied to future developments. This is likely to happen more rapidly and effectively than, say, London, for a number of reasons:

- the relatively high concentration of professional services firms in Scotland; and
- the fact that in London the clean energy know-how is scattered amongst a much wider array of firms;
- clean energy is only one of a wide number of sectors competing for attention in a London context, whereas in Scotland it has already assumed the position of a leading sector.

This area accounts for nearly two thirds of the activity in Scotland's low carbon and environmental sector: 64% of employees and 65% of companies²⁷ are based in the Central Belt, offering the GIB direct access to a high concentration of businesses in all segments of the low carbon supply chain.

From Edinburgh there is good access to a substantial proportion of existing and future project sites and key parts of the renewables infrastructure e.g. Aberdeen Dundee and Leith, which will be an important part of the offshore supply chain.

²⁶ Source: Scottish Government, Analytical Services Division

²⁷ Innovas Report, September 2010



8 Visibility and Transparency

The GIB's role means that it will need to be fully accountable and subject to a high level of transparency and scrutiny. A location outside London will also serve the geographical spread of the clean energy sector, without losing the benefits of a major financial centre, and drawing on the "critical mass" that already exists in the region. However, locating in Edinburgh would not lead to the regionalisation of the clean energy sector, which could happen if located anywhere else outside London.

The GIB's role in developing a high profile and critical sector means that it will need to be visible, transparent and well connected. This can be achieved, in part, by making it a distinctive institution, and selecting Edinburgh as its location would contribute significantly to that whilst not losing the benefits of a major financial centre.

8.1 Why outside London?

As a result of a location in outside London, the GIB will be more distinctive. This is important because, whatever its final remit, the GIB will be expected to help fulfil a purpose or purposes that are not being carried out to the optimum effect by existing institutions. It must not, therefore, 'follow the herd'. Location away from London, would give it a distinct identity and corporate culture with which to help ensure that all of this is achieved.

As the Chancellor of the Exchequer put it when he first announced the policy intention, a GIB 'will help deliver the

green finance we need for new growth and new jobs in every region of the country'. With this objective, the GIB will not be like any other bank; and its location needs to help set it apart from the others. The selection of London would not.

Moreover, the selection of a non-London location would be consistent with the principles of the UK Government's plans, announced in October 2010 to, as the Secretary of State for Business put it, 'create a fairer and more balanced economy - one that is driven by private sector growth with business opportunities spread more evenly across the country and between industries'.

8.2 Why Edinburgh?

Whilst a location outside London has attractions for the reasons given above, there is at the same time an inherent risk in isolating the institution, which would be likely if it is placed in a location with insufficient critical mass in terms of the industry and financial capability. The history of decentralising government bodies is littered with cautionary tales where the business case is inadequate beyond a general desire to spread activity around the country. The industrial and financial links that are essential to the GIB's role in commercialising the sector need to be strong.

The practical consequence of an Edinburgh location for the GIB is that its activities will be more visible and subject to this level of greater scrutiny, without impairing its ability to interact with the industry and the financial community, which, as this report has identified, is critical to the successful commercialisation of the sector. That level of scrutiny, and the metrics by which performance is measured, need to be seen in the context of the wider industry.



GIB's level of accountability for its performance, is particularly important, as for any new organisation in the early years of its operation, when its credentials and reputation are being established. An Edinburgh location, with the visibility and scrutiny that will go with it, will help to ensure that the focus on delivering successful outcomes is as sharp as it can possibly be, thereby maximising the prospects for the GIB's long-term success.

Whilst the physical location of the GIB should not influence the governance arrangements of the organisation, the reality is that it will be seen as a more significant body on an Edinburgh scale compared with London. Edinburgh is a financial services centre of scale and substance, capable of hosting and resourcing the GIB, but not to the extent that the GIB could be overshadowed in terms of size or overwhelmed in terms of impact. This is a clear risk for any nascent financial services organisation seeking to establish itself in London.

The significance of the 'clean energy sector to the economy in Scotland and the north of England will also help ensure maximum visibility and public profile for a GIB located in Edinburgh. Its distinctive role as an interface between government, the industry and financial markets increases the need for it to be seen as being at arm's length from these groups. This underlines the argument for Edinburgh, as the only location outside London.



9 A Good Place for Business

It is critical that the Green Investment Bank is established in as cost effective a manner as possible. The cost of locating in Edinburgh, in terms of real estate, is significantly lower than London.

9.1 Real Estate

Property costs will be a significant element in the set-up costs for GIB. Edinburgh has a wide range of quality office accommodation that is significantly below the equivalent cost in London.

Set out in Appendix D is a comparison of office costs for locations within the financial hubs of Edinburgh, compared with three of the possible locations in Central London.

As can be seen from these tables, London office costs are significantly higher than Edinburgh office costs. London rates and service charge costs are often double that of Edinburgh and base rent is often much higher too. In total, London rates are at least £30 / sq ft. higher than Edinburgh rates.

Based on an 8,000 sq ft office space, this would be an additional cost estimated at c.£240k per year, which would be likely to rise with any future expansion of the bank. And would be much more if located in the more prestigious areas of London.

Currently, Edinburgh also has more flexible, negotiable rates for office rent spaces, with good introductory offers and incentive packages, like free rental periods, on some properties.

9.2 Good Place to do Business

Edinburgh was ranked the seventh top city in the world in terms of ease of doing business in the Worldwide Centres of Commerce Index produced by MasterCard in 2008. The index was based on factors including the ease of employing workers and the availability of banking services.

Edinburgh has been named one of the most economically resilient cities in Britain in a new report from the Centre for Cities. The Cities Outlook 2011 found that Edinburgh had the third highest proportion of highly skilled residents (behind only Cambridge and Oxford) in Britain.

9.3 Quality of Life

Edinburgh is consistently renowned for its quality of life. This clearly plays a significant part in the decision-making processes of individuals, and to the extent that talent needs to be attracted both from London and from further afield, Edinburgh is able to position itself as a great place to live. Edinburgh was ranked the top city in the UK and the eighth top city in Europe in terms of quality of life in the 2010 European Cities Monitor produced by Cushman and Wakefield. Edinburgh has won a plethora of UK Best City Awards in the last decade, including the Guardian/Observer Readers Favourite UK City award between 2000-2010 and various others. Edinburgh has also consistently been ranked the top UK city for Quality of Life in the UK in recent years. In a survey of 10,000 adults conducted by YouGov in 2009, Edinburgh was named the most desirable city in the UK in which to live.

The City's positioning as a tourist and cultural destination is well known, but it is also an economically viable location for individuals. According to the ONS, Edinburgh has the second highest gross disposable household income per head in 2008 after London.



Appendix A – Financial Institutions in Edinburgh

Banks in Edinburgh with a strong presence in the renewable energy sector

Bank
Barclays
Clydesdale / National Australia Bank
Co-operative Bank
HSBC
Lloyds Banking Group / Bank of Scotland
Royal Bank of Scotland
Triodos Bank

Asset Management Industry in Scotland²⁸UK /European / Global Fund Managers with operations in Scotland	Scottish Independent Fund Managers
F&C Asset Management	Aberforth Partners
Euronova Asset Management	Alliance Trust Savings
AXA Framlington	Artemis Investment Management
Aberdeen Asset Management	Baillie Gifford
Adam & Company	Bell Lawrie
Rathbone Investment Managers	Blue Planet

²⁸ Source: Asset Management and Asset Servicing in Scotland, Deloitte, May 2009



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MLC	Charlotte Square
Ignis Asset Management	Cornelian Asset Managers
Franklin Templeton	Dunedin Capital Partners
BlackRock International	Edinburgh Partners
AEGOM AM	Martin Currie
Kempen & Co	McInroy & Wood
Newton Asset Management	Personal Assets Trust
Henderson Global Investors	Saracen Fund Managers
First State Investments	Scottish Investment Trust
Fidelity	SVM Asset Management
Scottish Widows Investment Partnership	
Standard Life Investments	
Thornhill Investment Management	
Walter Scott & Partners	
Williams de Broe	

Life and Pensions Companies with a major presence in Scotland²⁹

Company	Main Location
AEGON	Edinburgh
Alliance Trust	Dundee
Royal Scottish Assurance	Edinburgh
Scottish Friendly	Glasgow
Scottish Life	Edinburgh

²⁹ Source: Oxford Economics, Scottish Life & Pensions sector – competitive position & rationale for public intervention, December 2010



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Scottish Provident	Glasgow
Scottish Widows	Edinburgh
Standard Life	Edinburgh



Appendix B – Low Carbon and Environmental Research Centres in Central Belt Universities

<p>Abertay (Dundee)</p>	<p>SIMBIOS</p> <p>Abertay Centre for the Environment</p> <p>Urban Water Technology Centre</p> <p>Sustainability Enhancement</p>
<p>Dundee</p>	<p>Centre for Energy, Petroleum and Mineral Law & Policy</p> <p>Centre for Environmental Change and Human Resilience</p> <p>Division of Plant Science</p> <p>UNESCO Centre for Water Law, Policy and Science</p> <p>Centre for Remote Sensing and Environmental Modelling</p> <p>Fluid Mechanics</p> <p>Geotechnical Engineering</p> <p>Concrete Technology Unit</p> <p>CMRU</p> <p>Structural Engineering</p> <p>Environmental Systems Research Group</p>
<p>Edinburgh</p>	<p>Edinburgh Earth Observatory</p> <p>Centre for the Study of Environmental Change and Sustainability</p> <p>Global Change Research Group</p> <p>Institute of Energy Systems</p> <p>Institute for Infrastructure and Environment</p>



	<p>Scottish Universities Environmental Research Centre</p> <p>Scottish Alliance for Geoscience, Environment & Society</p> <p>Airborne Geosciences</p> <p>Contaminated Land Assessment & Remediation Research Centre</p> <p>UK Biochar Research Centre</p> <p>Edinburgh Technopole</p> <p>Centre for Research of Extreme Conditions</p> <p>EaStCHEM Materials Chemistry Group</p> <p>Scottish Centre for Carbon Storage</p>
Edinburgh Napier	<p>Institute for Sustainable Construction</p> <p>Building Performance Centre</p> <p>Scottish Energy Centre</p> <p>Centre for Timber Engineering</p> <p>Centre for Infrastructure Research</p> <p>School of Engineering & the Built Environment</p> <p>Institute for Science and Health Innovation</p> <p>Microbiology and Biotechnology Research Group</p> <p>Biofuel Research Centre</p> <p>Environmental Biology Research Group</p>
Glasgow	<p>Earth Systems Research Group</p> <p>Human Geography Research Group</p> <p>University Marine Biological Station Millport</p> <p>Scottish Universities Environmental Research Centre</p> <p>Scottish Centre for Ecology and the Natural Environment</p> <p>University of Glasgow Centre for International Department</p> <p>Water and Environment Research Group</p>



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	<p>Solar and Bio Energy Research Group</p> <p>Power Engineering Group</p> <p>Algae as Green Energy Source</p>
Glasgow Caledonian	<p>Centre for the Built Environment</p> <p>School of the Built and Natural Environment</p> <p>Centre for Research on Indoor Climate and Health</p> <p>Caledonian Environment Centre</p> <p>Remade Scotland</p>
Heriot-Watt	<p>Marine Technology Educational Consortium</p> <p>Scottish Institute for Solar Energy Research</p> <p>Scottish Centre for Carbon Storage</p> <p>Thermo-Electric Power Generation</p> <p>Riccarton Eco Village</p> <p>Heriot-Watt Energy Academy</p> <p>Ocean Systems Laboratory</p> <p>Flood Risk Management Research Consortium</p> <p>Drainage Research Group</p> <p>Urban Energy Research Group</p> <p>Centre for Marine Biodiversity and Biotechnology</p> <p>Logistics Research Centre</p> <p>Sustainable Cities</p> <p>Environmental Forecasting</p> <p>Sustainable Water Management Group</p>
St Andrews	<p>St Andrews Sustainability Institute</p> <p>Environmental Change Research Group</p> <p>Facility for Earth and Environmental Analysis</p>



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	<p>Centre for Research into Ecological and Environmental Modelling</p> <p>Sea Mammal Research Unit</p> <p>Institute for Environmental History</p>
Stirling	<p>Institute of Aquaculture</p>
Strathclyde	<p>UK Wind Energy Research – Doctoral Training Centre</p> <p>David Livingstone Centre for Sustainability</p> <p>Glasgow Research Partnership in Engineering</p> <p>Joint Research Institute in Environmental, Infrastructure and Transportation Engineering</p> <p>Environmental Research Group</p> <p>Institute for Energy & Environment</p> <p>Marine Engineering Group</p> <p>Centre for Process Analytics and Control Technology</p> <p>Marine Population Modelling Group</p>
West of Scotland	<p>Centre of Environmental & Waste Management</p> <p>Environmental Initiatives Research Group</p> <p>Advanced Concrete & Masonry Centre</p>



Appendix C – Leading Private Equity Firms in Scotland

Name	Comment
Alliance Trust Equity Partners	<p>Alliance Trust Equity Partners is an Edinburgh-based institutional investor in private equity funds and is building an investment portfolio comprising low to mid-market buyout funds and related co-investments across UK and Western Europe.</p> <p>ATEP is a long term, high conviction investor and is therefore looking to commit to successful private equity managers across multiple funds and investment cycles.</p> <p>ATEP is looking to invest in funds of up to £1.5bn with a key focus in the range £250m - £750m.</p>
Dunedin Capital Partners	<p>Dunedin is a leading UK mid-market private equity provider based in Edinburgh & London.</p> <p>Key criteria:</p> <p>Businesses with an enterprise value of £20m-£75m</p> <p>Buyouts requiring equity of up to £50m</p> <p>Ambitious and talented management teams</p> <p>UK businesses with strong organic, roll-out or acquisition opportunities</p>
Energy Ventures	<p>Energy Ventures is an independent venture capital firm dedicated to new upstream oil and gas technologies. Since Energy Ventures' creation in 2002 it has reviewed more than 2000 deals, made twenty-eight investments and successfully exited nine companies.</p> <p>It has a total committed capital of \$600 million, we currently manage and advise four venture funds. Investments range from \$5-20 million per company, with typical holding of 10 to 40 percent of equity.</p> <p>Energy Ventures is headquartered in Stavanger, with offices in Houston and Aberdeen, Energy Ventures is</p>



	<p>deliberately located where the energy industry and technology innovations thrive.</p>
Execution Noble	<p>Banco Espirito Santo de Investimento S.A. acquired a 50.1% stake been incorporated in Execution Noble, the investment bank based in Edinburgh and London. The combined group will offer a full range of product with strengths in: project and acquisition finance, M&A and private equity.</p>
Lloyds Development Capital	<p>LDC describes itself as the leading UK regional mid-market private equity house and part of the Lloyds Banking Group.</p> <p>The LDC team has the capacity to support a business with up to £100million of equity. LDC has a history stretching back over 29 years and is an organisation with over 60 investments spread across all business sectors, and retains an appetite for MBOs, IBOs, Equity Release, Development and Acquisition Finance transactions.</p> <p>Offices in Scotland opened in 2008 and 2009. The team has been created to capitalise upon LDC's pre-existing activity in the region and to establish themselves as the premier Scottish private equity operation.</p>
Maven Capital Partners UK LLP	<p>Maven Capital Partners UK LLP is an independent private equity business headquartered in Glasgow. Previously the Private Equity division of Aberdeen Asset Management, it provides funding for management buy-outs, buy-and-build projects and acquisitions, as well as mezzanine finance, for companies valued at up to £25 million throughout the UK private and small cap arena.</p> <p>Specialising in fast-growing companies across the private and small cap arena, Maven manages or advises on over £240 million for a variety of client funds.</p>
Murray Capital	<p>Murray Capital is run by David D Murray and a team of dedicated investment professionals. The company was set up in 2000.</p> <p>MC invests in a wide range of industry sectors, from manufacturing and technology to support services and leisure. MC is also a Scottish Co-Investment & Venture Fund Partner.</p> <p>Murray Capital takes a strong partnership approach to its investments, and differentiates itself from traditional investors by a flexible and longer term view to returns and exits.</p>



<p>Nevis Capital</p>	<p>An entrepreneurial equity firm based in Glasgow that invests in and supports private UK companies with growth potential.</p> <p>The objective is to back management teams to grow their business and create value for the benefit of the company, its employees and shareholders.</p> <p>Nevis Capital has four founding partners who bring a wealth of experience in growing and developing leading UK wide businesses (including LCH Generators sold to Speedy Hire Plc for £62m).</p> <p>Outline investment criteria are as follows:</p> <p>Deal value up to £15m (or more with funding partners – up to £30m).</p> <p>Attractive growth prospects and quality management team.</p> <p>Buy-out, Buy-in, and expansion capital opportunities.</p> <p>Most sectors considered, with a focus on business services and a niche in industrial services.</p> <p>Preference for established businesses with some level of asset backing.</p>
<p>Panoramic Growth Equity</p>	<p>Panoramic Growth Equity is an independent private equity based in Glasgow, focused on providing 'growth equity for growth companies.</p> <p>Panoramic was founded in 2009 by its 3 partners with the aim of increasing the supply of equity capital to UK small and medium sized companies ("SMEs").</p> <p>Panoramic's aim is to provide growth companies with the capital, expertise and support to significantly increase shareholder value.</p> <p>It invests in:</p> <p>Unlisted UK trading businesses with a growth equity need between £0.5m and £2m</p> <p>Businesses that have turnover of greater than £1m</p> <p>Management teams who are focussed on an exit</p> <p>Small MBO/BIMBOs</p> <p>Companies with flexible operating models</p>



	<p>Strong, ambitious and entrepreneur-led management teams.</p>
Penta / Pentech Ventures	<p>Penta Capital is an independently owned private equity fund management business based in Glasgow and London.</p> <p>Penta specialises in buy-outs, buy-ins and the provision of later stage development capital. Funds cover the UK and Irish unquoted mid-market and has a preferred investment size in the range of £5m to £25m. Penta is focused on businesses with strong management and high growth potential.</p>
Scottish Equity Partners	<p>A leading venture capital and growth equity investor focused on the UK and other European countries. As well as investing in early stage companies, invests in more established companies looking to build scale and momentum.</p> <p>Usually, invests between £1 million and £10 million in funding rounds of as much as £30 million.</p> <p>The funds invested are provided by blue chip investors including global financial institutions, alternative asset management companies, pension funds, family offices and corporates.</p>
Sigma	<p>Sigma Capital Group plc is an AIM listed UK based specialist asset management group whose principal business is carried out through subsidiaries focusing on investment property and venture capital. The venture capital focus is primarily on the clean energy and energy efficient sector.</p> <p>Sigma has four funds under management, the most recent being Sigma Sustainable Energy Fund II.</p> <p>The Sigma Sustainable Energy Fund II was launched in June 2007 and was set up to provide development and later stage capital for companies developing technologies relating to clean energy and energy efficiency.</p> <p>The fund has limited partners including Scottish and Southern Energy plc, Bank of Scotland Energy and Environmental Finance, West Coast Capital Limited, Dasmella Limited, EDP S.A. and Sigma Technology Investments Limited.</p>
S L Capital Partners LLP	<p>SL Capital Partners is a subsidiary of the Standard Life Investments group, located in Edinburgh, which specialises in private equity. SLCP offers private equity investment through fund of funds limited partnerships, bespoke arrangements and retail products. Clients range</p>



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	<p>from leading institutional investors in the UK, US, Canada and Europe, to family offices and high net worth individuals globally. SLCP has raised a total of approximately €6.2 billion in private equity assets from clients from 24 different countries.</p>
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Appendix D – Scottish Co-Investment Fund

The Scottish Co-investment Fund (SCF) is a £72 million equity investment fund that invests from £100,000 to £1 million in company finance deals of up to £2 million.

Unlike a standard venture capital (VC) fund or a business angel, the SCF does not find and negotiate investment deals on its own. Instead it forms contractual partnerships with active VC fund managers, business angels and business angel syndicates from the private sector (the SCF partner).

The SCF partner finds the opportunity, negotiates the terms of the deal and offers to invest its own equity cash. If the opportunity needs more money than the partner can provide, it can call on the SCF to co-invest on equal terms. The SCF partner determines how much the SCF can invest in any new deal, however, the SCF cannot invest more than the SCF partner.

SCF is managed by the Scottish Investment Bank (SIB) and is partly funded by the European Regional Development Fund (ERDF).

SCF partners include:

Partner	Investment Level	Sector
Alida Capital International Ltd	Up to £1m	Biotechnology
Archangel Informal Investments	Up to £1m	All sectors except property, retail and leisure
Aurora	Up to £500k	All sectors
Barwell PLC	Up to £250k	All sectors except property and financial services
Braveheart Ventures Limited	Up to £1m	Technology focused, although traditional businesses will also be considered, with the exception of film production, property and hotels.
Channel 4 Television Corporation	Up to £250k	Technology



ChimaeraBio	Up to £500k	Technology
Discovery Investment Fund	Up to £500k	All sectors
ED Capital Ltd	Up to £1m	Technology
Exomedica Limited	Up to £250k	Technology
Hamilton Portfolio	Up to £1m	All sectors except biotechnology
Highland Venture Capital	Up to £500k	All sectors except property, retail and leisure
Kapital Assets Ltd	Up to £1m	All sectors except biotechnology
Kenda Capital B.V.	Up to £10m	
London Capital Finance Limited	Up to £500k	All sectors
Longbow Capital LLP	Up to £2m	All sectors
Murray Capital	Up to £5m	All sectors except biotechnology
Par Equity	Up to £500k	All sectors except biotechnology
Pentech Ventures	Up to £1m	Software, internet technologies, new media, intellectual property
Sigma Technology Management Ltd	Up to £2m	Technology
Souter Investments LLP	Up to £10m	All sectors
SSE Venture Capital Ltd	Up to £1m	Cleantech
stv group plc	Up to £1m	Creative industries
Symphony Corporate Ltd	Up to £1m	All sectors



Green Investment Bank Business Case

TRI Cap	Up to £500k	All sectors
UKSE Fund Managers Ltd	Up to £500k	Manufacturing or Services to Manufacturing
Upstarts UK Limited	Up to £500k	Technology except biotechnology
Wideblue	Up to £250k	All sectors



Appendix E – Rental Comparisons between Edinburgh & London

Edinburgh

Location	Approx. Occupational Costs (including rent, rates and service charges)	Specification / Comments
City Centre		
Waverleygate, Waterloo Place	c. £30 / sq ft	Recently re-furbished to a high quality. Grade A listed building High profile, centrally located.
Clarendon House, George Street	£39 / sq ft	Grade B office View on upper floors over Edinburgh Castle
125 Princes Street	£35 / sq ft	Recently part refurbished Centrally located
81 George Street	£41 / sq ft	Grade A office
Fountainbridge and Exchange		
Exchange Place, Fountainbridge	£44 / sq ft	New Grade A development Recently finished with high quality finishing throughout
Exchange Crescent, Conference Square	£42 / sq ft	Grade A office. Some refurbishment needed
Saltire Court, Castle Street	£46 / sq ft	Grade A office. One of Edinburgh's most desirable office buildings High quality
Caledonian Exchange	£36 / sq ft	Grade A office.
Midtown / Fringe city centre		
Holyrood Park House	c. £30 / sq ft	Close to Parliament.
Donaldson House, Haymarket	£33 / sq ft	Grade B office.



Green Investment Bank Business Case

The Gyle and Edinburgh Park		
Lochside View	c. £30 / sq ft	Open Plan office space
Edinburgh Park		Flexible Leases
Broadway Park	£27 / sq ft	Open Plan office space
South Gyle		

London

Location	Approx. Occupational Costs (including rent, rates and service charges)	
The City		
On average	c. £85 / sq ft	
Mid Town		
On average	c. £69 / sq ft	
The Docklands		
Canary Wharf	c. £68 / sq ft	
Mayfair / West End		
On average	c. £121 / sq ft	



Appendix F – Key Renewable Energy and Nuclear Supply Chain members in the North East of England

Renewable Energy

- Econnect
- SMD Hydrovision
- AMEC Wind Energy
- CE Electric
- Engineering Business
- Romag

Nuclear

- Amec
- Aker Solutions
- Mitsui Babcock
- Hertel
- SEC Ltd
- Mowlem Nuclear
- Faithful and Gould
- ERS
- Corus
- Express Engineering
- INTEC
- Rolls Royce Nuclear Engineering Services
- SEC Environmentals Ltd



Appendix G – Scottish Renewable Energy Projects

Technology	Installed	Under construction	Resolution to consent	In planning	Appeal
Hydro	1,395	109	38	2	0
Wind	2,562	1,070	1,800	3,258	593
EfW (electric)	106	3	17	8	0
EfW (heat)	25	0	17	7	0
Biomass (electric)	89	65	49	588	0
Biomass (heat)	225	194	0	327	0
Wave	2	0	5	0	0
Tidal	1	0	0	10	0
Total	4,405	1,461	1,926	4,200	593





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