



STRATEGY DOCUMENT

November 2012



ENERGY
CORK



ABBREVIATIONS

CASP	Cork Area Strategic Plan	IERC	Irish Energy Research Centre
CCGT	Combined Cycle Gas Turbine	IMDO	Irish Maritime Development Office
CCS	Carbon Capture and Storage	IMERC	Irish Maritime and Energy Resource Cluster
CER	Commission for Energy Regulation	kV	Kilovolt
CIT	Cork Institute of Technology	LA	Local Authorities -Cork City Council & Cork County Council
CNG	Compressed Natural Gas	LNG	Liquefied Natural Gas
EU	European Union	LPG	Liquid Petroleum Gas
EV	Electric Vehicle	MW	Megawatt
GDP	Gross Domestic Product	NG	National Government
GW	Gigawatt	NTA	National Transport Authority
HEI	Higher Education Institution	SEAI	Sustainable Energy Authority of Ireland
IDA	Industrial Development Authority	UCC	University College Cork
ICT	Information and Communications Technology		

Kilgarvan windfarm –
courtesy of Bord
Gáis Energy

Cover photos: courtesy
of Bord Gáis Energy,
Phillips 66 and Tyndall
National Institute

Vision



THE VISION OF THE ENERGY CORK CLUSTER IS:

- To be a recognised and influential focal point for the energy sector in the Cork region
- Consolidate and raise awareness of Cork's position at the forefront of economic, commercial, research and educational activity in the energy sector in Ireland
- Contribute to economic growth and job creation in Cork and nationwide.

This vision will be achieved by building on the extensive natural resources, physical infrastructure, human capital, and tradition of innovation in the Cork region.

Chairman's Foreword

In November 2010, Cork Chamber produced a report¹ outlining the opportunity for Cork to accelerate energy sector activity in the region, grow the regional economy and foster enterprise and job creation.

As a result of the interest generated by this report, a stakeholder workshop was convened by Cork Chamber with the support of the Cork Area Strategic Plan (CASP) partners, Cork City Council and Cork County Council. Among the outcomes of that event was the formation of a Steering Group made up of industry and higher education stakeholders with the intention of forming an energy industry cluster for the Cork region with the working title of "Energy Cork".

Over the following months, the Steering Group produced a detailed workplan to develop the Energy Cork concept into an independent, membership-led cluster. Early in 2012 Cork City Council and Cork County Council agreed to fund the development of Energy Cork. A Project Manager was appointed in July 2012 and Energy Cork is to be formally launched by Mr Pat Rabbitte TD, Minister for Communications, Energy and Natural Resources, in December 2012.

Following its formal launch, Energy Cork will be developed further into an industry-driven energy cluster pursuing coordinated actions to strengthen enterprise and employment within the energy sector in the Cork region. Members will be sought among all energy stakeholders in the region.

The initiative is to receive interim support from Cork City Council and Cork County Council through their respective Economic Development Funds,

under which 1% of the commercial rates of the two Councils is dedicated to enterprise support and job creation. As Energy Cork develops it will bring forward a range of initiatives.

Clearly, Energy Cork has a local and regional focus. However, all of its activities will be carried out within the framework of national energy policy and it will take an international view with regard to its future direction. This is particularly relevant to the EU and the work of the Commission for Energy Regulation. Our member organisations will continue to collaborate at national and international level.

The success of Energy Cork will be built upon the extensive natural resources, physical infrastructure, human capital and tradition of innovation in the Cork region. A primary objective will be to create employment in the energy and related industries in the Cork region.

This Report sets out the rationale for Energy Cork in more detail and summarises the workplan drawn up by the Steering Group. Many of the projects identified are ambitious and far-reaching and we look forward to working with all those in the energy sector in Cork towards their fulfilment.

PATRICK FITZPATRICK

Chair of Steering Group

Energy Cork, November 2012

1. Cork's Energy Opportunity: Creating Jobs in the Green Economy, Cork Chamber, 2010

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Introduction

“The reliability of Irish energy and fuel supply systems and the increased competitiveness and efficiency of energy markets is fundamental to Ireland’s attractiveness to inward investment and indigenous economic activity.”

1.1 – WHY ENERGY?

As the International Energy Agency reiterated in its latest review of Ireland’s energy policies, “Energy is a cornerstone of the modern economy and delivering an efficiently functioning and organised energy system should be a priority for the government if it is to meet its commitments to sustainable economic growth”². The reliability of Irish energy and fuel supply systems and the increased competitiveness and efficiency of energy markets is fundamental to Ireland’s attractiveness to inward investment and indigenous economic activity.

The three important pillars of energy policy outlined in the Government White Paper of 2007³, namely, competitiveness, security of supply, and sustainability, remain paramount for the economy and society. Given the globalised nature of energy markets, the extent to which Ireland can influence these three factors internationally is debatable. However, in terms of Ireland’s economic development it is clear that all three can be influenced by Government actions, Irish industry’s proactive approach or response to technology and market trends, and the response of individual stakeholders and energy users.

The demand for and supply of energy in Ireland, in line with other EU Member States, have reduced by 11% and 5% respectively from their peaks in 2006/7⁴. Despite this high-level trend of declining demand, the impact of increasing wholesale energy prices and subsequent price increases in retail electricity and fuel prices on industry and households has been a major source of concern.

At present, Ireland imports nearly all (86%) of its energy needs with 100% of its oil and over 90%

of its natural gas requirements imported. Ireland has a mandatory EU Directive target to ensure that, by 2020, 16% of total energy (and separately 10% of transport energy) consumed will be from renewable sources. Ireland has set national targets to achieve this, namely that 40% of electricity and 12% of thermal energy is from renewable sources. In addition, Ireland has a target to achieve 20% (33% in the public sector) energy savings by 2010 relative to 2001-05 levels. These targets help to focus attention on the need for co-ordinated and effective activity.

While the decline in economic activity has made achieving Ireland’s Kyoto Obligations to stabilise greenhouse gas emissions in the 2008-2012 period very achievable, European Union targets for 2020 for sectors not included in the EU Emissions Trading Scheme (e.g. agriculture and transport) currently remain elusive. Energy production and use accounts for up to two thirds of all Irish greenhouse gas emissions contributing to global climate change⁵.

The energy sector in Ireland employs tens of thousands of people both directly and indirectly and contributes to the county’s economic productivity both in terms of the sector’s commercial activities and its important role in servicing other sectors of the economy.

Driven by economic incentive, environmental stewardship and security of supply considerations, the energy sector is the focus of intensive research and development activity around the world. This activity is no less visible in Ireland and the potential for development of new products and services in the sector, with the associated economic activity and job creation, is enormous.

2. Energy Policies of IEA Countries – Ireland – 2012 Review, International Energy Agency, 2012

3. Delivering a Sustainable Energy Future for Ireland, Department of Communications, Energy and Natural Resources, 2007

4. Energy Policies of IEA Countries – Ireland – 2012 Review, International Energy Agency, 2012

5. Ireland’s Greenhouse Gas Emissions Projections 2011-2020, Environmental Protection Agency, 2012

1.2 – WHY CORK?

The Cork region, including Cork City and County, is unique in Ireland in terms of its importance to the national energy landscape and its potential to facilitate and support innovation and enterprise in that sector to boost economic activity and employment nationally.

Home to over 500,000 people, the Cork region is a vibrant economic, social and cultural hub for the south and southwest of Ireland, which has a substantial and influential role to play in the nation's energy future.

Cork's natural resources include proven and exploited resources of natural gas, hydroelectricity, onshore wind, biomass, geothermal and solar energy. In addition, exploitable resources of oil, ocean energy and offshore wind energy are present in the region.

Cork's energy infrastructure is extensive. Ireland's only oil refinery, operated by Phillips 66 at Whitegate, is located in the region. Extensive oil storage facilities at Whitegate and Bantry Bay place Cork at the centre of the oil industry in Ireland. This position has the potential to be boosted with the development of Ireland's first indigenous oil field at the Barryroe prospect 50km off the Cork coast.

Cork was the first, and so far only, region in the country to see indigenous natural gas brought ashore. The Kinsale, Ballycotton and Seven Heads fields have been developed since the 1970's and Bord Gáis was established and headquartered in the region to facilitate the development of the necessary transmission, distribution and marketing systems to supply the national economy.

Cork has one of the largest natural harbours in the world, operated by the Port of Cork Company, a well developed port for commercial traffic with a track-record of service to the energy industry. Cork Airport also facilitates the support of oil and gas infrastructure off the coast.

A concentration of electrical power generation in the harbour area means there is a significant supply of low grade heat (up to 100MW) and electrical power (up to 1400MW) available to attract and support manufacturing industry.

The electricity transmission network in the region is extensive and reliable. The completion of the Cork Harbour 220kV project and the envisaged 400 kV Grid Link project linking Munster and Leinster will have enormous impacts for security of supply and renewable energy connections in the region and nationally.

Cork has a very strong energy research capacity. Within the region, there is a multitude of individual research groups and institutes embedded within the Higher Education Institutions (HEIs) at University College Cork and Cork Institute of Technology, and in the private sector, which carry out research, development and demonstrations within the energy and environmental sectors.

In terms of alternative energy sources, one example is the Irish Maritime and Energy Resource Cluster (IMERC), which has been established to promote Cork, and indeed Ireland, as a world class maritime and energy research and development location. It brings together in Ringaskiddy a critical mass of expertise from UCC, the National Maritime College

“Cork accounts for approximately 13% of Ireland’s energy use and supplies approximately 25% of national energy requirements. No other region can claim such a positive balance of supply to demand.”



of Ireland, and the Irish Naval Service. One of the flagship projects within IMERC is the creation of Beaufort Research at UCC, located in the Beaufort Laboratory at Ringaskiddy, which will build on existing expertise in the marine renewable energy sector to unlock sustainable resource development and innovation in the maritime and energy field

The establishment of the Irish Energy Research Centre (IERC), based at the Tyndall National Institute, represents another exciting avenue for research and development. The focus of the IERC is primarily on demand side management. The Centre will perform world-leading, collaborative research and innovation in integrated sustainable energy systems and will work in conjunction with industry and academic partners to enable commercial development of these technologies.

These and other research centres based in Cork continue to successfully seek national and international funding and partners for research projects which benefit the entire Irish economy.

Cork has a vibrant, modern and flexible agricultural sector that has the potential to greatly increase its production of bioenergy. In recent months, Cork City has seen the trial of its first Compressed Natural Gas

(CNG) bus with an expectation that more vehicles will follow. Significant research is being carried out in the region towards the introduction of biomethane into the existing natural gas infrastructure as well as the use of low-emission vehicles such as electric and CNG vehicles.

Currently, Cork accounts for approximately 13% of Ireland’s energy use and supplies approximately 25% of national energy requirements. No other region can claim such a positive balance of supply to demand. In addition:

- Cork stores over 90% of the strategic oil reserves held in Ireland as well as being the location for all indigenous refining of petroleum products. 31% of Ireland’s oil products are supplied from the region.
- 100% of Ireland’s indigenous natural gas is produced in the region (approximately 8% of the country’s current requirements)
- 14% of Ireland’s electricity production (from 20% of Ireland’s electricity generating capacity) is produced in Cork
- 19% of Ireland’s wind energy (from 17% of Ireland’s installed wind power) comes from the region.

Wind turbine blades being delivered & unloaded at the Port of Cork. Courtesy of the Port of Cork Company.

1.3 – WHY A CLUSTER?

The Energy Cork model is one of an industry cluster. Clusters, in the economic development sense are defined as “geographic concentrations of interconnected companies, specialised suppliers, service providers, and associated institutions in a particular field that are present in a nation or region”⁶

Clusters may develop organically, be formed under the direction of development agencies or, more likely, may result from a combination of these factors. Whatever their origins, successful clusters do tend to increase the productivity with which companies can compete. It is for this reason that development

agencies see clusters as being important for local, regional and national economic development and employment.

The Cork region, with its deeply rooted energy sector, extensive natural resources, physical infrastructure, human capital and tradition of innovation may already be said to constitute an energy industry cluster. The aims of Energy Cork, outlined in the following section, are to build upon this firm foundation, promote interaction between stakeholders and market the region as an outstanding location in which to do business in the energy sector.

1.4 – AIMS OF ENERGY CORK

THE AIMS OF ENERGY CORK ARE TO:

- Lead the development of an energy cluster in Cork.
- Build and promote an identity for the energy sector in Cork.
- Support the successful implementation of national and EU energy policy.
- Stimulate interaction across the energy sector.
- Develop and pursue co-ordinated actions to strengthen business and employment within the energy sector.
- Attract energy related businesses and infrastructure to Cork.
- Ensure that Cork is recognised as the premier region in Ireland for energy education and research at third level and beyond.
- Encourage research and cooperation between the energy industry and third level institutions in the region and with national and international research centres.
- Lobby for the energy sector in Cork at local, national and international levels.

In order to achieve these aims, Energy Cork will organise and promote:

Networking Forums: bringing together key decision-makers from across the spectrum of business and industry to meet to make connections and discuss issues affecting the energy sector from a local and national perspective.

Workshops and Training: ensuring that entrepreneurs are investor-ready and able to maximise their opportunities to secure capital for growth; helping to meet the training needs of businesses in the energy sector; and developing the capacity in the wider business community for improving energy efficiency and reducing energy costs.

Collaboration platforms: developing online networks (e.g. website, LinkedIn group and Twitter account) and offline communities to help create opportunities in the energy sector and provide an open environment for knowledge sharing and collaboration.

News sharing: circulating information on policy developments and new opportunities, and publicising information on exhibitions, conferences, seminars, workshops and forums from across the country and beyond.

Lobbying: being a strong coherent voice for the energy sector in Cork at local, national and international levels.

6. Institute for Strategy and Competitiveness, Harvard Business School. <http://www.isc.hbs.edu/econ-clusters.htm>

Areas of interest

Energy Cork seeks to engage with and influence all areas of energy supply and demand within Cork.



The activities we engage in as part of our daily lives require a supply of energy or, more frequently, energy services such as light, mechanical power or refrigeration. How societies choose to utilise natural resources to provide for this energy demand varies considerably. The supply and demand equilibrium is complicated by other policy priorities. As we have seen, for Ireland, the issue of security of supply, that is, the assurance that there will always be an adequate supply of energy (and energy services) in accessible forms and locations to meet a fluctuating demand at all times, is just one aspect of energy policy that must take account of potentially competing demands such as cost competitiveness and environmental sustainability.

Energy Cork seeks to engage with and influence all areas of energy supply and demand within Cork. The need for and willingness of Cork based companies and researchers, in cooperation with national and international colleagues, to develop intelligent business models, products, services, and lifestyles to address how we supply and use energy, has the potential to be a powerful driver of business, job creation and innovation in the region.

The Energy Cork Steering Group decided to structure the organisation's approach and areas of interest according to the broad supply/demand split. Within the demand side of the energy equation, however, there are areas of particular interest, such as the impact of building standards and construction practices on energy use, and transport energy use. In addition, there are elements of economic activity allied to the energy sector made up of demand for activities such as water and wastewater management, application of clean technologies, environmental management and waste management. As a result, the following five broad areas of interest were identified as being particularly relevant to the Energy Cork agenda.

Cork's Lower Harbour – a centre of national importance for energy supply. Courtesy of Phillips 66

- **Energy Supply**
- **Demand Side Management**
- **Building Standards and Construction**
- **Transport**
- **Cleantech**

2.1 – ENERGY SUPPLY

The supply of energy to end-users depends on:

- An energy resource (gas, wind, oil, etc.)
- Facilities for treating and/or converting the raw fuel or resource into a convenient form or carrier (e.g. electricity, compressed natural gas, petrol, etc.)
- Physical infrastructure and organisational competency to deliver energy to customers.

Cork currently supplies and processes over 25% of Ireland's energy needs in terms of transport fuel, heat and electricity. Cork is of strategic national importance to security of energy supply and the energy sector is an important employer in the area.



“Cork currently supplies and processes over 25% of Ireland's energy needs in terms of transport fuel, heat and electricity. Cork is of strategic national importance to security of energy supply.”

Whitegate Power Plant.
Courtesy of Bord
Gáis Energy

2.1.1 – OIL AND GAS

Ireland's only oil refinery, supplying almost a third of the country's transport fuel, is based in the Cork region, operated by Phillips 66 at Whitegate. Extensive oil storage facilities at Whitegate and Bantry Bay, where there is capacity for 1 million tonnes of the country's strategic oil reserves (four times the capacity of Dublin Port), place Cork at the centre of the oil industry in Ireland. This position has the potential to be boosted with the development of Ireland's first indigenous oil field at the Barryroe prospect 50 km off the Cork coast in addition to other prospects, for both oil and natural gas off the south and south west coasts.

Cork was the first, and so far only, region in the country to see indigenous natural gas resources brought ashore. The Kinsale, Ballycotton and Seven Heads fields have been developed since the 1970's and Bord Gáis was established and headquartered in the region to facilitate the development of the necessary transmission, distribution and marketing systems to supply the national economy. The positive impacts, for the Irish economy, society and environment of the availability of natural gas have been enormous.

Cork Harbour has the potential to accommodate a Liquefied Natural Gas (LNG) Storage and Re-gasification unit (either floating or onshore) which could provide a solution to the pressing need to diversify Ireland's natural gas supply. In addition, a possible conversion of the Kinsale Gas Field provides an opportunity for carbon capture and an expansion of gas storage operations. Energy Cork will support the development of an appropriate legislative and regulatory regime which will allow for carbon capture and storage concepts to progress.

The potential for increasing employment in the oil and gas sector is dependent upon the establishment of a critical mass of activity and expertise in the region building upon the last several decades of activity. This will depend on national policy as well as local and project specific factors.



Cork Harbour is a gateway for the energy sector. Courtesy of the Port of Cork Company

2.1.2 – RENEWABLE ENERGY

Another key prospective area for job creation lies in renewable energy. Many technologies in this domain are still at a nascent stage, and further optimisation, technology convergence and added value, all of which should lead to additional employment, are possible. Some of the most attractive renewable technologies and their relevance to the Cork region are outlined as follows:

1. Offshore wind power is a particularly vibrant sector, despite periodic policy revisions internationally, with up to 20 GW being developed in Irish, UK and neighbouring waters in the next ten years. Cork's experience in energy, construction, shipping, consultancy, IT and deep water ports are a particular advantage in serving these developments, at the design, construction and operational stages through services and products.

2. Marine renewable energy technologies such as wave and tidal energy devices in various configurations are steadily emerging as near-to-market options for electricity generation. The Cork region, along Ireland's southwest Atlantic coast, is well placed to develop and, in certain locations, deploy such devices with an extensive coastline and inshore waters. More importantly, the Hydraulics and Maritime Research Centre in UCC, which is being incorporated into Beaufort Research at UCC in Ringaskiddy, has built a reputation for world-class prototype testing faculties, several device developers are based in the region, and Beaufort Research located within IMERC will serve to attract others.

3. Cork could be promoted as a location for foreign direct investment in the area of high voltage

undersea cable manufacturing (which has been identified as a bottleneck in the roll-out of offshore wind development in UK). Cork's deep water port, large electricity generation capacity and an abundance of waste heat in the harbour area from its generation, as well as the proximity of the IMERC research cluster are key advantages.

4. Biomethane production from grass is an area of particular interest for the Cork region, and one on which the City Council, Bord Gáis⁷ and UCC have carried out research. Ireland has the highest density of grass cultivation in Europe. By involving agricultural co-operatives to process grass to biogas, and then on to technology providers and Bord Gáis for scrubbing and feeding into the national gas grid, the complete supply chain could be established on a local level.

5. Natural gas for transport is increasing in popularity around the world, as a clean and efficient alternative for diesel fuel in both public and private fleets of commercial vehicles. Bus Éireann have successfully trialled the use of a CNG bus in Cork City with a view to expanding into its national fleet.

6. Opportunities exist at the Energy Park at Whitegate (see below) to recover waste heat from three electricity generating plants and make available a heat source to industry. The opportunity also exists to manufacture synthetic natural gas from refinery produced fuel oil, use that gas to fuel the power plants, and capture the carbon dioxide in a process known as Carbon Capture and Storage (CCS), for storage in the offshore Kinsale Head gas field.

7. The Future of Renewable Gas in Ireland, Bord Gáis, August 2010 http://www.bordgais.ie/media/15665_BG_RenewGas_Final1.pdf



Cork has extensive natural gas transmission and supply infrastructure. Courtesy of Bord Gáis Networks

2.1.3 – ENERGY TRANSPORTATION

The Cork region has an extensive network of electricity, natural gas, oil and oil products transport infrastructure at both the transmission and distribution levels. The significant actors in the region in this area of the energy sector include:

- Bord Gáis Networks
- Gaslink
- ESB Networks
- Eirgrid
- Phillips 66
- Port of Cork

A basic strength and source of competitive advantage for the region lies in the current and future capacity, intelligent planning and reliability, of the energy transportation infrastructure.

ESB Networks has invested €300 million in the Cork region over the last 5 years, and as the owner, builder, maintainer and funder of the Transmission and Distribution electricity network in Ireland, has recently commenced a €500 million investment in six 220 kV stations between Moneypoint in Clare

and Knockraha in Cork to collect and export a further 869 MW of renewable energy. This is in addition to significant wind power already connected in the southwest region. This development makes Knockraha in Cork the most strategically important bulk electricity supply point in the country. The electricity network in Cork is very robust and reliable – capable of attracting the biggest industrial energy users e.g. pharma multinationals, food ingredient manufacturers and data centres/cloud computing facilities.

Energy Cork will support the maintenance and enhancement of the energy infrastructure in the Cork region and beyond, in order to ensure that security of energy supply, including the particular supply needs of industry, as well as the export of energy (e.g. wind and wave generated electricity) from the region is achieved. In particular, it is vital that the 400kV Grid Link project connecting the Dublin region to the Cork region, currently in the early planning stage, is delivered in a timely and cost-effective manner and is planned and constructed to bring the maximum benefit to the Cork region.

“A basic strength and source of competitive advantage for the region lies in the current and future capacity, intelligent planning and reliability, of the energy transportation infrastructure.”



2.1.4 – ENERGY PARK

Cork has the potential to create Ireland's first Energy Park: 25% of all national energy needs are produced in one square mile in Whitegate and 90% of the oil reserves held in Ireland are stored in the Cork region.

The Cork Energy Park Concept outlines the potential for the Whitegate area to be designated as Ireland's first Energy Park. The following factors and key pieces of infrastructure can contribute to Whitegate achieving the status of Energy Park:

- Whitegate is the location of Ireland's only oil refinery, operated by Phillips 66.
- Bord Gáis Energy operates Ireland's newest combined cycle gas turbine (CCGT) power station, with a generation capacity of 445 MW, adjacent to the Whitegate Refinery site.
- The Aghada Power Station, operated by ESB, with a total generation capacity of 963 MW, including a state-of-the-art CCGT plant forms an important part of the region's energy infrastructure.
- Options are being discussed regarding the potential relocation of Liquid Petroleum Gas (LPG) storage from the Upper Harbour to the Lower Harbour. This may result in further LPG activity in the Whitegate area.
- Significant biofuel is activity taking place – research, production, blending and distribution at the Whitegate Refinery.
- Due to its proximity to the Kinsale Gas Fields and associated infrastructure, the region is already the site of the only operational natural gas storage facility operated by Kinsale Energy. The infrastructure also offers the prospect of CCS projects in the region as technology and economic factors allow.
- A 400 kV connection from Cork to Dublin (as envisaged by Eirgrid's Grid Link project) could further enable Clean Coal Gasification and CCS in the Kinsale Field. This will depend heavily on national energy policy and the prospects for coal in the national electricity generation mix.
- There exists the potential to accommodate and develop a LNG Floating Storage and Regasification Unit at Whitegate, the only significant infrastructure requirement being a 5-8km interconnecting natural gas pipeline to the Inch terminal to enable the technology. This potentially provides a least cost solution for the diversification of natural gas supplies.
- Real opportunity to attract processed steam based industry to Whitegate, given that there are a number of power station facilities producing steam as a waste product.

Whitegate Power Plant – 445 MW". Courtesy of Bord Gáis Energy

“Cork has the potential to create Ireland's first Energy Park: 25% of all national energy needs are produced in one square mile in Whitegate and 90% of the oil reserves held in Ireland are stored in the Cork region.”

2.2 – ACTIVE DEMAND SIDE MANAGEMENT

Demand side management of electricity and heating fuels in residential properties, industrial and business sectors, public administration and institutional sectors, and in the agricultural sector, represents a key component in balancing the supply-demand equation. It also presents enormous opportunities for innovation and cost saving.

Recognising the importance of energy efficiency, a key aspect of demand side management, the Irish Government has established ambitious targets. The central commitment is to a national energy-saving target of 20% across the whole economy by 2020 (compared to 2005 levels), which incorporates a higher target of 33% efficiency savings for the public sector.

The Government's energy policy framework also highlights the importance of addressing peak electricity demand, and sets out its commitment to developing enhanced, cost effective demand side management programmes to deliver both energy efficiency gains and peak demand reductions.

The Cork region generates about 13% of Ireland's Gross Domestic Product (GDP) and therefore, based on a national energy budget (excluding transport) of €10bn, we may estimate that the total spend on energy (excluding transport) in the Cork region could be up to €1.3bn per year.

The establishment of the Irish Energy Research Centre (IERC), based at the Tyndall National Institute is an exciting avenue for research and development into demand side management. The Centre will perform world-leading, collaborative research and innovation in integrated sustainable energy system technologies in conjunction with industry and academic partners to enable commercial development of technologies.

The NIMBUS Centre, based at CIT, is Ireland's only dedicated research centre devoted to the field of embedded electronic systems. A significant portion of its research output has applications in the demand side management of energy in all sectors.

Smart electricity metering is currently being designed for national rollout by ESB Networks in consultation with industry and the CER. The two year rollout and design stage has already commenced.



Tyndall National Institute – home to the International Energy Research Centre. Courtesy of Tyndall National Institute.

One of the key challenges facing consumers and businesses in managing energy demand lies in the volume of energy data that is available to them. Smart meters, half-hourly data, and sub-metering all mean that commercial organisations are now starting to deal with data sets that contain thousands, if not millions, of data points every month. There is a pressing need to find new and innovative ways in which the consumer may utilise this data for effective energy demand management. These may include using social media and gaming to present consumption data in a more user-friendly format that draws in the consumer. Some of the most effective tools are to be found in visualisation packages such as dashboards, league-tables and graphs, and Energy Cork can play a role in promoting access to training in the use of such tools.

Recent accreditation awards such as the ISO 50001 energy management systems standard will play an increasingly important role. Cork has taken a lead in the adoption of this standard, with UCC being the first university worldwide, as well as the first public sector body in Ireland, to achieve ISO 50001 certification.

The Cork region has the potential to play host to the further development of national and international consultancy businesses focusing on energy management, energy efficiency and smart energy networks.

“Cork has taken a lead in the adoption of ISO50001, with UCC being the first university worldwide, as well as the first public sector body in Ireland, to achieve certification.”



2.3 – BUILDING STANDARDS & CONSTRUCTION

In discussing progress on its Strategic Plan 2010-2015 with the Committee on Communications, Natural Resources and Agriculture, Sustainable Energy Ireland (SEAI) recently set out some of the benefits of its sustainable energy programmes, including the following:

- In 2011, 80,000 homes received energy upgrades through the Better Energy Homes Programme. In turn this supports close to 6,000 full-time jobs.
- Investments in home energy upgrades will typically be repaid through energy savings within eight years.
- In 2011, €0.25bn was spent on energy efficiency work in homes and businesses that will generate a lifetime saving of €0.75bn.

In the Cork area there is significant potential for increased uptake of retrofitting. Energy Cork has a key role to play in promoting this, not only in the private home sector, but also through refurbishment of business premises and public buildings. The lessons learned from the virtual reconstruction of the County Hall deserve wider circulation, and the “Passive Retrofit Demonstration (PRD1974)”, a retrofit project being conducted at CIT; will act as an energy demand test bed. Also in prospect are the upgrading of a range of public buildings (such as the former Motor Tax Office), and buildings in the Docklands, where ESB has plans to

investigate district heating linked to the planned city redevelopment adjacent to Páirc Uí Caoimh and its Marina Power station. In addition, the green field site at Curraheen, designated for the Cork Science and Innovation Park, will provide a unique opportunity for the development of a new energy efficient complex.

Apart from the employment opportunities in construction created as a consequence of a coordinated and comprehensive retrofitting strategy, there is an opportunity for the establishment of a centre of excellence for the provision of education and training in this domain. Energy Cork is well positioned to support such an initiative through the HEIs in the region. Particular targets could include the development of construction methodologies and engineering solutions which are economically viable without increasing costs in the construction sector, and a dedicated training centre for construction personnel.

Furthermore, research into economic models for the financing of retrofitting (“green financing”) can be carried out by the HEI sector, and Energy Cork can act as a catalyst to promote the development of appropriate financial instruments.

For new builds or refurbishments, energy efficiency is a top priority.

2.4 – TRANSPORT

The transport sector is the largest consumer of energy in Ireland, representing 35% of total final energy consumption, and it is expected to increase to over 40% by 2020⁸. An efficient transport infrastructure, flexible and customer focused public transport provision, and the design and implementation of appropriate transport policy at local and national level, are important factors in creating a vibrant society and economy, raising standards of living and increasing tourism potential.

In order for the Cork region, and in particular the city, to continue to lead as a tourist, social and business hub, a clean and efficient transport system is required. In the short term this could include hybrid taxis, low emission buses and battery assisted bikes, available on a bike sharing scheme.

The future energy needs of the transport sector cannot be assessed without reference to environmental considerations. For example, replacing current public service vehicles (PSVs) with cleaner and more energy efficient vehicles also has the potential improve the air quality and noise emissions in the region.

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A Compressed Natural Gas fuelled bus on the streets of Cork City during the summer of 2012. Courtesy of Bus Éireann

2.4.1 – PUBLIC TRANSPORT AND BIOGAS

Public transport and other captive fleets in Cork are mainly powered by diesel engine vehicles. A small number of taxis operate with hybrid petrol/battery powered cars.

Hybrid diesel/battery powered and CNG buses and refuse trucks are currently utilised in other cities across Europe. Intelligent transport systems and transport related ICT are currently in use in Cork and have the potential to be more widely deployed. Bus Éireann has recently trialled a CNG bus on a Cork City route as part of its plans to introduce this technology more widely within its fleet. Introducing biogas fuelled CNG buses in Cork has the potential to create an environmentally clean transport system, which is less dependent on mineral oil fuels and their associated uncertainty and cost. Bio-CNG buses, operating in the Cork public transport system, would also establish a consistent demand for biogas in the greater Cork area to supply these vehicles. The Cork region is ideally suited to biogas production as it is home to a substantial agriculture sector.

Compressed biomethane is practically identical to compressed natural gas, meaning there are no significant issues with utilisation of biomethane as a

renewable sustainable gaseous biofuel. UCC and CIT are at the cutting edge of biomethane research.

Currently there are no government policies or incentives for low or zero emission large public service vehicles. CNG buses emit substantially less harmful emissions, and hybrid buses utilise more efficient systems and thus have reduced emissions in comparison to conventional buses. Small public service vehicles have government funded incentives, but this is the same incentive that is applied to private use vehicles. Increasing incentives for small PSVs would have the potential to transform the current taxi fleet of mainly conventional vehicles to a fleet of majority hybrid or zero emission vehicles.

In order to realise the deployment of natural gas in buses, and the long term vision of using Bio-CNG as a sustainable, locally produced fuel, a number of high level steps have also been identified. For example, a biogas plant could be constructed adjacent to the gas grid so that it can inject biomethane into the grid. A green certificate system would be required to monitor the quantity of sales into the plant and into the grid and onwards to the end-user (e.g. Bus Éireann).

“The transport sector is the largest consumer of energy in Ireland, representing 35% of total final energy consumption, and it is expected to increase to over 40% by 2020.”

8. Energy Policies of IEA Countries – Ireland – 2012 Review, International Energy Agency, 2012

“An IMDO report has identified the Port of Cork as one of three Category A ports in Ireland confirming that it offers the necessary facilities to be regarded as meeting the requirements of the international offshore renewable energy sector.”

2.4.2 – ELECTRIC VEHICLES

The ESB e-cars project is currently rolling out an electric vehicle (EV) charging infrastructure, including a first in the world, cloud based system, in support of the government target of 10% EVs by 2020. Ireland is now seen as a world leader in EV adoption. An electric car sharing system has been developed in the Dublin region, whereas Cork, to date, has been a somewhat slow adopter of EVs. Energy Cork will aim to increase knowledge of and deployment of EVs and associated infrastructure.

Cork City Council is leading one of the work packages in the international Green e-Motion project which aims to develop and demonstrate a user-friendly framework for green electric mobility in Europe. ESB e-cars and ESB Networks are also heavily involved in this initiative.

2.4.3 – BIKE SHARING SCHEME

It is estimated that cycle flows in Cork city are approximately 1% of traffic volume. This contrasts with a rate of 6%-7% in Dublin.

Bike sharing schemes have proliferated in cities across Europe in recent years. The Dublin bike scheme has been acknowledged internationally as being one of the most successful with approximately 2.6 million passenger journeys in the first two years.

The National Transport Authority (NTA) commissioned KPMG along with technical advisors Jacobs Engineering to carry out a feasibility study on the rollout of a similar scheme in Cork, Galway, Limerick and Waterford. This study found that although the potential exists for successful schemes in each city, “It would appear that schemes in Galway and Cork would be most successful partly due to the background levels of traffic congestion and the high price of car parking in both cities”⁹.

The study also commented that Cork had a relatively high level of cycling compared to other Irish cities. “Public cycle-parking was provided and generally well used in many locations across the city centre, and there was a fairly constant presence of cyclists on the main streets (during the evening peak).”

Introducing bike sharing to Cork has the potential to encourage the growth of alternative methods of transport within the city.

2.4.4 – PORT FACILITIES

Port facilities operated by the Port of Cork Company, and other facilities such as Cork Dockyard in Cork, have facilitated the transport of goods to and from the region and have further potential to be utilised to help support offshore activity. A 2011 report¹⁰ commissioned on behalf of the SEAI, in co-operation with the Irish Maritime Development Office (IMDO), outlines, in particular, the potential role of the ports in the commissioning and maintenance of marine renewable energy generation equipment.

More recently, an IMDO report¹¹ has identified the Port of Cork as one of three Category A ports in Ireland confirming that it offers the necessary facilities to be regarded as meeting the requirements of the international offshore renewable energy sector.

The research and innovation being carried out by IMERC in the areas of shipping, logistics and transport, as well as the practical implementation of energy management and efficiency solutions by Port of Cork and other stakeholders, has the potential to address a major transport sub-sector which is uniquely relevant to the Cork region.

9. Proposals for Introducing Public Bike Schemes in Regional Cities – Technical Feasibility Study NTA/JACOBS/KPMG Feasibility study, June 2011

10. Assessment of the Irish ports and shipping requirements for the marine renewable energy industry, SEAI IMDO, June 2011

11. Irish Ports Offshore Renewable Energy Services (IPORES): A review of Irish ports offshore capability in relation to the requirements for the Marine Renewable Energy Industry, IMDO, November 2012



2.5 – CLEANTECH

Providing superior performance at lower cost. Courtesy of Tyndall National Institute.

The definition of “cleantech” is extremely broad. It has been described as defining a diverse range of products, services and processes intended to provide superior performance at lower costs, while reducing or eliminating negative ecological impacts and improving the productive and responsible use of natural resources. The main components, almost all of which have an explicit or implicit link to the energy sector include:

- Air pollution control
- Cleaner technologies and processes
- Environmental consultancy
- Environmental monitoring, instrumentation and analysis
- Energy management/efficiency
- Marine pollution control
- Noise and vibration control
- Remediation and reclamation of land
- Renewable energy (wind power, solar power, biomass, hydropower, biofuels)
- Waste management, recovery and recycling
- Waste to energy
- Water supply and wastewater treatment
- Climate change mitigation and adaptation
- Marine energy (wave, tidal, offshore wind)
- Green transportation (vehicles, batteries, re-design of city transport infrastructure)
- Energy efficient products (lighting, insulation, smart metering)
- Carbon credits, carbon markets and carbon projects
- Energy efficiency (buildings, factories)
- Energy storage

2.5.1 – THE CLEANTECH SECTOR IN IRELAND

The following is a gross estimate of the level of investment needed by 2020 if Ireland is to meet its legal obligations under EU Directives on the environment, renewable energy sourced electricity and energy efficiency.

RETROFITTING OF BUILDINGS TO COMPLY WITH BER STANDARDS	€10BN ¹²
CLIMATE CHANGE/RES-E INVESTMENT	€0.87BN ¹³
INVESTMENT IN WASTE TREATMENT	€2BN ¹⁴
INVESTMENT IN WATER AND WATER TREATMENT	€8BN ¹⁵
OTHER	€2BN ¹⁶
TOTAL	€22.87 BILLION

“Cleantech: providing superior performance at lower costs, while reducing or eliminating negative ecological impacts and improving the productive and responsible use of natural resources.”

TOTAL CLEANTECH FORECAST INVESTMENT LEVELS TO 2020 IN IRELAND

Carbon neutrality can be regarded as a proxy metric for success across the board in cleantech. Energy Cork will promote the ambition of a carbon-neutral Cork by 2050.

In addition, Energy Cork will identify a small number of key actions in niche areas, possibly including maritime research, climate change mitigation and adaptation, clean water, and the development of “cold ironing” facilities in the harbour (to supply electricity from renewable sources to ships in dock).



12. EAI estimates this using an average cost of €25,000 per household. The figure given is based on an estimate of €10,000 per household. There are some 2 million buildings/housing units in Ireland.

13. The Commission's Impact Assessment of the EU's climate change/renewables strategy put the economic cost to Ireland at around 0.47% of GDP, SEC (2008) 85/3, 23 January 2008, Table 11.

14. A&L Goodbody Consulting, Ireland's Strategic Infrastructure Investment 2020, September 2005.

15. Includes €5.8 billion in Water Services Investment Programme 2007-2009 (September 2007) and investment needs (€2.6 billion) as set out in Greater Dublin Strategic Drainage Study.

16. Consultant's estimate.

Key Actions for Energy Cork

In this section we bring together some of the key actions identified by the working groups.

WORK STREAM: ENERGY SUPPLY	RELEVANT ACTORS	INDICATIVE TIMEFRAME
Devise strategies to utilise Cork's experience in energy, IT, construction, shipping, consultancy, and deep water ports which are a particular advantage in serving offshore wind and other marine renewable energy developments, at the design, construction and operational stages through services and products	INDUSTRY	SHORT
Promote Cork as a location for foreign direct investment in an area such as High Voltage undersea cable manufacturing	IDA, LAS	SHORT/MEDIUM
Support research into biomethane production from grass and lobby for a change to the policy in carbon credits for biogas.	INDUSTRY, UCC, CIT, NGLAS	MEDIUM
Promote development of natural gas refuelling stations in the Cork region	LA, INDUSTRY	MEDIUM
Work to advance opportunities at the Energy Park at Whitegate including the opportunity to recover waste heat from the area's electricity generation plants and make available as a heat source to incoming industry.	INDUSTRY, LA, CIT, UCC, NG	MEDIUM TO LONG
Promote the continued development of a vibrant oil and gas exploration and production industry in the Cork region as well as the further development of natural gas storage.	INDUSTRY, NG, LG	SHORT TO MEDIUM
Work with all actors in the energy transportation sector to enhance the infrastructure in the Cork region for the maximum benefit	INFRASTRUCTURE OWNERS AND OPERATORS,	MEDIUM

WORK STREAM: DEMAND SIDE MANAGEMENT	RELEVANT ACTORS	INDICATIVE TIMEFRAME
Obtain pledges from key leaders of business and society in Cork to reduce energy demand in their businesses/organisations by an agreed amount.	ENERGY CORK, INDUSTRY	SHORT
Work with a media partner to publish exemplar stories on a regular basis.	ENERGY CORK, MEDIA	SHORT
Identify a Cork version of the Güssing (Austria) development as a test bed for demand management technologies; with potential for Eco tourism.	ENERGY CORK, LA	MEDIUM
Work with research centres such as the IERC and the NIMBUS Centre to highlight innovative, high potential demand-side management technologies.	IERC, NIMBUS, INDUSTRY	MEDIUM

WORK STREAM: BUILDING STANDARDS AND CONSTRUCTION

Monitor CIT 1974 test-bed initiative, in view of the wider application of the technologies, training, employment, business development and financing models that this could bring to the sector.

Explore flagship public sector building retrofitting scheme with the Cork Local Authorities, this would be intended to act as a test bed for technologies and research developed in the region. One possible building identified is the Central Fire Station, Anglesea Street, Cork. A further potential quick win could be the delivery of a boiler servicing programme for all LA properties.

Gain representation on Steering Groups of both the Cork Science and Innovation Park and Cork Docklands projects, in order to establish these as major flagship initiatives for sustainable development and energy conservation.

Develop register of Cork development technologies and training to raise awareness of the sustainable and retrofit solutions that are available.

Prepare a practical guide to planning and building regulation issues regarding retrofitting works in association discussion with the Cork Local Authorities and the Department of Environment, Community and Local Government.

Establish a working group to develop financing models for retro fitting projects and new projects and use the experience to develop a centre for “green financing”.

RELEVANT ACTORS

CIT

LAS

LAS, PROJECT
STEERING GROUPS

INDUSTRY

LAS, NG

INDUSTRY

INDICATIVE TIMEFRAME

ONGOING

MEDIUM

SHORT

LONG

MEDIUM

SHORT

WORK STREAM: TRANSPORT

Develop a working group to advance the introduction of Bio-CNG into the bus and other PSV fleets in Cork.

Support utilisation of Cork's port facilities in growing the offshore renewable energy generation equipment sector.

Support introduction of a bike sharing scheme in Cork and investigate opportunities for a battery assisted bike scheme, working towards increasing Cork's cycle flows.

Lobby for government policies or incentives for low or zero emission large PSVs and investment in biogas.

Support the roll-out of EVs and supporting infrastructure in Cork

RELEVANT ACTORSBUS ÉIREANN, CITY
COUNCIL, HEIS

PORT OF CORK, LA

NTA, CORK CITY COUNCIL

NG

INDUSTRY, NG

INDICATIVE TIMEFRAME

MEDIUM

MEDIUM

SHORT

SHORT

MEDIUM

WORK STREAM: CLEANTECH

Ensure Cork becomes much more energy efficient as a region, and develop a target of Cork being carbon neutral by 2050, with associated milestones. This includes supporting strategic, flagship green energy projects such as a city wind turbine.

Identify key cleantech technologies, products or services, in addition to areas such as marine energy and retrofitting mentioned in other sections, which Cork should focus on in order to become leaders in specific niche areas with global export and development potential, such as

a. Climate change mitigation and adaptation**b. Clean water**

Promote the start-up of cleantech clusters in Cork in these niche areas.

Research further the feasibility of introducing “cold-ironing” facilities to allow vessels, particularly cruise liners and ferries, using Cork Harbour to be connected to the electricity grid while berthed rather than using onboard engines to generate electricity.

RELEVANT ACTORS

INDUSTRY, LAS

INDUSTRY, CIT, UCC, LAS

PORT OF CORK, INDUSTRY

INDICATIVE TIMEFRAME

LONG

SHORT/MEDIUM

MEDIUM

Measures of Success



The proposed Beaufort Research Laboratory at Ringaskiddy – currently under construction. Courtesy of Beaufort Research.

The success of Energy Cork will lie in it achieving its vision and pursuing its aims as outlined in this document. In addition, the following are some of the measures by which we will assess the development of Energy Cork:

2012/3

- Number attending events
- Number on mailing list
- Website visitors
- LinkedIn Group members and Twitter Followers
- Funding and membership model developed
- Establish jobs and revenue in sector in Cork 2012
- Share of Cork’s energy from renewable sources

2013/4

- Number of members
- Number attending events
- Number on mailing list
- Website visitors
- LinkedIn Group members and Twitter Followers
- Funding streams leveraged
- Jobs and revenue in sector in Cork 2013
- Share of Cork’s energy from renewable sources

Appendix A

MEMBERS OF THE ENERGY CORK STEERING GROUP – NOVEMBER 2012

Kevin Barry	EMC
Gordon Bryan	Bus Éireann
Conor Buckley	Longshipe
Seán Condon	ServusNet Informatics
Sharon Corcoran	Cork County Council
Val Cummins	Irish Maritime and Energy Resource Cluster
Claire Davis	South West Regional Authority
Gerry Donovan	Cork BIC
Noel Duffy	Cork Institute of Technology
Patrick Fitzpatrick (Chair)	University College Cork
Chris Gibbons	Cork Institute of Technology
Michael Grufferty	Tyndall National Institute
Conor Healy	Cork Chamber
Henry Kingston	Port of Cork
Tomás Mahony	Eirgrid
Maurice Minogue	Ernst & Young
John Mullins	Bord Gáis and Cork Chamber
Jerry Murphy	University College Cork
Kevin Murray	Kevin J Murray & Co
Brian Ó'Gallachóir	University College Cork
Michael O'Brien	Cork City Council
Neil O'Carroll	Phillips 66
Conor O'Connell	Construction Industry Federation
Aiden O'Neill	Coakley O'Neill Town Planning
Liam Ring	ESB Generation
Henry Smyth	Bord Gáis
John Walsh	Cork City Council

NOTES



www.enerycork.ie