

Green Paper on Energy Policy in Ireland

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Roinn Cumarsáide, Fuinnimh agus Acmhainní Nádúrtha
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Foreword – A Message from Minister Pat Rabbitte, T.D.

Energy is the lifeblood of Ireland's economy and society. Electricity and gas demand for business and for households must be met safely and securely on a continuous basis 365 days a year. Ireland's ability to attract and retain Foreign Direct Investment and sustain Irish enterprise depends on guaranteeing energy supply at competitive cost at all times. Accordingly, the three key pillars of Ireland's energy policy are security, sustainability and competitiveness which recognise the important role energy policy plays in driving economic activity. A smart energy policy has a pivotal role to play in creating the conditions for rebuilding the economy, creating jobs, delivering regional development, protecting our environment and contributing to our wellbeing as a people.

Ireland faces significant inter-related challenges in relation to climate change, energy security and competitiveness. These can be addressed by transforming Ireland's economy from one based on a predominantly imported fossil fuel to a more indigenous low carbon economy centred around energy efficiency, renewable energy and smart networks. This transformation lies at the heart of this Government's energy policy.

The Government is determined to ensure that the needs of the citizens of Ireland are also at the core of this necessary transition. Energy infrastructure must benefit society as a whole and everybody should be able to afford to adequately heat and light their home. Giving consumers more control over their energy choices by providing them with options through efficiency programmes and promoting real and active competition, will empower consumers to make decisions that can benefit them.

Since the publication of the 2007 Energy Policy Framework, 'Delivering a Sustainable Energy Future for Ireland', the global, EU and Irish energy landscape has undergone profound change as new technologies unlock cleaner fuels, the world economy regains positive momentum, and addressing the threat of climate change becomes ever more critical. The significant changes in Ireland's economic position mean that key assumptions supporting policy, as outlined in that White Paper, are no longer valid.

As the EU looks towards 2030 and 2050, it is timely to reflect on what has been achieved and to reorient Irish energy policy priorities towards the 2030 horizon. We must now rethink some of the key components of our energy policy.

I hope that this Green Paper will stimulate a broad and informed debate on this issue. The feedback from that debate will contribute to the preparation of a new White Paper that will set out a balanced and workable energy policy framework for the years ahead.

A handwritten signature in black ink that reads "Pat Rabbitte". The signature is written in a cursive, slightly slanted style.

Pat Rabbitte T.D.

Minister for Communications, Energy and Natural Resources

I. Setting the Context

Overview of Green Paper process

The purpose of the consultation process on the Green Paper is to invite written views, observations and suggestions from interested parties on the shape of Ireland's future energy policy. On completion of the public consultation process, the Minister will have due regard to all submissions received. It is envisaged that the public consultation process, along with the relevant stakeholder engagement, will contribute strongly to the development of an Energy White Paper for Ireland that sets out a balanced and workable energy policy framework for the medium and long terms.

Taking into account the three energy policy pillars and the fourth focus on job creation and economic growth, the Green Paper sets out six policy priority areas in respect of which views are sought:

Priority 1: Empowering Energy Citizens

Priority 2: Markets, Regulation and Prices

Priority 3: Planning and Implementing Essential Energy Infrastructure

Priority 4: Ensuring a Balanced and Secure Energy Mix

Priority 5: Putting the Energy System on a Sustainable Pathway

Priority 6: Driving Economic Opportunity

A number of questions are posed in relation to each of these policy areas in the Green Paper and interested parties are invited to structure their submissions around these questions. **Submissions are not restricted to the questions posed.** They may include any issues, suggestions or concerns that a person may have, including identifying gaps, opportunities and weaknesses in relation to existing energy policy.

The Green Paper also sets out the main developments in the Irish, European and global energy landscape since the Energy White Paper 2007, and identifies the major energy policy documents, strategies, plans and reports published since 2007.

The Green Paper is available on the Department's website: www.dcenr.gov.ie/greenpaper

Copies are available in hard copy, on application to the Department.

Submissions may be made by email at the following dedicated mailbox:

greenpaper@dcenr.gov.ie

Alternatively submissions may be made in writing to:

Energy Policy and Planning Unit,
Department of Communications, Energy and Natural Resources,
29-31 Adelaide Road, Dublin 2.

If you have any queries please contact 353 1 6782934.

The public consultation will conclude at 17.30 on Thursday 31st July 2014.

Please note that all submissions and comments submitted to the Department of Communications, Energy and Natural Resources for this purpose may be subject to release under the Freedom of Information Acts 1997–2003 and the Access to Information on the Environment Regulations (2007); and may be placed on the Department's website.

Introduction – Energy policy developments since 2007

The seven years since the publication of the 2007 Energy Policy Paper, ‘Delivering a Sustainable Energy Future for Ireland’, have been transformational for the Irish and all-Island energy market. The EU and international energy landscape have also undergone profound change as new technologies unlock new sources of fossil fuels as well as low-carbon alternatives, and the global economy regains positive momentum.

The 2007 policy paper was the first comprehensive Irish energy policy document in several decades. It provided policy certainty and a cohesive vision for Irish energy markets up to 2020. It underpinned some very significant achievements over the past seven years and also provided direction for a wide range of detailed action plans, schemes, measures and investment programmes. The continuing implementation of these actions will ensure achievement of Ireland’s ambitious energy objectives and targets by 2020.

As the EU looks towards 2030 and 2050, it is timely to reflect on what has been achieved and to reorient Irish energy policy priorities towards the 2030 horizon. The following section highlights key developments in the Irish, EU and international energy markets and sets out the changing economic backdrop. This contextualises the approach to the following chapters, which focus on energy policy as it interacts with citizens and as an input and driver to economic recovery. Six key priorities are identified for discussion to help formulate the next Irish Energy White Paper.

This section addresses the following areas.

- (i) Key Irish energy policy achievement
- (ii) Key energy policy developments
- (iii) Collective delivery
- (iv) International developments
- (v) Developments in the EU
- (vi) Developments since 2007: economic context and energy prices

I. (i) Key Irish Energy Policy Achievements

In 2007, Ireland faced a number of significant energy policy challenges with concerns over generation capacity and network constraints, the slow pace of developing competition in wholesale and retail markets, a lack of clarity as to how renewable and energy efficiency ambitions would be achieved and growing concerns on energy prices and their impact on households as well as on national competitiveness. Against this backdrop, the following key achievements demonstrate strong delivery on energy policy objectives and underpin the approach to 2030 priorities. A list of key policy papers and reports is in Appendix 2.

Key achievements include **keeping the lights on and gas flowing** during two of the coldest winter periods in 50 years. While secure energy supplies may be taken for granted, this was only possible following multi-€bn investment programmes in electricity

and gas networks, the delivery of critical new generation capacity, and very significant new renewable capacity by both State and private sector energy market participants.

The successful establishment in 2007 and subsequent operation of the **all-island Single Electricity Market (SEM)** has been hailed as an exemplar of regional co-operation by the EU and has provided cost reflective wholesale electricity, competition, transparency, greater consumer choice, diversity of generation, security of supply and increased renewable penetration. It has exerted downward pressure on electricity prices and has also attracted new market entrants.

The accelerating pace of **retail market competition** initially pushed Ireland towards the top of EU league tables for customer switching and provided Irish energy consumers with new services, including prepay and price comparison and switching websites, as well as choice and value from an increasing number of suppliers. This has also led to retail tariff deregulation in all but the domestic gas market, so that suppliers are competing actively, including on price and discounting, in the electricity, gas and dual-fuel markets. The **East West Electricity Interconnector** is a strategically vital energy project for the island of Ireland, linking it with the UK and broader European energy markets. It was delivered on-time and within budget by EirGrid and financially supported by an EU grant of €110m.

Increasing renewable energy supplies have helped decarbonise the Irish economy and provided new opportunities for jobs and growth. At the end of 2012, Ireland had achieved 19.6% of electricity generation from renewable energy sources, 5.2% in renewable heat, and 2.3% in renewable transport. A new biofuels obligation of 6% set for 2013 has seen further increases in renewable fuels in transport in 2013. Underpinned by a robust and transparent market, regulatory and policy framework, including key support schemes such as REFIT support and the biofuels obligation schemes, Ireland is now on a path towards meeting our legally binding 2020 renewables targets.

Energy efficiency enhancements underpinned by a wide range of programmes and measures under the National Energy Efficiency Action Plan, have delivered carbon and energy cost savings for Irish energy consumers and the economy. Substantial benefits in cost and emission reductions have been achieved by households, business and the public sector. There is much further potential, particularly around the forthcoming **national roll-out of smart meters**, to contribute to meeting energy efficiency targets while providing business opportunities for emerging energy service providers and innovators.

I. (ii) Key Energy Policy Developments

Following the publication of the 2007 White Paper, Irish energy policy has continued to evolve through a broad range of key policy decisions, action plans, measures, schemes and programmes, some of which are highlighted below.

In line with **EU network unbundling** requirements in the Third Energy Package, in 2013, the EU Commission certified the Irish arrangements for electricity transmission system ownership and operation in accordance with the relevant option applied for under the Third Package electricity directive (known as Article 9 9.). Also in 2013, BGE's application for the Independent Transmission Operator (ITO) model was certified by the CER taking

utmost account of the EU Commission's opinion on the application, in line with the relevant provisions in the Third Package gas directive. The completion of the BGÉ sale transaction will require a new application to be made by BGÉ for certification of the gas transmission system under the Full Ownership Unbundling model (FOU) in the Package.

The **Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure**, published in 2012, emphasises that it is in national and regional interests that investment programmes, including EirGrid's Grid25, are delivered in the most cost efficient and timely way possible, on the basis of the best available knowledge and informed engagement on the impacts and the costs of different engineering solutions.

The **National Smart Metering Programme** is a central component of the strategy to radically enhance management of energy demand, deliver smart networks and enable greater energy efficiency through the use of cutting-edge technology and consumer empowerment. A major programme of technology and user trials showed that a national rollout of Smart Meters could lead to significant reductions in overall electricity and gas consumption, as well as an 8.8% reduction in peak-time electricity consumption. A national roll-out of Smart Meters will therefore lead to lower customer bills, greater customer information and choice, lower CO₂ and other polluting emissions with consequential environmental benefits for Ireland.

In 2013, the Government published a report on the **Strategic Case for Oil Refining Requirements on the Island of Ireland**, which highlighted the additional security benefits that an operational refinery may offer and underlined that existing oil import facilities on the island of Ireland offer a robust infrastructure that would provide comfortable alternatives in the event of a serious disruption at any of the six principal oil ports.

The Government launched a number of initiatives in relation to energy efficiency including **Better Energy: the National Upgrade Programme** (May 2011) in the context of the Government's Jobs Initiative.¹

Warmer Homes – A Strategy for Affordable Energy in Ireland, presents a cohesive framework for achieving more affordable energy, ensuring that existing and future measures are targeted at households where the risk and adverse effects of energy poverty are greatest.

In 2013, Ireland submitted its second **National Energy Efficiency Action Plan (NEEAP)** to 2020 to the Commission. The second Action Plan identifies actions across six areas: Public Sector, Residential, Business, Transport, Energy Supply, and Cross-Sectoral. Ireland has invested €35m as a cornerstone investor in an energy efficiency fund for the non-residential sector in 2014.

Ireland's Strategy for Renewable Energy sets out five strategic goals – increasing onshore and offshore wind; building a sustainable bioenergy sector; fostering R&D in renewables such as wave and tidal; growing sustainable transport and building out robust and efficient networks.

¹ The Better Energy Homes Programme is designed to support the energy efficiency upgrades of one million homes, businesses and public buildings. The Programme has overseen the upgrade of over 136,000 homes since it began in May 2009.

To support this strategy, Ireland adopted two **Renewable Energy Feed In Tariff (REFIT)** schemes, extending supports to include new onshore wind and biomass capacity. These schemes have played a central role in enabling Ireland to become a world leader in grid integration of variable energy.

Ireland also published a comprehensive **National Renewable Energy Action Plan (NREAP)** to demonstrate how EU renewable targets for electricity, transport and heating will be met.

In 2012, Ireland adopted an Integrated Marine Plan (IMP) entitled **Harnessing Our Ocean Wealth** which put in place an integrated system of policy and programme planning for Ireland's marine affairs including renewable energy. In February 2014, the Offshore Renewable Energy Development Plan was published. This plan provides a framework for the sustainable development of Ireland's abundant offshore renewable energy resource

In accordance with the EU objective of reducing greenhouse gas emissions by 80-95% by 2050, Ireland is developing a **National Low-Carbon Roadmap**, which will set out the strategy to be employed to meet these targets. The Roadmapping process will be coordinated by the Department of the Environment, Community and Local Government with substantial input from relevant Departments.

The **Action Plan for Jobs 2013** contains a number of disruptive reforms², including transforming Ireland into one of the most energy efficient economies in Europe by 2020. The Plan identifies the vital role that energy efficiency can play in reducing the cost of energy for businesses and domestic consumers.

1.(iii) Collective Delivery

Collective delivery across Government, agencies and industry as well as the further strengthening of the critical all-island and East West relationships has been a hallmark of the key energy achievements over the past seven years and provides a strong foundation for further engagement to co-deliver on 2030 priorities.

A growing number of **private sector energy companies** are playing an increasingly important role, including through investing in power generation, competing actively for the benefit of energy consumers, implementing the biofuels obligation scheme, delivering on energy efficiency obligation schemes, developing innovative energy services and technologies and contributing broadly to energy policy, regulatory and market developments.

² A new category of high impact, cross cutting measures that the Government is determined to deliver that will have a real and immediate impact on enterprise and jobs.

The **commercial State energy companies** (Bord na Móna, EirGrid, Bord Gáis Éireann and ESB) have played a critical role in delivering secure, sustainable and competitive energy supplies through:

- delivering critical electricity and gas network investment programmes,
- adding significant fossil fuel and renewable generation capacity,
- developing co-firing of peat with biomass,
- complying with EU unbundling requirements,
- reducing dominance (in the case of ESB) by divesting generation capacity,
- enhancing competition by new market entry, and offering new services, choice and value to consumers, and
- investing in R&D and innovation.

The **State energy agencies** have also contributed strongly to collective delivery of energy policy priorities as follows:

- **CER** – providing a consistent, predictable and stable market and regulatory framework to underpin competition, market entry, and investments in support of energy competitiveness, security and sustainability, while also embracing new functions including ensuring consumer safety, protecting consumers (including vulnerable consumers) in competitive markets, and supporting innovations such as the roll out of smart metering.
- **SEAI** – playing a leading role in transforming Ireland into a society based on sustainable energy structures, technologies and practices through statistical and analytical expertise, and implementation of support services, educational programmes and grant schemes.
- **NORA** – enhancing oil security through a successful rebalancing of strategic oil stocks so that by 2013, over 70% of stocks are held as physical stocks on the island of Ireland with the remaining wholly-owned stocks held in neighbouring markets, as well as implementing the biofuels obligation scheme.

Whole of Government delivery remains crucial to developing and delivering energy policy objectives, particularly in the areas of transport, marine and built environments and social protection. The successful implementation of energy actions and objectives is also an increasingly important underpinning for other key national strategies such as the Climate Change Roadmap and the Action Plan for Jobs.

Collaboration with Northern Ireland on energy matters is now deeply embedded in Irish energy policy. Such co-operation contributes to competitiveness, security of supply and sustainability through a number of projects including market development, joint capacity and adequacy planning and co-operation on energy security and emergency planning. Industry collaboration and bodies such as the Single Electricity Market (SEM) Committee and the All-Island Market Joint Steering Group provide an important platform for further co-operation on 2030 priorities.

Underpinned by greater physical interconnection and further integration of regional and European markets, the **Ireland/UK relationship** is also deepening across increasingly wide-ranging projects, including the UK/Ireland Gas Emergency Planning Group, the integration of regional energy markets, collaborative approaches to off-shore renewable developments and other areas of common interest.

I. (iv) International Developments

Climate-change international commitments

Ireland, with the EU, is a party to the Kyoto Protocol which set binding targets to reduce greenhouse-gas emissions for the first commitment period 2008-2012. In Doha, an amendment to the Kyoto Protocol was adopted that set targets for a second commitment period which commits EU Member States to jointly achieve a 20% reduction in their combined greenhouse-gas emissions over the second period compared to the level in 1990 or their other chosen base years. This reduction commitment is consistent with the 2009 'climate and energy package' of legislation and mirrors the package's reduction measures at EU and Member State level. The Fifth Assessment Report by the United Nations' Intergovernmental Panel on Climate Change (IPCC) underscores the critical importance of the situation and has an important role to play in informing discussions at national, EU and International levels. The Report concluded that the effects of climate change "are already occurring on all continents and across the oceans but the world is ill-prepared for risks from a changing climate". Moreover, "nobody on this planet is going to be untouched by the impacts of climate change". Ireland remains engaged and committed, both domestically and internationally, to appropriately advance this work, including through participation at the United Nations Framework Convention on Climate Change (UNFCCC) where negotiations towards a new global deal on climate are underway and due to conclude in Paris in December 2015. Any such deal will need to reflect equitable effort sharing among all participants. It is expected to take the form of a protocol, another legal instrument, or 'an agreed outcome with legal force', and will be applicable to all parties.

Exploitation of Unconventional Energy Sources

The 2012 International Energy Agency's (IEA) World Energy Outlook highlighted a significant change in the global energy landscape due to increased deployment of hydraulic fracturing (fracking) and horizontal drilling. US unconventional oil and gas production is having a profound impact on international energy markets and prices and is likely to have significant implications for EU competitiveness, and geopolitics generally. In the EU, the possible exploitation of shale gas is controversial due to concerns about pollution and climate change. In Ireland, a research programme on the Environmental Impacts of Unconventional Gas Exploration and Extraction is underway under the auspices of the Environmental Protection Agency.

Notwithstanding these new oil and gas resources, oil prices have remained at a high level for the past two years, affecting the global economic recovery. The disparity in natural gas prices between regions has also affected relative economic competitiveness as US gas prices remain significantly below those in the EU and in Japan.

Nuclear Energy – Post Fukushima-Daiichi Nuclear Power Plant Disaster

Following the accident in Fukushima in March 2011, stress tests were carried out on existing EU nuclear power plants to ensure they could withstand severe natural disasters. Some states are continuing their nuclear programmes (for example, the UK's Hinkley Point C plans), while others are phasing out theirs. Ireland has maintained its stance that nuclear installations should meet the highest international standards with respect to safety and environmental protection, while respecting the rights of states to choose their own generation fuel mix.

International Energy Agency (IEA) Developments

The IEA continues to play an important role in Irish energy policy by contributing to a better understanding of global energy developments, international oil market dynamics and options to meet climate change targets. Two IEA in-depth reviews of Ireland's energy policy were published in 2007 and 2011. The following are the key recommendations from the most recent review:

- continue to encourage greater diversification and flexibility of gas supply,
- maintain funding support to develop and deploy new low-carbon technologies,
- further enhance the consultation, planning and consenting process for critical energy infrastructure projects,
- ensure that participation in regional energy markets brings benefits to Irish consumers and certainty for investors, and
- ensure that the powers of the energy regulator are enhanced as necessary.

In addition, the IEA carried out an Emergency Response Review in 2009, making further recommendations in relation to oil and gas security, back-up and emergency measures which are currently being implemented.

I.(v) Developments in the EU

The European Union's **Third Energy Package**, agreed in 2009, is a series of legislative measures aimed at the further opening up of the gas and electricity markets to complete the establishment of the EU's Internal Energy Market (IEM). The IEM's objectives are the achievement of better outcomes for EU citizens through contributing to economic growth, jobs, secure energy at affordable prices, and sustainability in energy use. The Third Package also provides for the unbundling of transmission and distribution assets.

The EU Commission's developing agenda on public interventions in the internal energy market

The European Commission has been active in the last year or so providing a framework for Member States as they develop and design policy interventions in their energy markets and highlighting how the implementation of the internal energy market in particular should shape such initiatives. The Commission published its *"Communication on delivering the internal electricity market and making the most of public intervention"* in November 2013. The guiding principle for the arguments articulated in the Communication and

accompanying Staff Working Papers (SWP) is that a properly designed market, with some limited public intervention, will provide sufficient price signals to encourage and remunerate investment in electricity markets throughout the European Union. It states that, while public interventions may be necessary in some cases, to support renewable electricity generation and provide sufficient generation adequacy, such interventions must be well-designed and coordinated and that they should not inhibit the completion of the internal energy market by introducing counterproductive distortions to it.

While the Communication is not legally binding, the Commission has made it clear that it will enforce the guidelines through rigorous implementation of Third Energy Package legislation and through the revised guidelines on environmental and energy state aid for 2014-2020. These revised guidelines will be developed in 2014. Potentially there are significant implications for national energy policy as the European Commission seeks to influence and align appropriate national public interventions in energy markets with a view to enhancing the integration of Member State energy markets. Such an approach may restrict Ireland's options in the design of policy initiatives and regulatory interventions in the energy area.

The EU Energy Roadmap 2020 makes provision for a non-binding EU energy efficiency goal of 20% energy savings by 2020. A review of each Member State's progress towards the European 20% objective will take place in 2014. The new **Energy Efficiency Directive** (2012/27/EU) translates elements of the European Efficiency Plan into binding measures on Member States.

In 2011, the EU Commission published an **Energy 2050 Roadmap** which sets out a number of different scenarios for developing a decarbonised energy sector over the coming decades. Under all of these scenarios, there will be a significant increase required in renewable energy deployment in Europe.

In 2007, the European Union agreed a **Renewable Energy Directive** with new climate and energy targets: 20% reduction in greenhouse gas emissions, 20% improvement in energy efficiency, and 20% of the EU's energy demand to be from renewable sources by 2020. The Directive established a common framework for the promotion of energy from renewable sources. It set mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy and for the share of energy from renewable sources in transport (a minimum of 10%).

The Commission's **Renewable Energy Communication** (2012) identifies areas where efforts should be stepped up to achieve 2020 renewable energy goals in a cost-efficient manner. These are the:

- completion of the Internal Energy Market and adoption of consistent schemes across the EU that encourage cost reductions and avoid over compensation,
- increased use of the co-operation mechanisms, and
- improved co-operation in the Mediterranean.

In January 2014, the European Commission published a Communication on the **policy framework for climate and energy in the period from 2020 to 2030**, which will guide discussion on energy and climate policy at EU level during 2014.

The EU Regulation on Guidelines for Trans-European **Energy Infrastructure** came into force in May 2013, and aims to ensure that major EU energy infrastructure of strategic importance to Europe, including networks and storage facilities, are in place by 2020. Projects of Common Interest (PCIs) designated under the Regulation can avail of more streamlined planning arrangements and other benefits and a number of projects with cross border impacts between Ireland and the UK were designated on the first PCI list, which applies for the next two years in the areas of electricity transmission, gas transmission, LNG and gas storage and electricity smart grids. These projects are of a scale capable of making a significant contribution to improving Ireland's security of energy supply, to facilitating the development of the renewable energy sector, and to enabling greater consumer participation in the energy market through smart grid technology. An Bord Pleanála has been designated Ireland's competent authority under the Regulation and will now have a significant role in the planning and permitting process for Ireland's PCIs. Other strands of the Regulation are being implemented variously by the EU Commission and ACER and in Ireland's case by the CER as Ireland's energy regulator. PCIs may be eligible for EU funding under the Connecting Europe Facility 2014-2020 (CEF) which was established under a separate Regulation, also in 2013. It aims to support the completion of major EU priority energy, transport and digital/communications infrastructure projects with some €5bn earmarked for energy. The Commission will later this year launch the first call for funding proposals for qualifying PCIs under the CEF.

In 2010, the EU adopted measures to safeguard **security of gas supply** (Regulation No 994/2010) to improve safeguards in relation to security of gas supply across the EU and to ensure that Member States are better prepared to respond to a major gas disruption. The Regulation was implemented in Ireland by EU (Security of Natural Gas Supply) Regulations 2013 (SI No. 336 of 2013).

In relation to **Energy Research, Technological Development and Innovation** the European Strategic Energy Technology Plan (SET-Plan) gives a strategic orientation for technology development and research in the energy field until 2020. It organises a structured dialogue between the relevant players, defines priority areas for technology development and focuses on industrial applications through large scale projects of European value. The recent Commission Communication on Energy Technologies and Innovation, launched at the SET-Plan Conference during the Irish Presidency in 2013, sets out how the high-level policy should be implemented and articulates various potential modalities for ensuring greater convergence between national and EU research support programmes. It has also shaped the recent call for proposals under the Horizon 2020 research programme, the successor to the Framework Programmes for Research.

I. (vi) Developments since 2007: economic context and energy prices

In recent years, Ireland has experienced dramatic economic change, representing an important backdrop for developments in energy policy. With the onset of the global financial crisis in 2008, the country was plunged into recession, ending a period of unprecedented economic growth. Government, working with international partners, has since enacted measures to put the Irish economy back on a sustainable growth path. The Economic and Social Research Institute (ESRI) predicts a strong recovery, with 3% growth in GDP expected in 2014, and 4% average annual growth expected in the following years, up to 2020.

Energy, as both a sector within the economy and a cross-cutting input into every aspect of the wider economy, is inextricably linked to the broader economic landscape, and has an integral role to play in enabling future growth. Government recognises that reliable, sustainable, affordable energy is vital to Ireland's economic success both at home and abroad, and has continued to make critical investments in energy research and infrastructure, despite challenging economic conditions. The EirGrid Grid25 initiative, announced in 2008, has earmarked €3.2 billion up to 2025 to upgrade Ireland's electricity transmission network, and substantial investments are being made to improve the Irish gas network. These critical efforts are helping to bring more energy to more parts of the country than ever before. Investment in renewable energy infrastructure has facilitated remarkable levels of clean-energy generation in Ireland, allowing the country to make impressive progress toward its sustainability targets and explore the potential for additional economic benefit.

Recent studies have shown the positive impact of energy efficiency on job creation and economic activity. Energy efficiency programmes, delivered by SEAI, are estimated to have supported 3000 jobs in 2013 and provide an important stimulus for the construction sector. Internationally, there is evidence to show that every €1 million invested in energy efficiency creates 19 jobs.³ Public finance of energy efficiency programmes is found to leverage significant amounts of private investment and deliver positive societal returns. Every €1 spent on the Better Energy programme by SEAI delivers a net benefit of €5 to society through energy, CO₂ and other pollutant savings.

Despite reduced energy consumption, Ireland still spends €6.5 billion on energy imports, taking large amounts of money from the domestic economy. Developing our indigenous renewable energy sources allows more energy and economic independence, reducing our exposure to international energy prices and cutting our energy import bill.

³ Janssen and Staniaszek (2012), How many jobs? A survey of the employment effects of investment in energy efficiency of buildings. A report for the Energy Efficiency Industrial Forum. http://www.euroace.org/PublicDocumentDownload.aspx?Command=Core_Download&EntryId=433.

Copenhagen Economics (2012) Multiple Benefits of investing in energy efficient renovation of buildings: Impact on Public Finances. A report for Euroace. <http://www.renovate-europe.eu/Multiple-Benefits-Study>.

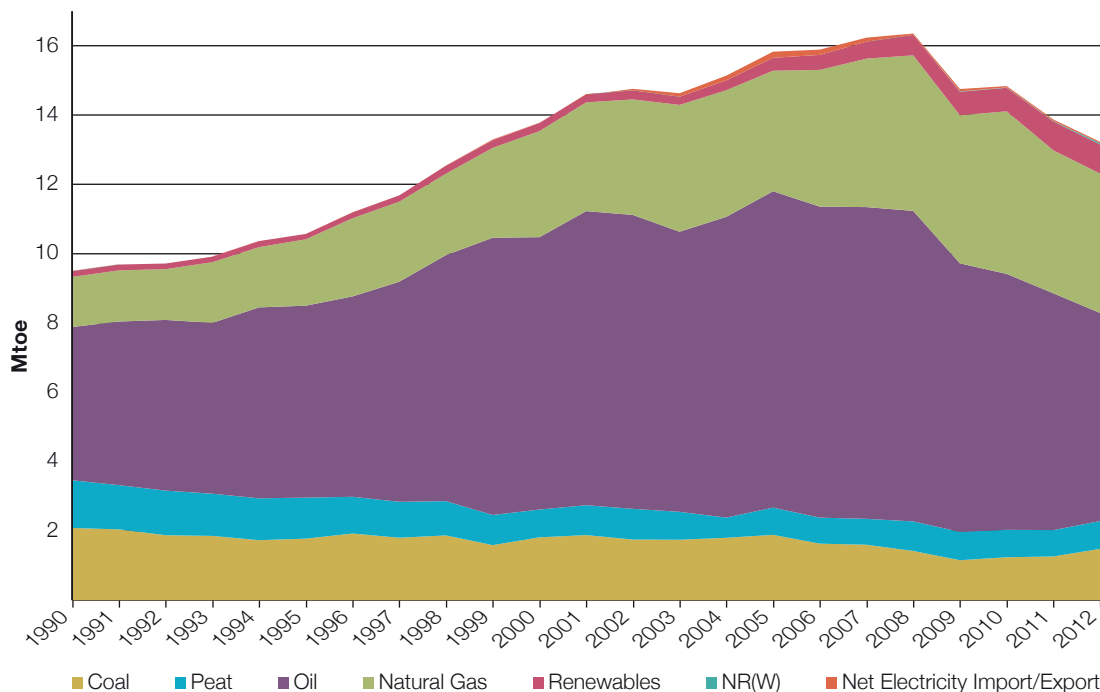
Another area with considerable economic potential is that of hydrocarbon exploration. To encourage investment in this regard, the State is:

- offering attractive and innovative licensing opportunities, such as the 2011 Atlantic Margin licensing round,
- providing a fit-for-purpose, transparent and robust regulatory regime,
- deepening knowledge of our offshore petroleum potential, in particular through data acquisition and supporting key research projects, and
- promoting actively the opportunity to invest in exploration in the Irish offshore, in particular to companies not currently active here.

I. (vi) (a) Energy use

Since 2007, overall primary energy use has decreased by 19% (see Figure 1), driven largely by the downturn in economic activity and by gains in energy efficiency. With the exception of coal and renewables, all energy sources have decreased, consistent with the overall scenario. Use of renewable energy has increased considerably in the same period, in 2012 it grew by 11% from 2011 to represent 7.1% of final energy use.⁴ Resulting from both decreased demand and successful energy policy, Ireland has moved from a position of requiring additional generation to be added, in the last decade, to enjoying a comfortable level of capacity available in coming years.

Figure 1: Primary energy use in Ireland by fuel, 1990-2012



Source: SEAI, Energy in Ireland 1990 – 2012, 2013 report

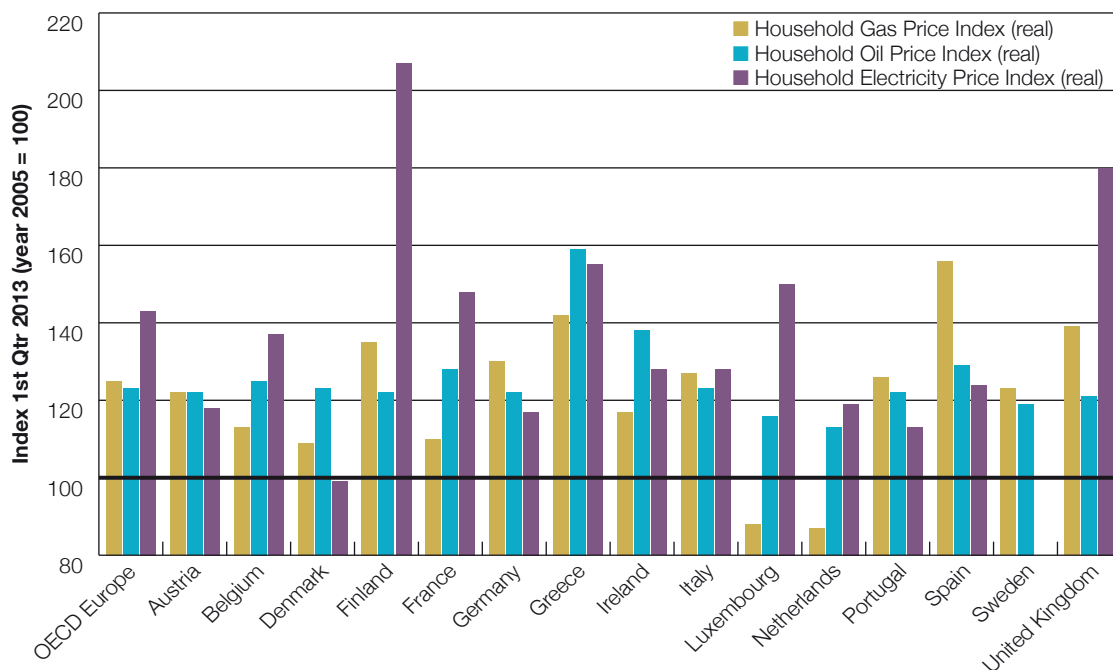
⁴ Sustainable Energy Authority Ireland, “Energy in Ireland Key Statistics 2013,” December 2013.

I. (vi) (b) Prices

The factors influencing Irish electricity and gas prices are identified in the text box in Priority 2 but among the main factors is that Ireland is a price-taker on international fossil fuel markets. Energy prices continue to be shaped by global trends, including the boom in US natural-gas production, a decline in nuclear energy following the meltdown at Japan's Fukushima Daiichi plant, and increasing demand in fast-growing countries like China, India and Brazil. In Ireland, being subject to global market prices has meant that, in times of economic growth, high Irish demand does not necessarily increase prices, and similarly a drop in economic activity does not yield lower energy prices. However, Government policy emphasis on energy efficiency and renewable energy development has meant that Irish consumers are at their least dependent on foreign fossil-fuel imports since 2000.

Ireland's status as an island nation, a geographically dispersed population and high dependence on imported fossil fuels generally result in Irish energy prices being higher than those for many of its European neighbours. In the period since 2007, the average price paid by residential and business consumers for energy throughout the OECD and the EU, including Ireland, has been on an upward trend, as illustrated in Figures 2 and 3.

Figure 2: Real energy price change to households since 2005 in EU-15 (index)

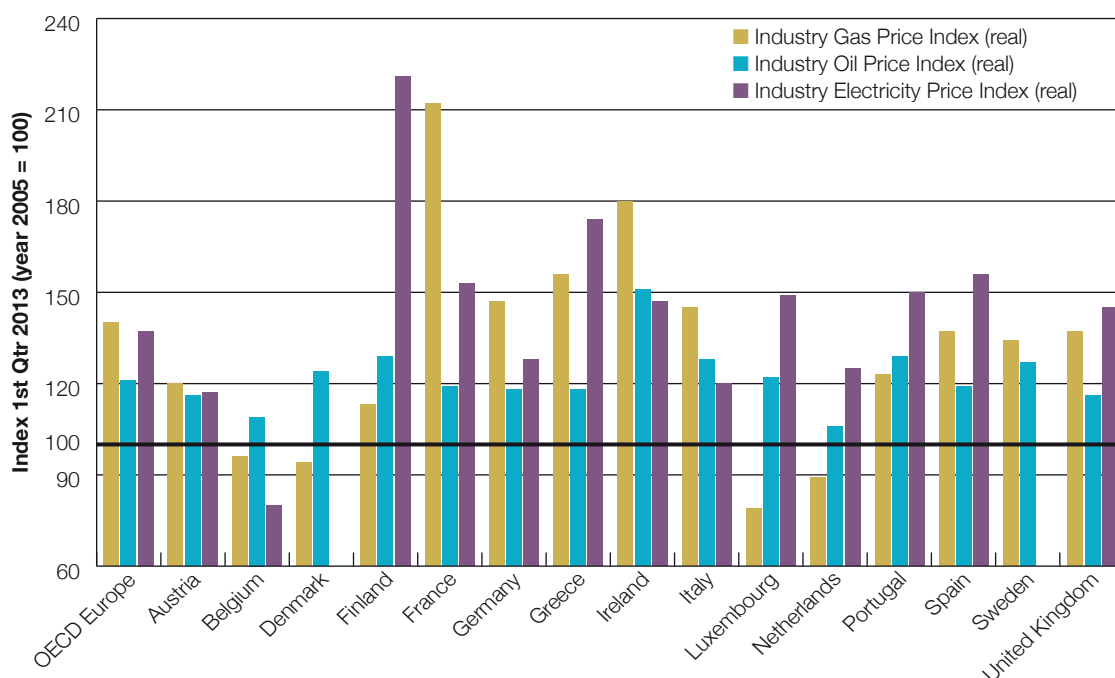


Source: SEAI, Energy in Ireland 1990 – 2012, 2013 report

Overall, real energy prices have increased for Irish households by 27% between 2007 and the first quarter of 2013, reflecting our high dependency on imports of oil and gas.

Global oil and gas prices rose in 2012, resulting in Irish household energy prices rising by 9.1% between 2011 and 2012. Within the Euro Area, Irish household electricity prices have remained below the average since the second half of 2009. Irish household gas prices were consistently below the Euro Area average from the first half of 2008 until the second half of 2011. Since then, Irish household gas prices have increased at a faster rate than the Euro Area average.

Figure 3: Real energy price change to industry since 2005 in EU-15 (index)



Source: SEAI (2013), Energy in Ireland, Figure 41 (based on IEA energy prices and taxes)

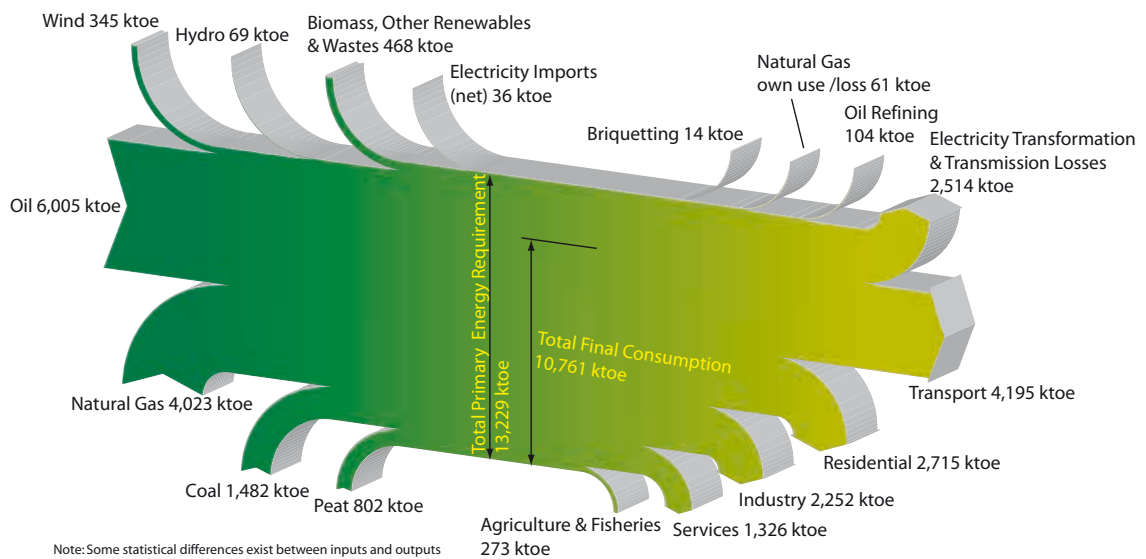
Real energy prices for Irish businesses have risen by 31% since 2007, again reflecting Irish dependence on oil and gas, which were the main drivers of global energy prices over the period. Industry electricity prices showed the biggest increase at 80%, compared with gas and oil prices. Competitiveness in terms of electricity prices for Irish businesses improved from the second half of 2008 until the second half of 2011, however, electricity prices increased in Ireland at a higher rate than the EU and Euro Area since the second half of 2011. Since 2007, Irish gas prices for businesses were below the EU and Euro Area average for most of the period, with the exception of the first half of 2009 when they were above the EU average. There has been upward pressure on gas prices to industry since the second half of 2011 compared with EU and Euro Area. Ireland has one of the highest dependencies of fuel mix for electricity generation on fossil fuels in Europe, at 72%.

As with residential users, consumers of less energy pay a relatively higher price than their European counterparts. In keeping with residential prices, as demonstrated in Figure 3, the EU average price for business consumers is on an upward trend. These prices are weighted to take account of different price bands reflecting levels of use.

I. (vi) (c) Energy mix 2012

Energy is used in the economy in electricity, heating and transport, and in approximately equal proportions in each of the three sectors.⁵ Figure 4 illustrates Ireland's total primary energy requirement and total final consumption in 2012. It shows that the economy remains largely reliant on imported oil and gas for its energy, with peat, coal and renewables contributing to a lesser extent.

Figure 4: Ireland's total primary energy requirement and total final consumption, 2012



Source: SEAI (2013), 'Energy in Ireland 1990-2012', Figure 5.

I. (vi) (d) Summary of current economic context

As noted above, Ireland has undergone significant economic transformation since the 2007 White Paper. Following an unsustainable boom, the economy suffered an almost unprecedented collapse. Since then, signs of recovery have emerged but much still depends on the performance of our trading partners. As a price-taker on international markets, Ireland is vulnerable to movements of fossil-fuel prices. While energy markets have been liberalised to bring competitive pressures on prices, they have historically been high, relative to our EU trading partners, due to an absence of indigenous alternatives, geographic isolation and low population densities. Improvements in energy efficiency and an increase in the renewable energy share of the energy supply are helping Ireland to become relatively less dependent on international fossil-fuel prices.

⁵ Source: SEAI Energy in Ireland 1990-2012, 2013 report.

II. Green Paper Energy Policy Priorities

Six Energy Policy Priorities for Discussion

As discussed in previous sections, energy is integrated into all sectors and areas of modern life, therefore, many different themes and issues are relevant in a conversation about Ireland's future energy path. To help structure the discussion, the Department of Communications, Energy and Natural Resources has identified six policy priority areas for consideration in the Green Paper:

Priority 1: Empowering Energy Citizens

Priority 2: Markets and Regulation

Priority 3: Planning and Implementing Essential Energy Infrastructure

Priority 4: Ensuring a Balanced and Secure Energy Mix

Priority 5: Putting the Energy System on a Sustainable Pathway

Priority 6: Driving Economic Opportunity

The Department recognises that certain subjects are common to several policy priorities. It selected these six policy priority areas simply as a way to organise the discussion. In particular, Priority 5 and 6, on sustainability and economic opportunity, are examples of cross-cutting themes that are integral to all energy policy priority areas. At the end of each policy priority section, a series of open-ended questions is set out for the purpose of stimulating discussion on key issues to be taken into account in the development of future energy policy. Readers are encouraged to give feedback to the Department in response to these questions or to suggest additional inputs.

Priority 1: Empowering Energy Citizens

The scale of the energy transformation that will happen in the coming decades will be unprecedented. The involvement of Irish citizens in choosing the appropriate pathway for energy policy is essential in enabling Ireland to realise its potential to be a low-carbon, inclusive, competitive and secure energy society. To ensure that the citizen remains at the centre of energy policy, energy users must be informed and proactive contributors to the ongoing evolution of the Irish energy market. Challenges and difficult choices lie ahead, so it is important to engage citizens in seeking and implementing solutions. Priority 1 aims to start a discussion on the role that Irish citizens can play, as we collectively transform the Irish energy system, and on what is needed from Government to enable and encourage people to join in this process.

1.1 Contextual Background

As the European Union aims to decarbonise the energy system by 2050, fundamental and profound decisions about how we generate, transport and use energy will have to be addressed by energy consumers and policymakers alike. There are two complementary paths to decarbonising the existing energy system: optimising energy use through efficiency and conservation, and deploying lower-carbon energy sources. Energy citizens can embrace both, to their benefit. Saving energy at home or at work is simple and can be achieved often at a relatively minor cost. Likewise, mechanisms are in place to stimulate the installation of renewable energy technologies to help offset fossil-fuel use.

The energy environment has changed dramatically for consumers over the past two decades. Liberalised energy markets have provided Irish consumers with more choice than ever before, better information is now available to consumers in a variety of formats, and innovative technologies have tremendous potential to further empower Irish energy users. Although the future direction of energy prices will always remain uncertain, greater variety allows consumers to switch between retailers, ensuring that they enjoy the most competitive tariff, and transitioning energy users from a role of passive consumer to active, engaged energy citizens. At the same time, the evolution of energy markets has made the role of the energy citizen more complex, making it difficult to access all of the ways in which consumers can manage energy costs and shape energy policy.

A functioning energy market requires a safe and reliable grid infrastructure. Since the 1990s, the national grid has been greatly expanded and reinforced in order to meet Ireland's growing population and increased economic activity. As new technologies and power sources continue to emerge, the ongoing renewal of Ireland's energy infrastructure will need to continue. The planning regime provides a rigorous and robust platform for developing essential energy infrastructure. It is imperative that public authorities work in partnership with industry and community stakeholders to ensure that the planning system can take objective decisions on energy infrastructure for the benefit of society as a whole. In 2012, the Government issued a policy statement on

the strategic importance of transmission and energy infrastructure.⁶ The statement reaffirmed the imperative need for development and renewal of our energy networks in order to meet economic and social goals.

1.2 Protecting Vulnerable Energy Citizens

Inability to afford adequate home heating or lighting is detrimental to health and wellbeing. The Government has recognised the challenge faced by those experiencing energy poverty through the Affordable Energy Strategy,⁷ which aims to make energy more affordable for low-income households in Ireland. The underlying factors that influence energy affordability are energy prices, thermal efficiency and incomes. While income supports, such as the National Fuel Scheme and Household Benefits, play an important role in reducing the financial burden of energy bills, they represent an expensive way of mitigating energy poverty. In contrast, improving the thermal efficiency of homes remains the most cost-effective means of increasing energy affordability and reducing energy poverty. By the end of 2013, more than 105,000 low-income households across the country had received free energy efficiency upgrades through programmes administered by the Sustainable Energy Authority of Ireland (SEAI), saving money for vulnerable families and improving the lives of hundreds of thousands of energy citizens.

1.3 Saving Energy at Home

With residential energy representing more than a quarter of final energy use, citizens collectively are big users of energy. While new buildings are becoming more efficient thanks to tighter specifications on energy performance in recent building codes,⁸ these represent only a relatively small percentage of buildings in Ireland. Further major improvement of the energy performance of the existing building stock will be needed in the future.

Citizens can have a strong impact on the energy market by taking steps to reduce their energy demand and costs in their homes. Commonly available energy-efficient products and technologies allow households to cut energy waste without sacrificing convenience. Indeed, energy efficiency has long been recognised as the most effective way to control costs, and it is internationally recognised as the most cost-effective approach to reducing greenhouse-gas and other air emissions from the energy sector. When implemented at a national level, simple steps such as installing attic insulation or high-efficiency lighting can have profound implications for overall energy use and carbon pollution. For example, if every household in Ireland installed high-efficiency light bulbs, residential electricity consumption would drop by 7%, saving 600 GWh, or over €41 million per year. Ireland's reaching of the EU target of a 20% reduction in energy use by 2020 will deliver collective societal savings valued at €2.36 billion.⁹

⁶ Department of Communications, Energy and Natural Resources (2012), 'Government Policy Statement on the Strategic Importance of Transmission and Other Infrastructure'.

⁷ Warmer Homes: A Strategy for Affordable Energy in Ireland. <http://bit.ly/R6ZY9w>

⁸ Building Regulations 2011, Part L: Conservation of Fuel and Energy – dwellings: <http://www.environ.ie/en/Publications/DevelopmentandHousing/BuildingStandards/FileDownload,27316,en.pdf>.

⁹ The National Energy Efficiency Action Plan.

Given the upfront capital necessary to stimulate such savings, Government has made grants available for the installation of home energy efficiency measures through the Better Energy programme to help ease the initial cost to consumers. The Better Energy Homes scheme, administered by the SEAI, has grant-aided the upgrade of more than 150,000 homes, on top of the 105,000 vulnerable homes mentioned above. Total investment stimulated by these programmes comes to more than €600 million, generating lifetime energy cost savings of more than €1.2 billion. As the energy upgrade market grows, homeowners will need access to affordable private financing in order to realise further savings. Several schemes are under consideration to encourage greater lending by private financial institutions for energy efficiency projects.

Through the Better Energy Communities scheme, citizens can collectively apply for funding for their community to upgrade buildings in their neighbourhood. In 2013, SEAI awarded €15 million through the Better Energy Communities scheme to 84 community energy projects countrywide, which involved the upgrade of 3,540 homes and 291 community, public and private facilities.

1.4 Decarbonising Energy in the Home

Renewable energy also plays an important role in empowering citizens. The building regulations require all new homes to integrate renewable energy technologies. When combined with high thermal performance, these measures reduce energy demand, which in turn would reduce the amount of new generation that would need to be built, resulting in lower costs to consumers.

Micro-generation incentives, such as feed-in tariffs or grants that enable individually hosted solar arrays, wind turbines, and other technologies are policy instruments that could allow homeowners to become increasingly energy self-sufficient. This could also facilitate a gradual transition to a decentralised grid; the cost implications relating to how such incentives would be paid for and by whom require detailed consideration. Greater electrification of home heating could also lower heating-related emissions particularly from solid fuel use. While these measures would ultimately reduce Ireland's demand for imported oil and gas, their large-scale adoption could require additional investment in the electrical grid. Such incentives would also need to be supported by accessible financing options to mitigate up-front capital costs.

1.5 Innovative Relationships between Energy Suppliers and Consumers

As society and markets experience a broad shift towards technological innovation, citizens will see a corresponding trend across the energy sector. The impending arrival of internet-enabled and -connected energy products and services will result in both opportunities and challenges for policymakers, regulators and consumers.

Obligations on energy suppliers to meet specified energy savings targets will drive innovation in the services offered by suppliers and their role in supporting energy efficiency. Energy suppliers will be actively looking for citizen partners to engage in reducing energy demand. Under the National Smart Metering Programme, smart

meters will be installed in homes nationwide, beginning in 2015/16, allowing energy users to monitor their consumption in real time. The smart meters should have user-friendly interfaces that allow citizens to easily interpret their energy use and facilitate change in behaviour to reduce energy consumption. It is anticipated that the smart-meter rollout will be accompanied by time-of-use (TOU) tariffs, which will offer lower electricity pricing during off-peak hours in order to incentivise consumers to switch usage from high-demand periods. Given that TOU would certainly affect peak prices, a possible concern is that this pricing structure could present challenges for those who may not be in a position to adjust their energy consumption without assistance, possibly those with medical needs, vulnerable customers, or those who find it difficult to manage electronically their energy consumption, for whatever reason. Government, regulators and industry will need to implement smart energy-saving measures in a manner that achieves the desired savings while maintaining a favourable environment for consumers, including specifically addressing the capabilities of all categories of consumers to adjust their behaviour to take account of TOU pricing. Indeed, when combined with better access to energy data, digitisation also creates economic opportunities for intermediaries to collect, analyse and present energy-use information in easily understood ways that allow the consumer to take greater control over their consumption and costs.

Beyond its immediate benefit to energy users, smart metering will facilitate the types of innovative digital technologies that are set to underpin the future of the energy sector. Smart metering also supports efficient use of wind generation, increased demand participation and efficient use of networks. There may be scope to encourage similar innovations in the adoption of renewable energy and energy efficiency measures in households. As cleaner sources of energy and more efficient products and services become available, the regulatory environment should remain flexible and responsive in order to accommodate new technologies. Creating the right regulatory conditions for the widespread adoption of emerging energy technologies could reduce further Ireland's import of fossil fuels, and optimise grid performance.

1.6 Realising the Benefits of Competition

Given that many of the drivers underlying Irish fuel prices are not controllable, creating a competitive framework in the electricity and gas markets is a key focus of Government and regulatory action on costs. Competition ensures that consumers have choices about products, prices and suppliers, and can easily switch to the best option for their circumstances. Since the 2007 Energy Policy Framework, competition in Irish retail electricity and gas markets has grown. In 2013, there were seven active suppliers in the electricity retail market, in both the business and domestic segments. Recently, new entrants and innovations in the market have included firms offering the supply of electricity via pre-payment meters and the launch of a campaign to secure group discounted electricity and gas prices. There are eight active suppliers in the retail gas market, five of which operate in the domestic gas market.

In order to fully realise the benefits of competitive energy markets, consumers must also be able to easily access comprehensive energy usage and price information so that they can switch suppliers according to their needs and options. To aid customers in

confidently comparing products and services, the CER has established an accreditation framework for price comparison website services, under which two price comparison websites have been accredited.

Supplier switching offers an important metric of competition and consumer engagement in the retail markets, and Ireland's switching rates rank highly in a global context. Since 2010 there have been more than 1.3 million electricity switches, representing nearly 60% of the Irish market, and over 343,000 gas switches. Switching continues to take place in both the electricity and gas markets. While both markets saw a reduction in switching between 2011 and 2012, switching levels in 2013 increased over 2012 levels: the switching level for gas (17.8%) surpassed the peak of 2010, while the level for electricity was above 11% in 2013. With increased supplier competition and initially high levels of switching, switching may be worthy of further research and analysis.¹⁰

1.7 The Educated and Informed Citizen

Irish people are more aware of energy than ever before, in terms of the costs to them and their families, the wider debates of where our energy comes from, its environmental impacts, and the infrastructure required to deliver it. Over the past decade, SEAI has developed information services on energy efficiency and clean energy options, making it a focal point for citizens seeking information on energy matters, with more than a million hits a year on the website. It also informs debates through its statistical and modelling outputs, and through conferences and events such as the Energy Show.

Empowering all energy consumers to make informed decisions about how they use energy is an important part of national policy. This extends from everyday decisions about energy use to major decisions such as buying a car or a home that will have a strong impact in energy use over many years. Building Energy Rating (BER) certificates are now required for all homes offered for sale or rent; these allow potential purchasers or renters to factor future energy costs and comfort into their choices. Over 45,000 Irish homes already have BERs, meaning that our knowledge of energy use in homes is growing rapidly. Evidence has already emerged of a premium in price of sale or rent for homes with better energy ratings.

Education in schools is a vital part of building national awareness of energy issues and informing the next generation of decision-makers, societal leaders and energy consumers. SEAI's energy education programmes have directly engaged more than 250,000 school pupils in the past ten years. Education and information will remain a central part of building our new energy systems of the future. Public consultation is also growing in its centrality in the development of energy policy and specific programmes and initiatives.

Given its importance for climate and clean air policies, energy is also one of the core themes of the Green Schools Programme which runs in over 90% of schools in Ireland. The Green Schools Programme is run by An Taisce and is funded by various Government Departments, local authorities and private companies. The programme aims to instil a strong sense of environmental awareness and responsibility in students.

¹⁰ Hyland, M., R. Lyons, and S. Lyons (2014), *The value of domestic building energy efficiency – evidence from Ireland*, ESRI Research Bulletin, Dublin: <https://www.esri.ie/UserFiles/publications/RB20140103/RB20140103.pdf>.

Priority 1 – Empowering Energy Citizens: *Questions and Policy Options*

1. How can we encourage citizens to be part of our transition to future energy paths and the policymaking process that goes with it? Given the scale of changes needed, what are the right mechanisms to engage citizens (e.g. would 'energy citizen' impact assessments for energy policy decisions or transition from written consultations to interactive workshops with interested stakeholders be more effective)?
2. What formal and informal mechanisms could be used to enhance citizen engagement with regulatory and policy decisions and how should they be structured? (e.g. should there be greater use of consumer panels?)
3. How can we increase the rate of home retrofit radically? What can Government do to encourage citizens to undertake ambitious home upgrades in large numbers? Are there particular barriers that need to be overcome, such as lack of finance, information, and skilled professionals?
4. How can we raise awareness of the scale of the energy challenges facing us and the ways that citizens can be part of collective solutions? What can we do to improve citizens' access to energy information?
5. How have other countries effectively engaged citizens in infrastructural development, and which innovative or interesting approaches could be helpful in Ireland?
6. Is there further scope for switching in the Irish retail electricity and gas markets to enable customers to avail of alternative price and product opportunities, or do the numbers indicate that Irish switching has plateaued? If there is indeed further scope for switching for consumer benefit, are there barriers that need to be overcome, such as availability of information or consumer difficulties with the switching process?
7. Is micro-generation the most cost-efficient solution to decarbonising home energy, and who should bear the costs of any associated support scheme – consumers, taxpayers or industry?
8. What is needed to ensure that smart meters enable greater consumer empowerment in the Irish energy market? Are there steps that should be taken to allow smart meters to play the fullest role in enabling greater consumer empowerment in the Irish energy market, in particular in relation to behavioural change, aside from CER's ongoing preparations for the national smart meter rollout programme, and its associated regulatory decisions?

Priority 2: Markets, Regulation and Prices

A stable regulatory framework will help to deliver competitive, secure and sustainable energy outcomes for Irish electricity and gas consumers, enabling Ireland to realise the full benefits from achieving the EU's energy policy objectives of greater energy market integration and better regulation and to facilitate investment in the Irish energy sector.

2.1 Contextual Background

The regulatory framework is critical to achieving competitive, secure and sustainable energy outcomes. The establishment of regulators, with varying degrees of independence, is now a common feature of energy policy in the EU and across OECD countries. Ireland has had an independent energy regulator in place since 1999. Market opening has allowed new actors to enter energy markets, ensuring greater competition and more choice for consumers. Largely driven by EU policy, the legislative and regulatory environment has expanded in recent years to include additional energy policy areas, such as enhancing security of supply, facilitating the integration of renewable energy and encouraging energy efficiency.

Like most EU Member States, Ireland's regulatory framework for energy contributes in two main ways to energy policy: regulation facilitates the achievement of national energy policy goals, and it provides stable, transparent, evidence-based regulation, thereby increasing choice, enhancing quality, ensuring continued investment and ensuring network costs that are as low as possible, commensurate with Ireland's energy circumstances and investment needs. Over the last decade, the EU has become increasingly involved in shaping both the scope and nature of the regulatory framework in energy, and in particular, determining appropriate roles, powers and functions for regulators.

Commissioner for Energy Regulation – Independent Energy Price Regulation in Ireland

The Commission for Energy Regulation (CER), which regulates Ireland's gas and electricity markets, is an independent statutory body established under the Electricity Regulation Act, 1999, as amended which provides that it is independent in its decision-making. Member States are obliged under EU law to guarantee the independence of their energy regulators. CER is funded by means of a levy on the energy industry and is accountable to an Oireachtas Committee for the performance of its functions. The Minister appoints the Chair and Commissioners to the CER and may issue policy directions to ensure the proper and effective regulation of the electricity markets. In carrying out its functions, the CER is required to protect the interests of final customers of electricity or gas.

Prices regulation

CER had responsibility for regulating the retail prices charged by the ESB and BGÉ only. The regulation of ESB's retail electricity prices for households and small to medium-size business ended in 2011; prices for large users had previously been deregulated. During electricity price regulation, CER did not always allow the increases sought and on occasion reduced prices (e.g. in January and May 2009). As regards gas, CER continues to regulate BGÉ's retail prices for households; (its regulation of these prices may end this year); BGÉ's tariffs for all business consumers have been either deregulated or were never regulated.

CER continues to regulate the network component that feeds into the electricity and gas retail prices. Every five years it undertakes a review in order to put in place a revenue controls setting the transmission and distribution revenue that can be collected from consumers. This revenue is set at a level that would allow an efficient business to finance its activities; it is determined by a combination of benchmarking against organisations in other countries and examining the specific underlying costs of the Transmission System Operator (TSO) and Transmission Asset Owner (TAO). CER rigorously scrutinises past performance and future costings in this exercise.

In the most recent electricity network cost review, for the period 2010 to 2015, CER required a €146.4 million or 11.9% reduction in operational spend for the forthcoming five years relative to that requested by ESB Networks. On top of reductions sought in both current and capital spend, CER also required ESB Networks to deliver additional efficiency savings in operating and capital expenditure. Its regulation of network expenditure has not automatically allowed all costs sought by the electricity and gas network operators to be funded through their full imposition on the consumer.

The policy framework for energy regulation in Ireland, as expressed in the relevant statutory provisions, clearly provides for CER's independence of the Minister and Government in its regulatory decisions and for its accountability otherwise, to the Oireachtas. CER's practical implementation of regulatory decision-making and determinations on regulatory issues within its remit clearly demonstrates both its independence and protection of consumer interest.

2.2 Energy Prices: Secure, Sustainable, Affordable

Energy Prices in Ireland

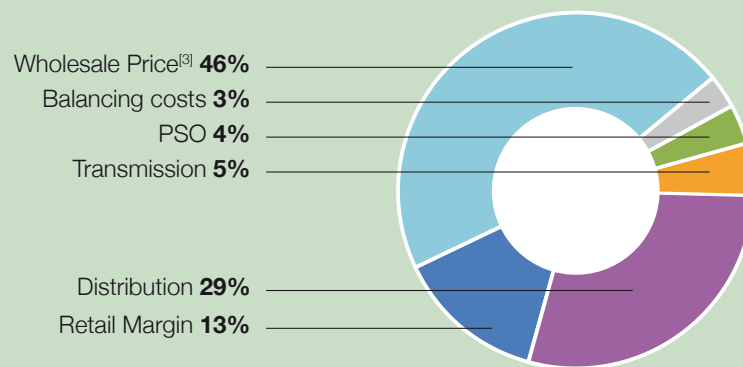
Energy prices in Ireland are influenced by several factors, including:

- High dependence on imported gas, for heating and electricity,
- absence of conventional energy sources,
- widely dispersed population resulting in higher network charges ^[1],
- international cost of capital,
- requirement to pay for investment in existing energy infrastructure and for significant additional investment, and
- geographical isolation of Ireland's island market.

As fossil fuel prices are subject to global market forces, and are not under Irish control, Ireland is effectively a price taker for internationally sourced imported fossil fuels and also vulnerable to exchange rate movements. Because of the extent of our dependence on gas in power generation, the international gas price trends outside our control inevitably impact on Irish electricity prices. Energy policy choices to move towards renewables for sustainability and security reasons also influence costs and prices and increasing use of wind for power generation would be expected to have a depressing impact on the system marginal price in the wholesale electricity market. Energy market integration has the potential to reduce the impact of our isolation. Price regulation in energy markets has been virtually ended, in line with the requirements of the various EU energy packages, so that competitive forces will place downward pressure on prices, in line. However, effective competition also necessitates proactive consumer behaviour in comparing prices and availing of cheaper deals on offer from suppliers in electricity and gas markets.

The constituent parts of electricity prices are listed below^[2]:

Figure 5: Domestic Electricity Price, Relative Share of Component, 2011 (Band DC)



^[1] 'Ireland has 82 metres of distribution per customer on average (Commission for Energy Regulation 2010). For Great Britain the network with the longest per capita distribution is Northern Scotland at 63 metres per customer. Elaboration of data in Ofgem (2012) shows that the British average was 27 metres per customer' ESRI Irish and British electricity prices: what recent history implies for future prices, 2014.

^[2] Source: Data for 2011 taken from Irish and British electricity prices: what recent history implies for future prices, ESRI 2014.

^[3] Wholesale price comprise approximately 80% fuel cost and 20% capacity payment (Capacity payments are payments to generators which contribute towards their fixed costs, if they are available to generate).

The cost of energy is an important factor for businesses and households alike, with significant implications for budgets and balance sheets but Irish energy prices in Ireland are influenced by several factors set out in the box above on energy prices in Ireland. As noted earlier, Ireland is effectively a price-taker for internationally sourced imported fossil fuels and energy policy choices to move towards renewables and improve energy efficiency for sustainability and security reasons also influence costs and prices.

Government policy has been to create the conditions for competition in both electricity and gas, wholesale and retail, by means of market opening and regulatory action, so that consumers can avail of its benefits. Competition has been a success; more players have entered the market, offering competing products, services and prices. Retail price deregulation has been implemented in Ireland's electricity market and largely

implemented for the gas market, in line with EU requirements. Competition in generation and supply has benefited business and domestic consumers, who can now easily avail of competing products, services and price offers, if they wish to. Regulatory scrutiny of the network cost component in the reviews of five-year investment periods has been rigorous. Governmental and regulatory action has been directed at areas within the limited scope for action, but, given the energy realities outlined above and the implementation of deregulation, the Government has limited remaining scope to influence energy prices.

Despite the constraints concerning energy prices, the Government is committed to exploring all appropriate options available to keep costs competitive, moderate any price growth to the greatest extent possible, and underpin a regulatory framework that robustly scrutinises network costs and promotes competition. The Government seeks to address the question of costs specifically by encouraging the use of energy efficiency measures, which help keep costs down.

2.3 Market Integration and Regional Initiatives

One of the key objectives of EU energy policy is the establishment of the Internal Energy Market (IEM). The objectives of the EU IEM are the achievement of better outcomes for EU citizens through contributing to economic growth, jobs, secure energy at affordable prices, and sustainability in energy use. The IEM offers benefits to Member States through potentially lower wholesale prices than would otherwise be the case, and enhanced security of supply. Implemented in the most suitable way for Irish conditions and, in certain circumstances, the IEM has the potential to do so for Ireland. The ESRI highlighted in a 2011 report the benefits of intensifying competition in Ireland, as suppliers from Great Britain and beyond could enter the Irish market, spurring efficiency and increasing consumer choice. The ESRI also stated that security of supply would increase through access to a greater diversity of fuels and that there would be less need for maintaining expensive reserve capacity to insure against supply interruption. The EU internal energy market objective is embraced by Ireland as a key European goal, with a view towards implementing it in a manner that ensures optimal benefits relative to costs for Ireland, including those relating to once off implementation.

In order to secure the free flow of electricity and gas across borders in line with the IEM, Member States must harmonise certain arrangements governing the cross-border operation of their electricity and gas systems. This requires the adoption and implementation of common codes or business rules enabling cross-border trade in both electricity and gas, greater use of existing cross-border interconnectors, construction of many additional cross-border interconnectors, and greater co-operation between Member States in a range of different regional configurations. Realising integration at least cost and maximum benefit to the Irish consumer poses complex challenges in the Irish electricity and gas systems. The CER is involved in various individual projects to further Ireland's compliance with the IEM, both on an all-island and individual Member State basis.

The design and implementation of the new Europe-wide electricity and gas codes and Ireland's participation in various regional initiatives is a current area of focus for Government, regulators, network operators and the energy industry. The negotiation

and implementation of these new codes in particular is a huge practical challenge for all concerned.

The implications of gas and electricity market integration requirements, including the impact of the new codes, in the Irish context are necessarily different from one another, partly because the rate of progress in all-island co-operation has been different in each, and because of the varying influence of EU codes. Since the last White Paper, wholesale electricity market arrangements in Ireland and Northern Ireland have been transformed with the establishment of the SEM, which operates and is regulated on all-island basis. The SEM project is now undergoing a redesign, scheduled for completion around end 2016, to ensure compliance with the new European electricity codes, as they are being developed to enable the practical realisation of the EU IEM, and to facilitate deeper market integration of the SEM with the IEM. New legislation may be required to implement the redesigned market arrangements for the SEM.

European gas codes have been developed, also for the purpose of enabling the practical realisation of the EU IEM, and are being implemented more quickly than the corresponding electricity codes. The manner of their implementation has the potential to deepen regional gas integration on the island and between the islands of Ireland and Great Britain. In 2008, the Irish and Northern Irish governments began efforts to create Common Arrangements for Gas (CAG), allowing gas to be traded, transported and developed in an all-island market, but the CAG project is strongly interlinked with ongoing EU gas code negotiations and their implementation on these islands.

Aside from the current initiatives on this front relating to EU gas and electricity code implementation in Ireland, including the SEM project, there are broader, post-internal market implementation issues for Ireland: how market integration will develop further after 2016, how such a structure can best be shaped in the interests of Irish electricity and gas consumers, and what the appropriate governance arrangements should be.

In both the electricity and gas sectors, investment in infrastructure connecting Member States' systems will be a critical complement to the new EU trading rules and codes. The new codes are not enough in themselves to facilitate trading and to help realise the EU IEM if the necessary infrastructure is not available to transport electricity and gas. The Irish energy system must be equipped with the interconnection and physical capacity necessary for energy trading in both directions, as well as the regulatory framework to regulate this infrastructure to best effect for the Irish consumer, in order for Ireland to achieve the benefits of the EU's internal energy market. These benefits include greater security of supply and lower prices than they would otherwise be. Interconnection of itself is desirable on many fronts and, if of sufficient scale, will, in the right circumstances, allow Ireland to export surplus renewable energy to Great Britain and the rest of Europe.

2.4 The Role of the Regulator: Certainty, Stability, Flexibility

The regulatory framework, as well as delivering energy policy, must be stable, certain and predictable. New investors and existing participants alike require regulatory stability. Perceptions of regulatory uncertainty, or of irrational or ad hoc behaviour,

will deter investors and new players from entering a market, depriving the system of potential cost and efficiency gains. A stable, relatively certain regulatory environment will help to create a climate for investment and ensure that the cost of capital for new and existing investors is kept as low as possible, including for network investors. To demonstrate the potential impact of any perceptions of regulatory uncertainty, the CER has provided approximate estimates of the impact of changes in the weighted average cost of capital (or WACC) for the electricity and gas networks, assuming that such uncertainty increases the network cost of capital. Each 1% fall in the WACC for the electricity network is estimated to lead to a fall of about 1.9% in electricity retail prices, and slightly less (about 1.4%) for large energy users (LEUs). For gas, a 1% fall in WACC is estimated to lead to a fall in retail prices of about 2.9%. This is a larger fall than with electricity due to the networks being a larger component of gas retail prices, some of which is due to the gas interconnectors. These CER estimates are only broadly accurate if everything else in the electricity and gas price equation stays the same; e.g. if international fuel prices or other costs suddenly doubled, then a 1% fall in WACC would only result in electricity prices falling by about 1.5%.

An energy regulator must also be strong, independent and sufficiently resourced to deliver on its mandate and provide evidence-based, transparent regulatory decisions and comprehensive consultation processes. The EU's 2009 Third Energy Package obliges Member States to ensure that their energy regulators are fully independent and resourced. These strong requirements on regulators, in these areas of independence, resources and decision-making, are consistent with the current Irish system. The CER was established as an independent regulator in 1999 and continues to deliver a stable regulatory regime, in alignment with EU and national policy requirements.

Complexity of CER mandate

The CER's independent statutory functions and duties continue to evolve in a changing and challenging environment. Since the 2007 White Paper, the CER's functions and powers have been enhanced on many occasions in accordance with EU energy legislation. In addition, Irish legislation has assigned new regulatory functions to the CER that extend beyond a strict remit of energy market regulation, such as monitoring, and regulating, for security of supply, upstream gas and oil petroleum safety and water supply. CER also has responsibility for, the certification of highly efficient CHP, the administration of the Public Service Obligation (PSO) and the implementation of the smart-meters project. In addition, CER is charged with regulating safety for onshore oil and gas operations, the gas network, liquefied petroleum gas (LPG), and electricity and gas contractors in the home. The resulting legislative framework contains a complex set of objectives, which the CER must execute in a balanced, evidence-based and justifiable manner.

There have also been areas where the regulator has exited regulation and related activities, such as determining the electricity prices of the ESB (from which it withdrew in April 2011) and setting the gas prices charged by BGÉ to business consumers (which ended in October 2012). This has released resources, but to a certain extent redundant functions have been replaced by new EU obligations, such as monitoring the operation of the deregulated markets. CER has had to be flexible to accommodate the

growing demands listed above, adapt to new requirements and, to the extent possible, reallocate resources from areas it is no longer regulating.

Review of regulatory framework for energy

The 2007 White Paper called for a comprehensive review of the Irish energy regulatory framework to be undertaken after the completion of the Single Electricity Market (SEM), in order “to ensure the optimum regulatory environment to meet the energy challenges up to 2020 in relation to security of supply, sustainability and competitive markets”. As noted above, the SEM was successfully established in 2007 and has been operational for six years. Neither the Irish energy regulatory framework nor the CER has undergone a comprehensive review since the framework was put in place and CER was established in 1999, although the breadth and depth of its role and functions have expanded considerably. These developments have increased the complexity of the regulatory system and its underpinning legislative framework. However, the 2012 International Energy Agency review of Ireland’s energy policy included recommendations on the extent and efficacy of CER’s sanctions and on the relative rigidity of SEM regulation. More generally, the Government 2013 Policy Statement on Sectoral Economic Regulation has addressed the overall question of sectoral economic regulation in the economy as a whole, and particularly whether it could contribute more to recovery and competitiveness. It set out certain requirements of regulators and their associated Departments under the following headings: principles underpinning regulation; prioritisation of objectives; the need for mandate reviews; greater efficiencies; cost reductions; effectiveness; performance; accountability and appeals mechanisms; compliance and enforcement; a regulatory forum; and monitoring and review. The previous 2009 Government Statement made similar recommendations. The new statement highlights the importance of reviews of the roles and mandates of regulators every seven years. Prior to the 2013 statement, stakeholders had already referred to the fact that the 2009 requirement for such a review every five years had not been implemented in the case of CER.

The Action Plan for Jobs commits to the inclusion of a regulatory mandate review as part of the Green Paper process.¹¹ The Government 2013 Policy Statement on Sectoral Economic Regulation also specified that the energy policy White Paper being developed during 2014 should include a regulatory mandate review of CER. However, given limited regulatory and departmental resources and EU mandatory compliance requirements, it is arguable that such a review may distract the regulator, and Government and market participants, from the huge challenges involved in negotiating and implementing the IEM including the SEM project and its associated codes. Any delay in achieving full compliance could expose Ireland to the risk of infringement proceedings from 2014 onwards.

The optimal approach to a CER mandate review needs to be considered in the overall context outlined above. The Green Paper affords an ideal opportunity to consult on the review and on issues such as content, approach and scope. One approach might be to conduct a more limited review, perhaps focusing on consumer engagement and empowerment and/or the extent of regulatory objectives, while market integration is

¹¹ Action 107: http://www.djei.ie/publications/2014APJ_Table_of_Actions.pdf.

being implemented up to 2016. A more detailed review would at that stage be more efficient and effective, given that it would address the more integrated market, and its different challenges, including regulatory governance, at that time. At present, the Department has begun a scoping exercise for the purpose of conducting an internal desk-based mandate review of CER, even if limited as above. It might assist better public understanding of the nature of energy regulation if this review were to describe the EU requirements on energy regulators as regards energy regulatory objectives and functions; for example, independence from Government and industry, the need for consumer engagement and protection, and the requirement to end retail price regulation. It could also consider existing cross-country comparisons of how those regulatory objectives are set out in the various legislative mandates for regulators. The views of industry and other stakeholders on the nature and timing of a CER mandate review are accordingly being sought as part of this Green Paper consultation.

CER's financial and human resources

Against the backdrop of increasing demands and expansion of its remit, CER must be sufficiently resourced to deliver on its existing and growing mandate. The CER is funded by a levy on industry, amounting in 2013 to €8.6 million in electricity, €5 million in gas and €2.9 million in petroleum safety. CER's overall spend is governed by its financial resources, while its staffing is directly controlled as part of the public service-wide Employment Control Framework (ECF), which strictly controls staff numbers in the public sector.

The electricity and gas sectors that CER regulates have a combined annual turnover of over €5 billion, with capital spending projections of up to €8 billion in the next five years. This equates to as much as 3-4% of Ireland's total GDP. CER has shown it can flexibly reallocate and adapt resources as its roles and objectives change, but it is an open question as to whether it is adequately resourced and positioned for regulatory stability and optimal energy regulation and decision-making when compared with other equivalent EU regulators, especially considering its additional functions and responsibilities over and above 'traditional' energy market regulation. Data from a study currently under way at the level of the Agency for the Co-operation of Energy Regulators (ACER) on regulator resourcing may shed further light on CER's comparative position, but any comparisons for the years up to and including 2007 would not be representative because of the considerable human resource input involved at regulator level for SEM implementation.

The CER is, of course, legally wholly independent in the performance of its functions and therefore none of its individual decisions nor its organisational performance is under consideration here. However, this Green Paper consultation process presents a useful opportunity for interested parties to consult on a number of associated themes and issues relating to the regulatory framework and how it contributes to energy policy goals and regulatory certainty.

2.5 Market Transformation and Industry Structure

In line with EU policy, the Irish electricity and gas markets, at wholesale and retail levels, have opened incrementally since 2000. Over the last decade many new players have entered the Irish energy market, in areas such as power generation and gas and electricity retail.

As regards the structure of ownership and operation of the Irish electricity transmission system, the European Commission certified the arrangements in place in Ireland under the relevant provisions of Directive 2009/72/EC of 13 July 2009, in its decision of 12th April 2013. The Government had decided in September 2011 that existing arrangements for transmission ownership and operation in Ireland would continue (e.g. with ESB as owner of the electricity transmission assets and EirGrid as the transmission system operator), and that Ireland would therefore apply for certification under Article 9 9. of the Directive. The application was submitted to the regulators and SEM Committee. It was approved by the Committee subject to the implementation of certain proposed improvements, and then submitted to the EU Commission. The improvements relate to the Infrastructure Agreement between ESB and EirGrid, ESB financing and additional ring-fencing of ESB Networks Ltd. within the ESB Group. It is noted in the Committee's decision that the implementation of the proposed improvements can be made by the CER within the existing legislative and regulatory framework. Accordingly, these are matters for CER to address and progress further.

Government policy on Ireland's transmission asset ownership regime has been settled for a number of years now, and EU certification was obtained. The Commission certification decision mentioned three areas which Ireland will now consider, as to whether changing or modifying the Irish arrangements would improve the position as regards effective transmission operation. The three areas relate to (a) EirGrid having certain rights to own new transmission lines if there is delay or default of the Infrastructure Agreement between ESB and EirGrid, (b) separating the ownership regime between EirGrid and ESB, and (c) ensuring that ESB's transmission roles are in a single, separate entity. A variety of financial, legal, economic and technical considerations need to be examined to assess whether and when these suggested changes could or should be implemented. The Commission's decision notes that there are financial factors at play in regard to the effective implementation of its changes and legislative change may be needed. The Green Paper process will facilitate consultation on these proposals for change, on the nature of the benefits and costs associated with them and how they might be achieved, particularly for the Irish electricity consumer. The views of all stakeholders are therefore being sought as part of this Green Paper consultation.

Turning to the structure of the Irish gas transmission system, in July 2013, BGÉ's application for the Independent Transmission Operator (ITO) model was certified by the CER, taking utmost account of the Commission's opinion, in accordance with the relevant provisions of Directive 2009/73/EC of 13 July 2009. This opinion was effectively favourable. While CER's decision referred to certain outstanding ITO-related requirements, both the opinion and CER's decision looked forward to a subsequent application for the Full Ownership Unbundling (FOU) model in respect of BGÉ's gas transmission system, on completion of the transaction selling BGÉ's energy business, currently under way. The Government decided in 2012 on that sale, and on retaining the gas networks and interconnectors in state ownership.

Priority 2 – Markets, Regulations and Prices: *Questions and Policy Options*

9. Given the success of Government policy on increasing competition to create downward pressure on prices, are the extent and effectiveness of competition and of competitive behaviour, in both the electricity and gas markets (wholesale and retail), sufficient, and are there any strengthening measures required, at regulatory and/or Government level?
10. Is the regulator strongly enough positioned and resourced – financially and in terms of human resources – to deliver its regulatory decision-making and advice roles as set in its legislation, and thereby to contribute to the achievement of energy policy outcomes and regulatory certainty and stability in the Irish market?
11. Is CER's legislative remit appropriate for the purpose of regulatory certainty and stability?
12. Aside from the market integration initiatives as set out above and currently being worked on (the SEM 2016 project and EU electricity and gas code development and implementation), what should be Ireland's long-term approach to, and strategy for, electricity and gas market integration for the period after 2016, and how can appropriate governance at regulator and Member State level be provided for in the post-2016 market? What further actions can be taken at Government or regulator level to ensure that Ireland benefits from the EU internal energy market in gas and electricity?
13. Given the length of time since the establishment of the regulatory framework for CER, and the extent of additions to the CER functions since then, how should a review of the regulatory framework and/or CER's mandate best be conducted? The Action Plan for Jobs commits to the inclusion of a regulatory mandate review as part of the Green Paper process.¹² In light of the implications of the market integration challenge for all players in the period up to 2016, should this review be partial or full? If a partial review is envisaged, should it be limited to how the regulatory framework and/or CER enable consumer understanding and citizen empowerment?
14. Current Government policy on Ireland's transmission asset ownership regime is settled and the SEM Committee's requirements as regards certification must be progressed by both companies involved (EirGrid and ESB). What are the likely cost and benefit impacts for end consumers associated with the Commission's recommended changes in its certification decision? Assuming an overall sufficiently positive impact for consumers, how might these changes be best implemented?
15. Given that Government policy has sought to increase competition to create downward pressure on prices, are there unrealised opportunities in the pricing and regulatory framework for ensuring further price improvements, and if so, what are they?

¹² Action 107: http://www.djei.ie/publications/2014APJ_Table_of_Actions.pdf

Priority 3: Planning and Implementing Essential Energy Infrastructure

Ireland must continue to maintain and develop integrated energy infrastructure systems, which deliver secure, reliable and competitive energy supplies to families and businesses and support the transition to a low carbon economy.

3.1 Contextual Background

Economic prosperity and social progress demand advanced infrastructure that can deliver secure, reliable, affordable power. Ireland's generation, transmission, interconnection and distribution systems will continue to expand to support balanced regional development, attract and sustain indigenous and foreign direct investment, and enable job creation and economic growth. After a prolonged period of under-investment, the 1990s saw the expansion of grid development and reinforcement in order to meet Ireland's growing population and economic activity. In a marked improvement from past conditions, Irish energy networks now compare favourably with other countries in offering safety and resilience, and in recent years they have met the test of severe weather episodes and record peak demands. However, emerging technologies and new power sources require continued development and renewal to ensure that Ireland's energy system is safe, secure and ready to meet increased demand as economic conditions improve. With modern energy systems becoming increasingly interlinked and interdependent, the development of future energy infrastructure will need to target the strengthening of energy systems integration as well as the resilience of individual energy networks.

To enable the quick, successful deployment of such investments, public authorities must continue to streamline planning processes, with support from industry leaders and in close partnership with stakeholders and the wider community. In 2012, the Government issued a policy statement on the strategic importance of transmission and energy infrastructure.¹³ The statement reaffirmed the need for development and renewal of our energy networks in order to meet economic and social goals. It endorsed the strategic programmes of the energy infrastructure providers, subject to their adherence to national and international standards for design and construction and to them being planned and executed with appropriate community consultation.

3.2 Electrical Infrastructure

The 2007 White Paper identified reliable, secure and competitively priced electricity supply as vital to the competitiveness of Irish industry and to Ireland's long-term economic and social development. In the coming years, the Irish grid will need to meet growing demand for electricity, and incorporate higher penetration of renewable energy sources. This combination of requirements presents new network management challenges.

¹³ Department of Communications, Energy and Natural Resources (2012), 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure'.

EirGrid estimates that, to facilitate the expected increase in renewable generation and to adequately meet electricity demand, the capacity of Ireland's transmission system would need to double by 2025. To ensure that these objectives are met, EirGrid in 2008 launched Grid25, a comprehensive strategy for essential infrastructure upgrades that will invest €3.2 billion in major grid reinforcements and transmission projects over the coming decade.

In recent years, EirGrid has successfully constructed and commissioned the 500 megawatt East-West interconnector (EWIC), which links the electricity grids of Ireland and Great Britain. This both increases security of electricity supply and provides an increased opportunity for market participants to trade electricity in a larger market context than previously possible. Full commercial operation of EWIC began in 2013.

As part of the Grid25 strategy, EirGrid and ESB Networks continue to work in partnership with Northern Ireland Electricity (NIE) and the System Operator Northern Ireland (SONI) to strengthen cross-border transmission capability by way of the planned second North-South Interconnector, a high-capacity transmission line that will run between Counties Meath and Tyrone. Implementation of this project is necessary to reduce transmission flow constraints between North and South, and improve both overall system operating efficiency and market liquidity.

To complement this infrastructure development, EirGrid and SONI, the two Transmission System Operators (TSOs) on the island, are implementing a programme for 'Delivering a Secure, 'Sustainable Energy System' (DS3). This is aimed at ensuring that the infrastructure can be securely operated with increasing amounts of variable, non-synchronous renewable generation in the future. This programme is aimed at delivering what was identified as feasible in the All-Island Grid Study, published in 2008 by the Department of Communications, Energy and Natural Resources and the Department of Enterprise, Trade and Investment (Northern Ireland) and subsequently adopted as a target of 40% for renewable electricity. DS3 involves the development of financial incentives for better generator plant performance, together with operational policies and system tools to enable generation plant, and the system as a whole, to operate in an optimal manner.

The question of whether or not energy storage, and what forms of energy storage, should be investigated in order to optimise electricity system operation in the future is under study by Government, CER, the TSO and DSO (Distribution System Operator), by research institutions, and by industry. Taken together, these developments are resulting in the technical boundary between the transmission and distribution systems becoming less distinct. Existing policies have facilitated projects such as intelligent storage heater technology, involving data communication between domestic customer loads and the transmission system operator, and the electricity network utilities. In addition, plans for a Smart Grid project in the North-West, involving transmission and distribution-level operations as well as load management, have been facilitated by current policy. The recent Memorandum of Understanding between ESB Networks and EirGrid gives institutional support for operational co-operation. Future policy must continue to foster innovative technological and organisational collaboration.

3.3 Oil Infrastructure

Oil continues to play a major role in the national energy system, despite its virtual disappearance as a fuel for electricity generation. In 2011, oil represented 59% of primary energy use in Ireland, dominating the transport sector and serving as the primary fuel for home heating nationally. Modelling by the Sustainable Energy Authority of Ireland (SEAI) predicts that oil demand is likely to remain steady to 2020, and will play a strong role in the fuel mix in the medium term.¹⁴ Therefore, port infrastructure, shipping capacity, oil port terminals, tank storage facilities, the motorway network, and oil distribution facilities will remain important components in the national energy supply infrastructure.

Whitegate, Co Cork, Ireland's only oil refinery, currently supplies approximately 25-30% of the transport and liquid heat fuels in the domestic oil market. In advance of the expiry of Whitegate Refinery's refining obligation in 2016, the Government published a report examining the future of oil refining on the island of Ireland.¹⁵ The study was carried out at a time of ongoing rationalisation in the EU refining sector and, together with the analysis undertaken by the International Energy Agency (IEA) and the EU Oil Refining Forum and Roundtables, the study has helped inform the Government's position. The Government concluded that the presence of an operational refinery on the island of Ireland provides flexibility, enhancing the options available to the State in the event of an oil supply disruption by providing an alternative source of product and avoiding a complete reliance on product imports. In light of those findings, Government is liaising with the Irish oil industry and appropriate public bodies to determine available policy options that may facilitate the commercial future of refining in Ireland. Ireland will continue to participate in the debate on refining at EU and IEA level, and supports the EU refining 'fitness check'¹⁶ process. Arising from the fitness check, we will engage with the EU on the scope for a coordinated EU approach.

Another key finding of the 2013 study is that the oil import facilities on the island of Ireland taken as a whole offer a robust infrastructure that would provide comfortable alternatives in the event of serious disruption at any of Ireland's six principal oil ports. In this context, and given that Ireland has no oil pipelines, the study found that the upgrading of the Irish motorway network in recent years had contributed to oil security of supply, improving the speed, distance and efficiency of transporting oil by road, particularly from the major ports. The current system is able to meet total Irish oil demand, regardless of any future decisions on the operation of the Whitegate facility as either a refinery or as a terminal for refined product. We will seek to deepen our co-operation with our counterparts in Northern Ireland with regard to ensuring the continued robustness of oil supply infrastructure on the island and the development of contingency measures to mitigate risks to oil supplies.

¹⁴ Department of Communications, Energy and Natural Resources (2012), 'Government Policy Statement on the Strategic Importance of Transmission and Other Infrastructure'.

¹⁵ *Ibid.*

¹⁶ The European Commission announced in April 2013 that it planned to complete a "fitness check" for the region's €500 billion refining industry, assessing EU policies and laws, including issues such as taxation and carbon emissions requirements that affect competitiveness versus companies operating in other regions.

Ireland is following a policy of maintaining more of its 90 days of required oil stocks on the island of Ireland than has been the case in the past. This has implications for oil tankage and related infrastructure. The National Oil Reserves Agency (NORA) has commissioned additional storage in Ireland. These developments are discussed in further detail in Priority 4: Ensuring a Secure Energy Mix.

3.4 Gas Infrastructure

In the period from 1990 to 2010, natural gas more than doubled as a share of Ireland's primary energy requirement, mainly as a result of its increasing use for electricity generation and home heating where it has provided a cleaner alternative to solid fuels. Natural gas now comprises about one-third of total energy. With the decline in output from Ireland's only indigenous operational gas field at Kinsale, Ireland currently imports almost all of its gas supply through two interconnectors with Great Britain. While Priority 4 specifically addresses the need to maintain a secure energy mix, infrastructure improvements could be required in order for Ireland to improve the diversification of its energy supply sources and of the routes for imported energy. Natural gas is now available in over 160 population centres in 19 counties throughout the country, and the number of gas users continues to increase, mainly due to new towns connections.¹⁷ Bord Gáis Networks has been granted approval by the CER to extend the natural gas network to towns in Counties Wexford and Tipperary, and has plans for additional new connections and pipeline refurbishment in coming years.¹⁸ Future energy policy must also ensure the optimum level of gas interconnection to underpin security of supply. Over the long term the two existing gas interconnectors with Great Britain will also remain of strategic importance, including the onshore section of the Irish gas pipeline in Scotland, which connects to the British gas system.

It is also important that Ireland avail of additional gas supply sources, such as indigenous natural gas from the Corrib Gas Field, and from liquefied natural gas (LNG) from the proposed Shannon LNG project. Both of these would greatly enhance supply security. In the most recent policy period, Government has actively facilitated both developments.

3.5 Planning and Public Engagement

In recent years, regulators, planning authorities and industry leaders have made progress in streamlining processes for projects designated as 'strategic infrastructure', leading to quicker, less cumbersome project approvals. The same actors could usefully be encouraged to apply those practices and explore new approaches to all infrastructure projects to remove regulatory and process-driven barriers, while maintaining a steadfast commitment to safety, partnership and transparency for the broader community. By way of example, the Maritime Area and Foreshore (Amendment) Bill is already piloting this approach.

¹⁷ Department of Communications, Energy and Natural Resources (2012), 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure'.

¹⁸ *Ibid.*

Since the 2007 Policy Framework, the EU has adopted Guidelines for Trans-European Energy Infrastructure which established a process for the selection of European cross-border Projects of Common Interest (PCIs) in nine priority corridors and three priority areas, relating to electricity, gas, smart grids, carbon capture and storage and oil across the EU. The PCI designation for energy projects carries certain conditions and entitlements, including more streamlined planning and regulatory processes and eligibility to apply for EU funding, provided the project qualifies. PCIs may also be eligible for EU funding under the Connecting Europe Facility 2014-2020 (CEF) which was established under a separate Regulation, also in 2013.

Fifteen projects with cross-border impacts involving the island of Ireland (either on the island or enhancing its energy connections with Great Britain) were selected for designation as PCIs. They variously concern electricity transmission and storage, gas transmission, liquefied natural gas (LNG) storage, gas storage, and smart grids. PCI regulations require Member States to accord priority to consideration of applications for applicable projects in their national development planning and energy regulatory consenting processes. An Bord Pleanála has been designated Ireland's competent authority and will now have a significant role in the planning and permitting process for Ireland's PCIs. The next step in the process will be for those project promoters who do not yet have planning permissions to prepare their applications and/or, if eligible, engage with the process of funding calls for CEF funding. The European Commission is working closely with promoters to ensure they are kept informed about the process.

As the energy system evolves to take account of changing demographics and policy priorities, infrastructure needs to be built out in order to provide reliable energy services to homes and business. Greater public awareness and, ultimately, acceptance of critical energy infrastructure, such as the East-West Interconnector or the North-South transmission line, is central to the rollout of new generation infrastructure, whether in the form of new wind turbines or fossil-fuel power stations. As Ireland strives to decarbonise the energy system by 2050, the need for grid strengthening and reinforcement becomes increasingly important. However, such infrastructure has proved divisive in the past, with communities and developers finding themselves in opposition. A new way is required, one that places the citizen at the heart of the planning and decision-making process, and ensures that public and private actors effectively communicate the risks and benefits associated with energy projects in both a local and national context.

Local authorities play a key role in identifying and zoning areas suitable for renewable and other energy projects and infrastructure and in implementing appropriate project permitting processes. A Local Authority Renewable Energy Strategies (LARES) methodology published by SEAI in 2013 will assist this function and facilitate consistent approaches. It will help local authorities in developing co-ordinated renewable energy strategies in accordance with national and European obligations, and addresses many common issues regarding renewable energy technologies and projects.

The reforms of local government under the Local Government Reform Act 2014, including the enhanced role for local authorities in promoting sustainable economic development at the local level, and the development of the role of local authorities in fostering citizen engagement, may provide elements of the way forward. There are modalities and principles for citizen and community engagement being developed here

that will need to be reflected in the processes for engagement with communities and developers in relation to energy projects.

A Report from the NESC entitled “*Wind Energy in Ireland: The Challenges of Community Engagement and Social Support*” together with two connected consultancy studies is scheduled to be published in the coming weeks and may be of interest to citizens and stakeholders who wish to make submissions in relation to community engagement. In addition, in light of the feedback Eirgrid received as part of extensive consultation process over the past 20 months on its Grid25 projects, it has initiated an external review of its consultation processes. In the interests of independence and objectivity Eirgrid has requested the Chartered Institute of Arbitrators to provide experienced professionals to undertake the review.

Priority 3 – Planning and Implementing Essential Energy Infrastructure: Questions and Policy Options

16. What improvements to energy infrastructure are required to facilitate the transition to future integrated energy systems?
17. How could the permitting and licensing processes for major energy infrastructure projects provide for greater collaboration and engagement with community stakeholders?
18. Following the 'Government Policy Statement on the Strategic Importance of Transmission and Other Infrastructure' in 2012, what additional improvements could be made to the permitting and licensing processes for energy infrastructure projects to make them clearer and more efficient for project developers, the public, and other stakeholders?
19. How can Ireland better collaborate with Northern Ireland and neighbouring EU Member States on a shared approach to supporting potential investment in building and accessing energy storage capacity in order to better use oil and gas fuel supplies and to facilitate further exploitation of variable renewable energy sources?
20. Is Ireland's electricity and gas infrastructure – including, but not limited to, interconnection – sufficiently developed for Ireland to be able to achieve the benefits of European market integration at least cost? How should Ireland continue to improve electricity and gas interconnections in the context of this integration and its security of supply policy objectives? What additional steps could be taken to facilitate this improvement?
21. Does the existing regulatory regime underpin and incentivise appropriately investment in existing and potential future electricity and gas interconnection infrastructure and/or full consideration of its alternatives, on a cost-effective basis?
22. In light of continued reliance on oil to 2030 and beyond, what is the best approach to monitoring and ensuring the capacity of Irish oil infrastructure? What measures should be taken to facilitate the commercial future of oil refining in Ireland?

Priority 4: Ensuring a Balanced and Secure Energy Mix

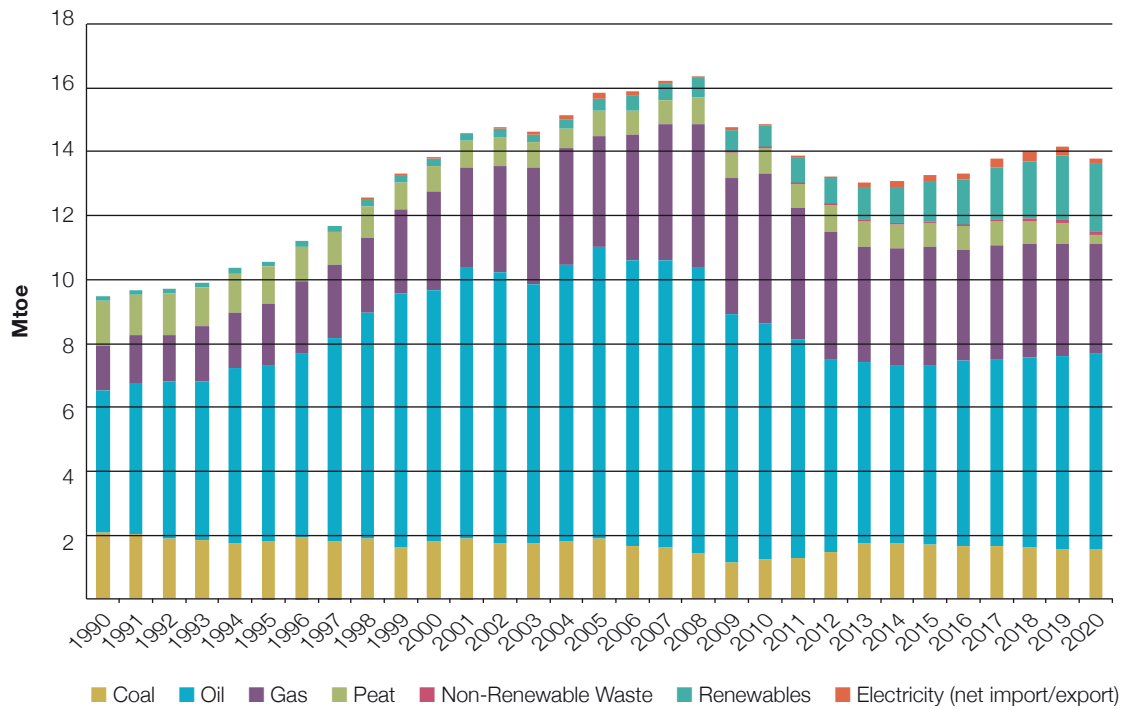
As Ireland makes the transition to a low-carbon economy, the country will require a balanced and secure energy mix that creates the framework and market conditions for investment, stability and growth.

4.1 Contextual Background

A well-balanced fuel mix that provides reliable energy, minimises costs and protects against supply disruptions and significant price spikes is an essential foundation for Irish enterprise and consumers. Our choices on the nature, type and origin of fuels we use to provide heating, facilitate transport and generate electricity are profoundly important to our energy and decarbonisation policy objectives. Ireland has made good progress towards achieving our legally binding target of 16% renewable energy by 2020, with overall renewable penetration at 7% in 2012. Further work will be necessary to realise the 2020 objective. Alongside our renewable targets, oil and gas remain a critical part of our energy mix, providing 76% of primary energy requirement in 2012.

In January 2014 the Commission published its proposals for the 2030 Climate and Energy Framework. The framework includes a proposal for a reduction in greenhouse-gas emissions by 40% below the 1990 level and an EU-wide binding target for renewable energy of at least 27%. Unlike in the current framework to 2020, the target of 27% for renewable energy sources (RES) is not binding on individual Member States. The Commission considers that this “EU-wide binding target” gives Member States greater flexibility to take advantage of the most cost-effective means of achieving a more sustainable, secure and competitive energy system.

Figure 6 is a modelled scenario that projects annual primary fuel requirement through 2020, assuming that Ireland meets current renewable energy and energy efficiency targets set by the EU. As the graph illustrates, we will remain dependent on fossil fuels in the medium term. Oil and gas will remain central to the economy, particularly in the heating and transport sectors, until affordable, secure and viable alternatives become available. In the intervening period, certain fuels, including gas, will enable the transition to a low-carbon economy.

Figure 6: Forecast primary energy requirement 1990–2020 (NEEAP/NREAP)

Source: SEAI

Based on rigorous economic modelling, decisions are required on the optimal fuel mix within each sector (heating, transport and electricity), bearing in mind the need to decarbonise, to diversify fuels and supply routes, and to minimise energy costs to the economy as far as possible.

4.2 Fuel Diversity and Indigenous Resources

Ireland currently imports 95% of its natural gas and 100% of its oil, leaving the country particularly vulnerable to supply disruptions and to volatility in prices, which are determined by global markets. We must reduce our reliance on imported fuels and develop cost-effective, indigenous sources of energy in order to provide protection from instability and enjoy greater command over our energy security. The potential to develop large-scale renewable energy or hydrocarbon projects for energy export could provide additional economic benefits.

The Government's underlying objective in respect of oil and gas exploration is to ensure that the State's natural resources are managed in a way that will maximise the benefits accruing to the people of Ireland. It is a central tenet of the State's strategy for this sector that private industry rather than the Exchequer is best placed to assume the high exploration investment cost and high financial risks associated with offshore exploration. Ireland competes for mobile exploration investment in the same way it competes for foreign direct investment in already established onshore sectors. The Government's strategy for the exploitation of the State's natural hydrocarbon resources aims to maximise the level of exploration activity and increase the level of production activity, while ensuring a fair return to the State from these activities. Mobile international

exploration investment is encouraged to locate in Ireland through an active and targeted promotion campaign, regular licensing rounds, support for petroleum research projects that deepen knowledge of the petroleum potential of the Irish offshore, and maintenance of an appropriate fiscal regime.

The number of exploration authorisations in place is currently the highest ever, and 2013 witnessed both new company entrants and a marked increase in the level of acquisition of new seismic data. The level of exploration drilling, however, remained low. Without a significant increase in drilling levels, the potential of the Irish offshore will not be realised.

Robust regulatory processes are critical. They were reformed by the enactment of the Strategic Infrastructure Act 2006 and the Petroleum (Exploration and Extraction) Safety Act 2010, which resulted in the Commission for Energy Regulation going live as the upstream petroleum safety regulator in December 2013. A Maritime Area Development and Foreshore (Amendment) Bill is being progressed by the Minister for the Environment to further streamline regulatory processes.

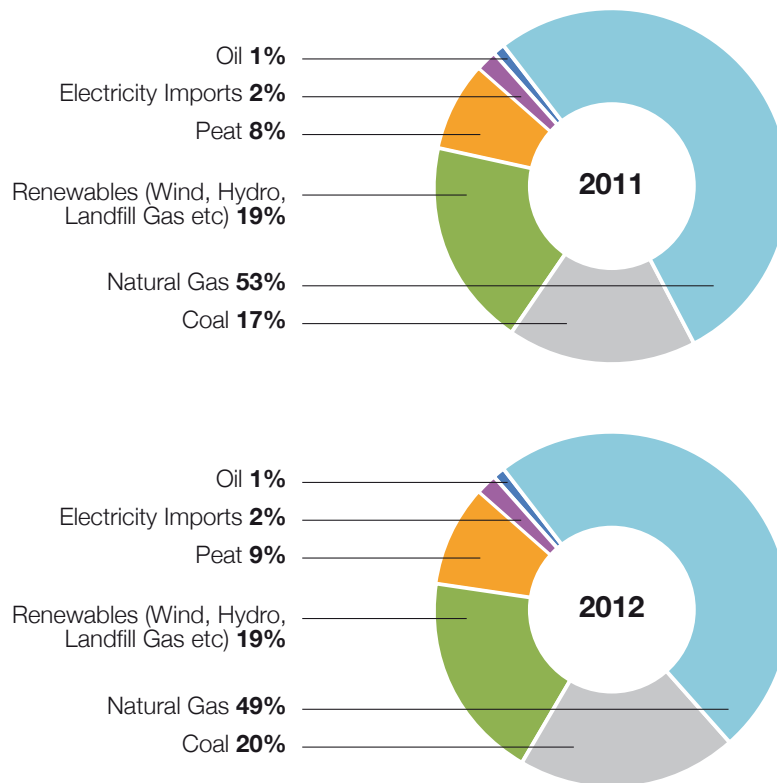
In relation to potential exploration for unconventional hydrocarbon resources onshore, the EPA has initiated a process to produce a comprehensive study on the environmental impacts of unconventional gas exploration and extraction in Ireland. No decision will be made on proposals for the use of hydraulic fracturing in unconventional gas exploration until the results of this EPA research, which is projected to conclude in the second quarter of 2016, have been considered.

Based on current understanding of the oil and gas prospective of Ireland's offshore area, successful exploration and production of our indigenous hydrocarbon resources has the potential to deliver significant and sustained economic benefits to the country at both a national and local level, over an extended period of years. Unlocking this potential is an important focus for the Government and a promising source of opportunity for many regions throughout the country. While this potential is the key driver of the Government's hydrocarbon strategy, the focus of this chapter is on the additional benefits that indigenous resources could deliver in terms of strengthening the security and diversity of Ireland's energy supply. In that regard, production from the Corrib Gas Field, which is projected to commence in 2015, will enhance energy security, and reduce dependence on the gas interconnectors with the UK.

4.3 Electricity

The figures shown in Figure 7 (based on data provided by SEAI) setting out the fuel mix for gross electricity consumption for 2011 and 2012 paint a picture of a dynamic market, with fuel mix changing in response to a number of market signals.

**Figure 7: Electricity generation fuel mix 2011-2012
(gross electricity consumption)**



A number of policy and regulatory instruments that influence fuel mix are currently in place, including:

- Public Service Obligation (PSO) schemes to support renewable and indigenous generation and security of supply, including the Renewable Energy Feed-In Tariff (REFIT) and peat PSO schemes,
- mandatory priority dispatch for renewables, the East-West Interconnector, high-efficiency combined heat and power (CHP) and peat generation,
- the EU Emissions Trading System (ETS), which is intended to incentivise low-carbon generation, and
- Single Energy Market (SEM) rules, which are designed to incentivise the lowest-cost generation mix.

These policy instruments have operated effectively to increase renewable generation. However, in 2012 the positive carbon impacts of this were offset by the increased use of coal and peat generation, for reasons set out below.

4.4 Coal

The unconventional oil and gas revolution in the United States continues to have profound implications for global energy markets. Cheaper gas has prompted the US to switch from coal-fired to gas-fired generation. This shift has flooded the EU market with cheap US coal, which, along with the collapse in carbon prices, has dramatically increased coal-fired generation in the EU as the market responds to price signals.

Aside from those entitled to priority dispatch (peat, renewables, and high-efficiency CHP), generation plants in the SEM are dispatched on the basis of prices bid in. As coal and carbon prices fall, the Moneypoint coal plant can bid in with lower prices, allowing it to run baseload, while newer, cleaner, more efficient and less carbon-intensive gas-fired plants are not dispatched. It is not clear when or if either ETS reforms or a changing price differential between coal and gas will reverse this trend. This further underlines the importance of a policy decision on the future of the Moneypoint plant.

Moneypoint, Ireland's only coal plant, is nearing the end of its useful life, and is expected to close by 2025. Its total output of 915 MW supplied about 17% of electricity demand in 2013. The decision on how to replace Moneypoint's power generation will have to be taken in a timely fashion, to allow adequate time for replacement planning and delivery. Coal plants have environmental drawbacks due to high emissions and implications for climate change, though they run on an abundant fuel source at relatively low cost and provide useful baseload and fuel diversity in generation. A decision on the role of coal in the Irish fuel mix needs to be seen in the broader context of sustainability, competitiveness and security of supply. If, consideration is given to using Moneypoint for future generation using coal, the issue of carbon capture and storage (CCS) for climate mitigation would also need to be explored.

4.5 Peat and Biomass

The increase of peat generation in the fuel mix from 2011 to 2012 was largely driven by forced outages of peat stations in 2011, which were not repeated in 2012. Peat generation is supported by a PSO that expires in 2015 for the Edenderry station and 2019 for the West Offaly and Lough Ree peat stations. Extensions to these peat PSOs are not envisaged. In line with Government policy, Bord na Móna has gradually increased the proportion of co-firing with biomass at the Edenderry plant, achieving 22% co-firing in 2012. Market dynamics, regulatory decisions on priority dispatch for hybrid renewables, as well as policy decisions on REFIT 3 and in the forthcoming Bioenergy Strategy, will influence the future of peat in the Irish generation fuel mix once the current peat PSOs have expired.

4.6 Natural Gas

The share of natural gas in the Irish power generation fuel mix fell from 56% in 2011 to 49% in 2012, and was further affected by the operation of the East-West Electricity Interconnector in 2013.

This shift has led to a decline in overall consumption of natural gas in the Irish market and consequential increases in gas network charges. However, gas remains a key component of the power-generation fuel mix and offers important flexibility to back up variable wind generation. While an overreliance on gas in the Irish power generation mix may be undesirable, with Corrib gas due to enter the national gas transmission system and proposals for a new LNG terminal in Shannon, Ireland looks set to have ample capacity and more diversified supply sources for natural gas, which will enhance security of supply.

4.7 Nuclear Energy

Ireland has a strong history of engagement on safety and non-proliferation in relation to nuclear issues and has worked with the nuclear-power states over the last number of years in relation to the Power Resolution at the International Atomic Energy Agency (IAEA). This is of particular importance to Ireland as the impacts of nuclear accidents do not respect national borders or territorial limits. Ireland respects the rights of individual states to determine their own energy mix, however, where a state chooses to use nuclear power, it must be done in accordance with the highest international standards with respect to safety and environmental protection. Ireland's priority is the safety of the Irish people and the protection of the environment, including the shared marine environment of the Irish Sea. There are currently two statutory prohibitions on nuclear-power generation in Ireland. The Planning and Development (Strategic Infrastructure) Act 2006 prohibits the authorisation of development consisting of an installation for the generation of electricity by nuclear fission, while the Electricity Regulation Act 1999 makes similar provision in respect of regulatory authorisations.

During the debate on the 2007 White Paper a number of interlocutors called for greater public debate on the nuclear issue, particularly in the context of the need to create low-carbon economies in response to climate change. The complete nuclear power plant process produces much less carbon dioxide than equivalent fossil-fuel plants however, it should be understood that nuclear is not a "zero carbon" technology.

Proponents of nuclear energy often cite its low costs and advances in reactor technology in recent years. Nonetheless, nuclear energy continues to prove expensive to build, as illustrated by the ongoing development of a nuclear plant in Finland greatly above budget, and UK incentives for nuclear on a similar basis to renewable energy. Consideration of nuclear power options must also take account of Ireland's existing generation plant and grid system size. Moneypoint is a baseload coal-fired power station with large set sizes (300 MW). Such stations are not suited to mid-merit order running, where regular output changes are required. Moreover, much of the new large gas-fired generating plant in the system also prefers to run at constant output. The addition of a relatively large nuclear plant, also designed to run at constant output, would unbalance the system, with too much inflexible baseload and not enough flexible plant for a system with limited interconnection to other systems. On the other hand, when 'fourth generation' nuclear reactors become commercially available, it is technically possible that smaller reactors could be accommodated on the Irish grid.

As Ireland considers additional interconnection with the UK and France (which derives nearly 80% of electricity from nuclear generation), imported power from nuclear sources may become a small but increasing element of the all-island fuel mix.

In light of considerations on the future of the Moneypoint coal plant, it may be questioned whether the time is right to consider in greater depth the potential economic and technical implications, or indeed to test public acceptance of nuclear generation located on the island of Ireland.

4.8 Heating

More than two-thirds of energy consumed in Ireland annually is used in the transport and heating sectors. While oil's dominance in both sectors is likely to continue into the medium term, improvements to fuel diversity in the two sectors must be delivered. Boosting fuel diversity is challenging and will require intensive coordination between the energy, transport and environment sectors. As Ireland continues to invest in network infrastructure, electricity and gas use should be optimised in the heating and transport sectors where they can displace more carbon-intensive fuels.

Some 44% of Irish households used oil to heat their homes in 2011, with 34% using gas heating. Solid-fuel heating remains a small but significant component of the heating mix. The Carbon Tax, which was extended to include solid fuels in 2013, and which will increase over time, will play a part in incentivising switching to cleaner, less carbon-intensive heating fuels.

Building retrofits designed to improve insulation and other measures to reduce energy consumption should be the foremost energy goal for the built environment, as discussed in other sections of this paper. Ireland has already made strides in energy efficiency; SEAI figures show that energy use per household fell by 18% between 2006 and 2011. Energy efficiency improvement trebled in pace during that five-year period compared with the previous 10 years. The recent publication of S.R. 54:2014 Code of Practice: Methodology for the Energy Efficient Retrofit of Existing Dwellings by the National Standards Authority of Ireland provides detailed technical guidance on the energy efficient retrofit of dwellings and will provide the benchmark for quality retrofits to the domestic housing stock going forward.

The uptake of the Combined Heat and Power capacity under REFIT 3 support scheme will make a contribution to increasing the amount of heating from renewable sources, along with migration to renewable heat in response to market forces. The requirements of Part L of the Building Regulations are also expected to make a contribution to increasing the uptake of renewable heat. These measures and developments will build on the increases in renewable heat which were achieved by schemes such as the Greener Homes Scheme, the Renewable Heat Deployment Programme (ReHeat) and the CHP Deployment Programme.

Solar thermal heating for water, shallow geothermal heating, ground-source heat pumps and biomass wood-chip boilers are other options that have been installed in Ireland in recent years with relative success, providing complementary and alternative heating sources, although their penetration remains low.

Biomass energy for heating doubled between 1990 and 2012, reaching 232 ktoe. The growth in biomass is mainly due to increased use of wood wastes, other solid wastes and the renewable portion of industrial and municipal wastes. Most of this solid biomass is used in the industrial sectors where it is combusted directly for heat or used in CHP units; the rest is used in the residential and commercial sectors. Most growth has been through larger units, where economies of scale are better.

To facilitate the integration of renewable energy, several EU Member States already provide for the injection of biogas into their natural gas networks and have put in place regulatory frameworks which address corresponding safety and fuel quality matters. Under the REFIT 3 support scheme in Ireland, anaerobic digestion is supported through tariffs available for electricity exported to the grid. Once the Commission for Energy Regulation has consulted on the use of injecting biogas into the natural gas network and implemented the necessary regulatory framework, anaerobic digester plants should have the option of injecting into the natural gas grid, where appropriate and feasible. The availability of such an option is anticipated to improve the penetration of renewable energy in the heating and transport sectors.

4.9 Energy in Transport

In 2011, Ireland was 96% dependent on oil for transport, with biofuels making up 3.6%. Ireland's biofuel policy is set in the context of the legally binding target imposed on all Member States under Directive 2009/28/EC (the Renewables Directive) to ensure that at least 10% of energy consumption in the transport sector is from renewable sources by 2020. Additional discussion of biofuels follows under Priority 5: Putting the Energy System on a Sustainable Pathway.

Transport accounted for almost 19% of greenhouse-gas emissions in 2012 in Ireland. The Department of Transport acknowledged the need for an integrated approach to transport, combined with spatial planning. By creating compact, accessible urban environments, people will be in a better position to walk and cycle from home to avail of local education, employment and retail services. This will help to reduce transport and related energy demand. Transport policy is focused on encouraging smarter travel, delivering alternative travel options, improving the overall efficiency of motorised transport, and on the provision of a more targeted and efficient public transport service. Investment in public transport reflects this focus. Additionally, current smarter travel investment programmes administered by the Department of Transport are delivering high-quality walking and cycling infrastructure across the country as well as supporting behavioural change in personal travel options. A low-carbon roadmap for the transport sector, now being developed, will take into account initiatives proposed by the European Commission in its 2011 White Paper on transport.

We will also need to undertake a thorough examination of the medium and long-term costs, benefits and implications of the use of alternative fossil fuels such as natural gas, including biomethane, in gaseous (Compressed Natural Gas – CNG) and liquid (Liquefied Natural Gas – LNG) form as well as liquefied petroleum gas (LPG) for fleet transport. A proposed EU directive on alternative fuels infrastructure (2013/0012 (COD)), which is currently under negotiation, sets out requirements for establishing national policy frameworks for the market development of alternative fuel through infrastructure provision, and the implementation of common technical specifications.

This proposal also seeks to establish a minimum number of recharging points for electric vehicles by each Member State, with 10% of them being publicly accessible. This proposal seeks to oblige Member States to put in place an appropriate number of publicly accessible recharging points by 31st December 2020 to ensure that electric vehicles (EVs) can at least circulate in urban and densely populated areas and then, where appropriate, within networks determined by Member States. A grant scheme to incentivise electric vehicle EV take up in Ireland has been in operation for the last three years and EV charging points are being rolled out. EVs are also exempt from VRT.

The proposed Directive also requires that CNG refuelling points be provided to the extent required to allow circulation of CNG motor vehicles in urban and densely populated areas and, where appropriate, within networks determined by Member States. The deadline for the obligation to put in place an appropriate number of publicly accessible refuelling points will be 31st December 2020 assuming the Directive becomes law. The proposed deadline for installing an appropriate number of refuelling points along the TEN-T Core Network is 31st December 2015. CNG for transport is available and used, particularly by fleet transport, in several EU Member States and provides a viable and proven alternative to oil. It also provides a natural gas pathway to biomethane given that CNG and biomethane are directly interchangeable.

There is also potential to use Liquefied Natural Gas (LNG) in the transport sector. The proposed Directive seeks that an appropriate number of LNG refuelling points, determined by Member States, shall be built in all maritime and inland waterway ports, and along certain motorways to ensure adequate circulation of heavy duty motor vehicles throughout the Union. In relation to the ports, the Directive allows for the possibility of co-operation between neighbouring Member States to ensure adequate coverage of the network. The proposed deadline for installing the infrastructure is 31st December 2025 with the exception of inland ports where the deadline is 31st December 2030. LPG, often known as propane or butane, is an output of the oil refining process that is used as a transport fuel and rural heating fuel in some countries and, although a fossil fuel, offers potential for further diversity.

Biofuels accounted for 3.8% of road and rail transport fuels in 2012, according to the definition in EU Directive 2009/28/EC. Biodiesel is the main biofuel, representing 66% of biofuel usage in 2012, followed by bioethanol (34%) and pure plant oil (0.5%). Most biofuel in Ireland is imported. Indigenous biofuels make up 21% of Irish biofuels supply. Since 2010, under the Biofuels Obligation Act 2010, fuel suppliers for road transport were required to include an average of 4% biofuels by volume in their sales. In 2013, this increased to 6.4%. The EU Commission is preparing to amend the Renewable Energy Directive and may cap the contribution of first-generation biofuels to encourage the production of more advanced biofuels.

As with all sectors, Ireland's dependence on imported fossil fuels can also be greatly reduced through improved energy efficiency. Adjustment of VRT and motor taxation structures in recent years to reflect vehicles' CO₂ emissions has been central in stimulating a substantial improvement in the energy efficiency of cars on Irish roads. In 2007, the average emissions of Irish cars were 164 g/km; in 2012 they had fallen to 125 g/km (SEAI, *Energy in Ireland*, 2012 report). Similarly, SEAI programmes focused on improved fuel efficiency of public and commercial fleets have demonstrated that significant efficiency gains are possible in the transport sector through changes to energy

management practices and technology. A shift from petrol to diesel fuelled vehicles has played a significant role in the energy efficiency gains and reduction in CO₂ emissions. However, this could potentially have impacts for air quality, as diesel vehicles have higher emissions of air pollutants, fine particulate matter and nitrogen oxides.

4.10 Storage and Emergency Planning

As the all-island market is highly dependent on imported oil and gas, with an increasing reliance on variable renewable power generation, it is vital to continue building the resilience of our electricity, gas and oil supply, and ensure preparedness for any energy supply disruption. Priority 3, dealing with Essential Energy Infrastructure, highlights the importance of the ongoing development of key infrastructure to support resilience, particularly interconnection with neighbouring markets. Storage and emergency planning also play a key role.

In 2007, the National Oil Reserves Agency (NORA) held approximately 75 days of Ireland's total 90-day stockholding obligation, specified under EU and International Energy Agency (IEA) commitments. NORA was heavily dependent on stock tickets, and much of its wholly owned stocks were held abroad. Following from Government policy and underpinned by an increase in the NORA levy, NORA has maximised the use of existing commercial storage and refurbished and commissioned three new storage facilities. At the end of August 2013 NORA held 88 days of Ireland's stockholding obligation, with 71% held as physical stocks on the island of Ireland, 29% as physical stocks held abroad in neighbouring markets, and no stock ticket requirement.

The Government's proposed new legislative framework for the foreshore and maritime area will contain a new regulatory framework for gas storage, following consultation conducted during 2011. The depleted Kinsale gas field currently offers some potential for commercial offshore natural gas storage, while the proposed Shannon LNG terminal could boost Ireland's gas security by facilitating the holding of LNG stocks here. In addition, a potential commercial salt cavity gas storage project located off Larne in Northern Ireland is currently being examined. This project has been approved as a Project of Common Interest (PCI) under EU Regulation 347/2013.

Since 2007, the obligation for new gas-fired generation stations to maintain five-day back-up of an alternative fuel (usually an oil distillate) has been fully implemented by CER, and is subject to regular testing. Further analysis has pointed to possible options to enhance these arrangements for holding oil stocks as a back-up to gas-fired power generation. Government will further explore, with CER, NORA and other relevant bodies, available, cost-effective options, including their costs and implications for consumers. Additionally, Government will explore the potential for developing storage technologies that capture renewable generation for later use in order to help mitigate the use of variable power sources, such as wind, solar, and marine energy.

Significant work has been undertaken in recent years to enhance gas emergency planning, including on an all-island basis and with the UK. Further work has been undertaken to enhance oil emergency plans, and this must continue and expand.

Priority 4 – Ensuring a Balanced and Secure Energy Mix: *Questions and Policy Options*

23. How can we reduce our high dependence on oil and gas?
24. How best should we ensure that appropriate framework conditions are in place for secure markets and infrastructure with sufficient capacity and investment in the medium to long term?
25. How can we optimise the policy and regulatory environment to enable the market to decide on an appropriate fuel mix from a grid, market design, carbon, cost and energy security perspective? Are current policy and regulatory instruments sufficient or are additional interventions required, and what should those be?
26. Given that Moneypoint will approach the end of its life by 2025, is there a role for coal in the future power-generation fuel mix, taking into account cost, security of supply and environmental issues? If coal generation does not continue at Moneypoint, what are the alternatives? Should options such as biomass or nuclear power be considered?
27. What strategy is needed to support the continued increase of renewable energy on the electricity grid? Are new approaches needed?
28. What are the security, carbon and cost implications of alternative transport fuels including electricity, biogas, biomethane, LPG, LNG and CNG? What supports or policy interventions will be required to achieve the switch to these alternatives?
29. What options should we pursue to incentivise switching to cleaner lower-carbon heating fuels?
30. How best should we further develop and implement streamlined and integrated oil, gas and electricity emergency planning and control frameworks to ensure resilience to fuel-supply disruptions and external energy shocks?
31. What options should we pursue to enhance oil, gas and electricity storage? Should we explore further the potential for additional oil stocks to be deployed as secondary fuel in the event of gas disruptions? What are the costs and benefits of delivering energy storage, and are there alternatives?
32. What further efforts are required to pursue indigenous development of hydrocarbons and ensure suitable conditions for development on the island to improve Ireland's security of supply position? What additional actions should we take?

Priority 5: Putting the Energy System on a Sustainable Pathway

A sustainable energy pathway is one that ensures the transformation of Ireland's economy from one predominantly dependent on imported fossil fuels to a more indigenous low-carbon economy based on renewable energy, energy efficiency and smart networks, while fully exploiting the major opportunity this presents for job creation and economic growth. This is recognised as a cross-cutting priority that affects all the others, but it is discussed here separately to highlight it as a priority.

5.1 Contextual Background

Achieving a low-carbon economy is a focal point of Ireland's energy policy. The EU has set a binding target for Member States to reduce greenhouse-gas (GHG) emissions by 20% by 2020, relative to 1990 levels. Consideration of the longer term beyond 2020 is well under way. In December 2011, the European Commission published its Communication on an Energy Roadmap 2050. The energy agenda set out in the Communication sought to explore the challenges posed by delivering the EU's decarbonisation objective, as already set out in the March 2011 Communication on a Roadmap for moving to a competitive low-carbon economy in 2050, while at the same time ensuring security of energy supply and competitiveness. Alongside the Energy 2050 Roadmap, the EU published a Green Paper to invite consultation on a new 2030 framework for climate and energy policies, which must also ensure that the EU is on track to meet longer-term climate objectives. In January 2014, the EU Commission published its Climate and Energy Framework 2030 which seeks to drive continued progress towards a low-carbon economy and build a competitive and secure energy system that ensures affordable energy for all consumers and increases the security of the EU's energy supplies. It proposes to achieve a 40% reduction in greenhouse gases (GHG) by 2030 relative to 1990, and a binding EU-wide target for renewable energy of at least 27% in 2030. The EU process of deciding on the 2030 framework is well under way in parallel with Ireland's own low-carbon roadmapping exercise, which looks to 2050, with a particular emphasis on the period 2020 to 2030. Coordination of these independent yet interrelated processes will have to be carefully managed to ensure optimal coherence in the development of Ireland's energy policy. For Ireland, as elsewhere, the reduction in emissions to 2020 and beyond calls for a fundamental shift in energy production and consumption habits. The drivers of this shift have been and will continue to be a strong emphasis on the promotion of energy efficiency, the development of renewable energy and the progressing of smart grid technologies, while recognising trade-offs between the objectives of competitiveness, security of energy supply and sustainability. The outcome of the 2030 process will need to be sustainable for Ireland and other Member States, as well as the EU as a whole, on environmental and economic grounds, as well as from a secure energy system perspective – the Framework must be affordable and fair, taking account of Member States specific circumstances and capacities.

5.2 Making our Use of Energy More Efficient

Underpinning Ireland's ability to deliver on all parts of its energy policy goals in a cost-effective way is the development and optimisation of energy efficiency and demand-side management technologies. We must first seek to reduce energy consumption in so far as possible and to maximise energy efficiency. We should consider how best to optimise energy use, particularly in the heating and transport sectors, which are highly dependent on carbon-intensive fossil fuels. Building retrofits designed to improve insulation and other measures to reduce energy consumption should be the foremost energy goal for the built environment, as discussed in other sections of this paper. Ireland has already made strides in this area, and now has one of the lowest energy intensities among OECD countries. Between 1995 and 2012, the energy intensity of the economy improved by 18%, or by 21% when behavioural improvements are extracted.¹⁹

This progress has been driven in the main by improving the energy efficiency requirement in Ireland's building standards,²⁰ and by the success of programmes to stimulate the retrofitting of homes to enhance their efficiency. There has also been good progress on energy efficiency in business and the public sector. Most notably, SEAI's Large Industry Energy Network (LIEN) supports the energy efficiency efforts of around 160 of Ireland's largest business energy users, representing nearly 15% of Irish total primary energy requirement in all sectors. The LIEN has continuously improved its energy performance since it was formed with member companies avoiding energy costs of €40 million in 2012 alone. Overall, the member companies have improved their energy efficiency by over 20% in the last decade, leading to hundreds of millions of euros saved. The LIEN has not only contributed strongly to national energy objectives but also established Ireland as a global leader in energy management, and many LIEN members have implemented the ISO 50001 standard on energy management. In addition, co-operation between the National Standards Authority of Ireland and SEAI has led to the publication of a new Irish standard, IS399, in 2013 concerning Energy-Efficient Design (EED) Methodology, which has been deployed in several large industrial firms.

Ireland's second National Energy Efficiency Action Plan (NEEAP), published in 2013, reaffirms our commitment to a 20% energy savings target in 2020, complemented by an ambition to reduce energy consumption in the public sector by 33% by 2020. The second Action Plan identified 97 ambitious actions in the public, residential, business, transport, energy supply and cross-sectoral areas. These energy efficiency measures will directly assist and complement the National Renewable Energy Action Plan (NREAP), which is predicated on successfully meeting the targets in the NEEAP. If Ireland falls short on energy efficiency, it will have a legal obligation to do more to achieve our renewable targets. To meet the 20% energy-use reduction target by 2020, all energy-consuming sectors will need to make strong progress, particularly in the building and transport sectors where more than 60% of primary energy is consumed.

¹⁹ Sustainable Energy Authority (2013) Energy in Ireland 1990-2012.

²⁰ Department of Environment (2011), Building Regulations Part L Amendment 2011: <http://www.environ.ie/en/Legislation/DevelopmentandHousing/BuildingStandards/FileDownload,27314,en.pdf>.

Since 2007, the Department of the Environment, Community and Local Government has twice upgraded the energy performance standards for dwellings under the Building Regulations. This represents an efficiency improvement of 60% and positions Ireland firmly on a path to achieving the 'near zero' energy standard required under Directive 2010/31/EU on the Energy Performance of Buildings by the end of the decade. Similarly, a review process was commenced in 2013 towards upgrading the performance standards for non-domestic buildings.

The EU Energy Efficiency Directive will drive energy efficiency actions and policy across all sectors in Ireland until 2020. The public sector will have an ambitious and leading role to play in reducing energy consumption in public buildings, while energy providers are now obliged to carry out energy efficiency measures to reduce energy demand. SMEs will be supported to improve energy efficiency and reduce their energy bills. There is potential to deliver further savings in energy demand, but further policy measures will be needed.

The EU 2050 Roadmap points to further energy efficiency improvements as a key part of the "no regrets" options for transforming the EU's energy system.²¹ However, the ongoing economic crisis is affecting energy efficiency policy in Ireland; scarcity of public funding in general and a lack of private capital for investments are presenting challenges for improving energy efficiency. The transition to non-Exchequer funding models such as pay-as-you-save (PAYS) is being hampered by the current economic climate. The Better Energy programme has shown the important role that retrofitting the energy performance of buildings can play; the SEAI estimates that each home retrofitted under the programme avoids 1.5 tonnes of CO₂ emissions on average and overall national CO₂ savings from this programme now exceed 450,000 tonnes per annum. The Better Energy Communities programme is growing particularly quickly, with very wide interest among communities across Ireland seeking to reduce their energy bills and their environmental impact, and in the process create local employment and other benefits. In addition, the transport sector, which is one of the key sectors for improving energy efficiency in Ireland, continues to be challenging in terms of energy efficiency policy implementation, although some policy choices, such as the introduction of a carbon-based vehicle taxation scheme, have achieved greater energy efficiency. The average CO₂ emissions of new private cars in Ireland fell by 22% from 2008 to 2011.

One particular focus of energy efficiency action is to reduce the public sector's expenditure on energy. The Department of Communications, Energy and Natural Resources is undertaking a range of actions to help all parts of the public sector become more energy efficient, and savings of more than €40m have already been achieved. SEAI works directly with public bodies, and has signed formal partnerships with bodies and agencies collectively accounting for more than 60% of public sector energy spend. Delivery of the public sector's 2020 energy efficiency target will lead to permanent annual savings of €200m.

²¹ No regrets options are by definition GHG emissions reduction options that have negative net costs, because they generate direct or indirect benefits that are large enough to offset the costs of implementing the options (IPCC website).

5.3 Renewable Energy

Ireland has excellent renewable energy resources, which will be a critical and growing component of Irish energy supply to 2020 and well beyond. Indigenous renewable energy plays a vital role in the country's domestic fuel mix, increasing sustainability through the use of clean power sources and enhancing energy security by reducing Ireland's dependence on imported fuels. Wind, bio-energy and ocean energy could yield additional economic opportunities for both Irish workers and businesses. Under the 2009 Renewable Energy Directive, Ireland is committed to produce from renewable sources at least 16% of all energy consumed by 2020. This will be met by 40% from renewable electricity, 12% from renewable heat, and 10% from the renewable transport sector. The target to have 40% of electricity consumed from renewable sources by 2020 is one of the most demanding in the world.

From a low base, Ireland has made significant progress with regard to renewable energy deployment. Since 2003, installed wind capacity has increased from 209 MW across 12 counties to over 2,000 MW across 22 counties. In this regard, it should be noted that increased wind energy can reduce energy costs when gas prices are high, and act as a hedge to reduce exposure to gas price fluctuations. While focusing on a single year to assess the effect of wind energy on prices does not capture all the long-term impacts, analysis shows that wind did not add to consumer prices in the 2011 system. Any assumption that wind energy automatically increases prices must be avoided. The renewable energy contribution to thermal energy rose from 2.5% in 2003 to 5.2% in 2012, resulting in more than 40,000 homes and more than 550 businesses using renewable energy for heat. Every passenger vehicle now travels an average of 500 km using biofuel every year compared to no biofuel being recorded as being consumed by transport vehicles in 2003.²² SEAI analysis demonstrates that the use of renewable energy sources in electricity alone have led to a reduction in fossil fuel imports worth over €1 billion since 1990.

In 2012, 7.1% of gross final energy use came from renewable sources. Between now and 2020, there must be a steady, progressive and measurable increase in the amount of renewable energy consumed in the electricity, heat and transport sectors. With respect to the individual sectors, at the end of 2012, Ireland was at 19.6% in renewable electricity, 5.2% in renewable heat, and 3.8% in renewable transport. The National Renewable Energy Action Plan to 2020, submitted to the EU Commission as required under the 2009 Renewable Energy Directive, is the framework within which Ireland has set out the detailed policies, schemes and measures to deliver the required trajectory of growth from renewable sources.

Ireland's wind resources can generate power well beyond national targets for renewable electricity, potentially creating a significant export opportunity. Proper exploitation of that opportunity would spur job creation through direct employment in construction, operations and maintenance jobs. Realising energy export potential could also encourage economic growth by leveraging ICT capabilities, and by attracting and expanding a robust, efficient supply chain to support future wind (offshore and onshore) wave and tidal power production.

²² Biofuels are now blended with much of the conventional petrol and diesel supplied.

The recently published Offshore Renewable Energy Development Plan sets out a vision for Ireland's renewable energy resource contributing to our economic development and sustainable growth, generating jobs for our citizens, supported by coherent policy, planning and regulation, and managed in an integrated manner. Ireland has a sea area around 10 times the size of its landmass, with one of the best offshore renewable energy (wind, wave and tidal) resources in the world. The development of this offshore renewable energy resource is central to overall energy policy in Ireland and in the future can enable Ireland to develop an export market in green energy and enhance security of supply. A fully developed ocean energy sector can make a significant contribution to economic growth and job creation over the longer term out to 2030 and beyond.

Ireland continues to face several challenges inherent to successfully further deploying renewable energy in electricity, heat and transport, including predictable and transparent support frameworks, regulatory certainty, cost efficiency and effectiveness, protection of the consumer, and societal acceptance. For example, with respect to onshore wind, we are starting to revise and reduce price supports for new projects over time as wind technology becomes a mature renewable energy technology. There is now an opportunity, with stakeholder consultation, to design a new support scheme that takes account of the structure of the target market that will operate in Ireland from 2016.

In the area of transport, it is estimated that 630 million litres of biofuel – 283 million litres of bioethanol and 346 million litres of biodiesel – are required to achieve the RES-T (renewable energy in transport) 10% target. Increasing towards the 10% blend necessary to enable target achievement comes with challenges that are primarily associated with the EU Sustainability Criteria which could severely limit availability of the bio-energy crops needed to produce biofuels, especially biodiesel.

Bio-energy has historically been the largest contributor to Irish renewable energy through heat generation, and is anticipated to play a significant role in further displacing fossil fuels, especially in the larger heat users in the commercial and industrial sector, stimulating local economic activity, and improving the country's net trading position. The National Energy Efficiency Action Plan and National Renewable Energy Action Plan scenario for renewable heat assumes that the historic rate of deployment of biomass use for heat continues to 2020. Further, additional biomass CHP installations, driven by the feed-in tariff for biomass CHP and the expected contribution from building regulations requiring some renewable heat are assumed. These measures will need to be supplemented if renewable heat is to contribute the required levels to achieving the 2020 target. In this regard, a central focus of the Bioenergy Strategy is the identification of the existing and additional bioenergy policies and schemes necessary to cost-effectively contribute to the 2020 renewable energy target and position Ireland on a pathway to further decarbonising the energy system. These challenges will need to be addressed for both 2020, and the longer-term time horizons to 2030 and 2050. The strategy recognises the economic, environmental and energy opportunities that a developed bioenergy sector, fuelled by indigenously sourced biomass can deliver. It sets out the measures required to support the mobilisation of home-grown, renewable and sustainable biomass from wastes and residues through to purpose grown energy crops and wood.

It is worth bearing in mind, in the context of the renewable energy targets in general, that the overall level of effort can be reduced by increasing the extent to which energy efficiency affects overall demand. Improving the efficiency of energy use in all sectors will be an important element in delivering on our renewable energy target.

5.4 Grid Development and Sustainability

The growth of renewable energy and, in particular, wind requires the modernisation and expansion of the electricity grid. Ireland, in common with many EU Member States, is investing in the transmission system in support of renewable energy as well as regional economic development. Significant investments are needed to modernise the energy system, with or without decarbonisation, which will affect energy prices in the period up to 2030.

Over 2,500 MW of renewable generation is now installed on the island of Ireland. With renewable generation capacity set to reach between 4,800 and 5,300 MW to meet Ireland's target of 40% of electricity from renewable sources by 2020, managing this amount of intermittent generation on a small island system presents a unique set of operational challenges. The 'Delivering a Secure Sustainable Energy System' (DS3) programme being undertaken by EirGrid and the system operator for Northern Ireland (SONI) is designed to manage the achievement of our 40% renewable electricity target from a grid perspective over the coming years. The DS3 programme will develop system operations solutions to ensure the secure and safe operation of the all-island power system as we move towards progressively higher levels of non-synchronous renewable penetration.

In addition to developing a grid operation strategy and investing in infrastructure, the grid must also be adapted to operate in a 'smarter' manner, to enable system flexibilities that will allow the potential of smart metering in bringing energy efficiency benefits to consumers, and allow the integration of high volumes of electricity from renewable sources into the system. A smart grid would also better facilitate electric vehicle usage, electricity storage (utility and distributed scale), effective energy efficiency technologies, and enhanced consumer control over energy usage. Due to our proven record of engaging with information and communications technologies (ICTs) and our strong research infrastructure, Ireland has become a world leader in smart grid research and deployment.

5.5 Job Creation and Economic Growth

The sustainable energy sector (encompassing renewable energy, energy efficiency, and research, development and demonstration) presents a major opportunity for job creation and economic growth in Ireland. Under the 2014 Action Plan for Jobs, provision is made for €57 million in Exchequer supports to further stimulate energy-saving activity in the residential sector. This is estimated to sustain approximately 3,500 jobs. A further €35 million is being invested in the creation of an Energy Efficiency Fund to invest in

energy efficiency projects in the commercial and public sectors.²³ SEAI estimates²⁴ that the renewable and sustainable energy sector could create at least 30,000 jobs by 2020. SEAI is currently working with Enterprise Ireland, IDA and Forfás to examine what sectors and sub-sectors in the supply chains of energy efficiency and renewable energy offer the most opportunities for Irish firms in order to inform strategies to maximise job creation.

In addition to its critical contribution to energy supply on the island and the meeting of our national targets in that context, Ireland's renewable energy resources have rich potential (subject to an economically viable market being in place) for the development of an export industry to the UK in the first instance and to North-West Europe over time. Our renewable energy resources, both onshore and offshore, are significantly greater than the national energy requirement. The Government is committed to working with the UK government, under the auspices of the British-Irish Council, and with the European Commission and Member States in the context of the North Seas Countries Offshore Grid Initiative to create the framework and conditions for renewable energy export. In the context of a European Internal Market and greater integration, greater trade in energy is inevitable in the post 2020 scenario. The development of commercial large-scale electricity storage to deliver on such an export opportunity also merits clear attention at a time when electricity storage is receiving more attention in the EU and International Energy Agency (IEA) in the context of increasing volumes of renewable generation becoming part of the power supply. Electricity storage on the scale envisaged would require technological, logistical and environmental challenges to be met. If these challenges are met, the potential opportunities, over time, could be very considerable for renewable energy export.

Apart from our excellent renewable energy resources, Ireland has a number of strengths which it can use to leverage employment opportunities, including strengths in key sectors such as engineering and ICT; a strong research, development and demonstration base; our favourable corporate tax rate, and a well-educated, adaptable workforce. A sustainable energy sector can both maintain jobs in these sectors and attract new employment as companies are drawn to locate to Ireland, in part due to its low-carbon energy supply chain.

5.6 Climate Change

Climate change is recognised as the most serious and threatening global environmental problem. There is scientific consensus that humans are contributing to climate change through the emission of substantial amounts of greenhouse gases. In Ireland, approximately 60% of greenhouse-gas emissions derive from energy-related uses in the residential, transport, energy, industrial and commercial sectors, which remain primarily dependent on fossil fuels. In 2012 Irish energy-related CO₂ emissions were 20% above 1990 levels.

Ireland is part of the United Nations Framework Convention on Climate Change (UNFCCC) and is a signatory to the Kyoto Protocol, which set binding targets for

²³ Action 296: http://www.djei.ie/publications/2014APJ_Table_of_Actions.pdf.

²⁴ http://www.seai.ie/Publications/Statistics_Publications/EPSSU_Publications/The_Case_for_Sustainable_Energy.pdf.

developed countries to reduce greenhouse-gas emissions by 2012. At the Durban climate conference in December 2011, UN negotiations were initiated to develop a new international climate-change agreement that will cover all countries. The new agreement will be adopted in 2015, at the Paris climate conference, and implemented from 2020. It will take the form of a protocol, another legal instrument or “an agreed outcome with legal force”, and be applicable to all parties. In the meantime, the EU, a few other European countries and Australia have agreed to join a legally binding second period of the Kyoto Protocol, which runs until 2020.

The 2030 policy framework for climate and energy proposed by the European Commission aims to set a target to reduce EU domestic GHG emissions by 40% below the 1990 level by 2030.²⁵ This would require the sectors covered by the EU emissions trading system (EU ETS) to reduce their emissions by 43% compared to 2005, while emissions from sectors outside the EU ETS would need to be cut by 30% below the 2005 level. This effort would be shared “equitably” between the Member States. This will have implications for Ireland’s policies on energy efficiency improvement and for renewable energy which will need to be cost effective and reflect an appropriate contribution to effort sharing.

In April 2014, the Government published a National Policy Position on Climate Change, along with the final heads of the Climate Action and Low-Carbon Development Bill. This Bill mandates the creation of a National Low Carbon Roadmap for Ireland, which will incorporate sectoral roadmaps from those areas of the economy with significant emissions. The objective of the Roadmap is to identify the challenges and opportunities of the transition to low-carbon future from a national perspective and to set out how this transition will be managed and achieved. It is anticipated that there will be an open consultation on the first National Low-Carbon Roadmap in the second half of this year. A consultation paper on the sectoral roadmap for the electricity generation sector was published in late 2013 and that paper and the responses to the consultation are available on the Department’s website.

It should also be noted that while climate-change mitigation draws a lot of attention, climate-change adaptation is also important. In particular, the resilience of energy infrastructure in the face of climate change may need examination, with steps taken to minimise risks to the security of energy supply.

5.7 Role of the Sustainable Energy Authority of Ireland (SEAI)

The Sustainable Energy Authority of Ireland was established by Government in 2002 to promote and assist the development of sustainable energy in Ireland. SEAI’s stated mission is to play a leading role in transforming Ireland into a society based on sustainable energy structures, technologies and practices. Its roles include: supporting Government decision-making through advocacy, analysis and advice; driving demand reduction; providing advice to all users of energy, and driving the decarbonisation of energy supply. Its work programme is structured in terms of *delivering* programmes, *informing* government and society, and *developing* markets and sectors.

²⁵ http://ec.europa.eu/clima/policies/2030/index_en.htm.

SEAI delivers a number of energy programmes on behalf of Government. Most notably, it administers all strands of the Better Energy programme, offering financial support for energy upgrades in buildings. It also administers schemes to help business and the public sector become more energy-efficient, and has directly assisted more than 3,000 organisations to reduce their energy costs. In its informing role, it supports Government through its statistics, modelling and analysis roles, and it informs all parts of society through education, training and information activities.

As an agency focused on the development of sustainable energy sectors in Ireland, SEAI works to develop enterprise, skills and quality in order to build markets for new technologies and services. This function is an important part of delivering on policy goals to enhance the sustainability of the Irish energy system; new policy instruments often require agency support to see them achieve their desired impact. An agency can house specific expertise as needs arise, and can interact with all market actors to provide support and development. SEAI's previous work in helping to foster the growth of Ireland's renewable energy sector, through market building, demonstration and support, is a good example of this. As Ireland seeks to accelerate its transition away from over-reliance on imported fossil fuels, working to develop markets through supply- and demand-side actions will remain essential. This will include exploiting opportunities for Irish companies to become exporters of new technologies and services to the many other countries seeking solutions to their own energy challenges. As the process of change and innovation in energy accelerates, future roles for SEAI, and the resources required to fulfil them, form part of the discussion for energy policy.

Priority 5 – Putting the Energy System on a Sustainable Basis: *Questions and Policy Options*

33. How should cost-effective sustainable energy be promoted and supported? What are the appropriate support and regulatory frameworks to do this, ensuring both regulatory certainty and protection of the long-term interest of consumers? Is there a role for solar, offshore wind, wave, tidal or other technologies?
34. What options are available to encourage private investment in energy efficiency and ensure the transition to non-Exchequer funding models for energy efficiency?
35. How might supports for sustainable energy measures be made more predictable and transparent, and more effectively attract cost-competitive investment in renewable electricity, heat and transport?
36. How can Ireland best develop sustainable energy solutions that meet our long-term international climate obligations? Which pieces of energy infrastructure should be our priorities for climate adaptation?
37. How do we ensure cost-effective and timely investment in electricity transmission and distribution, including in smart grids?
38. How can we exploit Ireland's sustainable energy strengths to realise job creation and economic growth opportunities?
39. Are the optimal structures in place to deliver sustainable energy and realise the associated jobs and growth opportunities? Are existing policy interventions for sustainability (e.g. public service obligation, priority dispatch, efficiency measures) consistent and aligned?

Priority 6: Realising Economic Opportunity

Irish energy policy will continue to achieve energy security, energy sustainability and competitiveness, and in so doing will facilitate investment, job creation, research and development, exports and economic growth.

6.1 Contextual Background

Continuing the theme adopted by the Government during the 2013 Irish Presidency of the Council of the European Union, economic and energy policy will focus on growth and jobs. While competitiveness considerations emphasise the importance of minimising the cost of energy to businesses, it is also important to exploit the potential of the energy sector itself to create jobs, attract investment, facilitate research and development, and enhance economic growth.

It is abundantly clear that economic opportunity exists in every facet of the energy industry, and that a modern, robust energy system is a key enabler for future economic growth. In addition to promoting policies to realise that opportunity, Government will consider supporting policy areas that are essential to the framework of Ireland's energy economy, including a well-equipped energy workforce, strong investment in research and development, strategic partnership between industry and academia, and a collaborative governmental approach.

6.2 Contribution by Commercial State Energy Companies, and Government Support Programmes to the Overall Economy: Investments, Employment and Training

Priority 6 examines many key issues such as skills requirements, and the potential of investments in the energy sector to stimulate economic growth in the wider economy. The scale of the commercial State energy companies' contribution to the economy is significant in terms of investment, employment and job creation and, as such, illustrates the energy sector's potential to support economic growth.

A number of the major commercial State energy companies, including ESB, Bord na Móna and BGÉ, envisage investment totalling over €3 billion between 2014 and 2016. This will have a positive impact on employment, particularly in the construction sector. ESB contributed €1.8 billion to the Irish economy in 2012 and employed 8,000 people. EirGrid employed over 370 people during 2012, with a further 55 engaged in capital programmes; the Grid25 investment programme is expected to sustain nearly 3,000 direct and indirect jobs up to 2025. Bord na Móna employed over 2,000 staff in 2013, along with over 650 seasonal workers.

BGÉ is undergoing unprecedented transformation for an Irish State company; including completing the sale of its Bord Gáis Energy business as part of the State assets disposal process, the dividends from which will provide Exchequer funding for investments in jobs and growth. In addition, Bord Gáis Networks' rolling capital refurbishment programmes will sustain in excess of 600 jobs directly in the Networks business and through third-party contractors, and an estimated additional 100 jobs during design and construction.

While Bord Gáis Energy's wind farm business is being sold, its ongoing investment programme is expected to create approximately 200 construction jobs across four projects in construction. The State companies also have a number of important training programmes in place for apprentices and graduates. In addition, private sector energy companies have also invested in significant new fossil fuel and renewable generation capacity, which has contributed to security, sustainability and competitiveness, as well as underpinning job creation.

The Better Energy Programme, since its inception in 2009, has provided Exchequer support to over 250,000 homes, realising energy savings to homeowners of €76 million. It has supported on average 4,000 jobs per annum during its lifetime. In 2014, a further €57 million will be spent under the Better Energy Programme, supporting 3,100 jobs. In addition, the re-spending effects from savings in citizens' energy bills sees additional money spent in local economies.

6.3 Skills and Training: Tomorrow's Energy Workforce

Ireland's high-quality education and training environment has proven to be an invaluable asset in its successful history of attracting world-class multinational companies. As we bring new energy sources online and lead the development of the future grid, industry, academia and government will work together to recruit and prepare the next generation of energy professionals.

Special attention will be paid to strengthening the linkages between academia and industry. The former National Board for Science and Technology published various Inventories of Energy Research, Development and Demonstration Projects since the 1980s that have shown the increasing share of industry funding in the research support portfolio.²⁶ There are good case studies of industrial engagement with energy research centres, such as the UCD Electricity Research Centre (ERC). Business is represented on the ERC board, and the centre has spun off incubator companies which have gone on to become internationally trading businesses, such as Cylon Controls Ltd. However, most energy research is still conducted without visibility to, or support from, the private sector. Experience from the biotechnology, ICT and food and drink sectors could usefully be brought to bear on this issue.

A problem that has emerged in recent years has been a shortage of appropriately trained technicians. While the collapse of the construction sector has resulted in many craftsmen and technicians being available, they often lack the specific skills necessary for energy-sector work. There have been a small number of pilot projects to retrain and upskill technicians, such as the INTERREG-funded Installers Academy, but there is, as yet, no large-scale activity devoted to solving this problem. This is a case where more 'joined-up government' could improve the situation.

²⁶ The SEAI has an Energy Research Portal where current research projects are available. See http://www.seai.ie/Renewables/Energy_Research_Portal/.

The STEPS Programme led by Engineers Ireland has helped to raise awareness among school students of the exciting career opportunities in science and technology generally; however, relatively little impact has yet been felt in the energy sector. More work needs to be undertaken at primary and secondary school levels to increase the effective teaching of mathematics and science.

As the findings from Build Up Skills Ireland (BUSI) project demonstrate, a well-trained energy workforce is essential to delivering the 2020 energy and climate goals. Yet the training provision for the construction workforce is largely comprised of skills gained through learning on site, formal apprenticeship for the main construction trades and add-on training programmes for system specialists or installers. Neither approach has sufficiently evolved to assist in the transition to a low-carbon economy; a concerted effort is needed to upskill the trainers in this sector. While the BUSI report provided a good analysis of the type and number of trades required through to 2020, a national approach to identify and inventory the specific skills and certifications that industry requires is needed. Authorities must also leverage educational networks and institutions, especially those that provide training in the electrical, mechanical, engineering, and information technology fields in order to facilitate the provision of interactive online training, apprenticeships, classroom engagement and hands-on work experience in relevant areas.

6.4 Procurement: Spending Strategically

Public procurement in Ireland represents about €15 billion in expenditure on supplies, services and construction works each year. With the economic climate demanding that every sector do more with less, targeted procurement reforms hold the potential to deliver savings to taxpayers while stimulating industry growth. Adding additional rigour to procurement processes, particularly in the execution of energy and infrastructure projects, could achieve greater efficiency without curtailing quality.

Green Tenders sets a clear vision for how the public sector can spend more strategically on energy and energy-related items or equipment. Broadly speaking, such procurement generally falls into the procurement of energy-using products, energy services or capital projects. By understanding what is being procured, the energy implications, and how to select the most effective procurement method, public-sector bodies have huge power to drive the market towards more efficient products and services. More recently, the Department published a National Energy Services Contracting Framework which aims to standardise procurement for energy services contracting, energy performance-related payments and local energy supply contracts. This framework will be complemented in later years with additional methodologies.

Ireland led the way in Europe in developing an Irish standard for energy management, which specifically included a focus on energy-conscious procurement. The global standard, ISO 50001, was based on the Irish standards, with the result that Ireland has the highest uptake of ISO 50001 in the world relative to its size. Ireland will take action to ensure that the principles enshrined in the global standards are adopted in public procurement practice.

6.5 Research, Technological Development and Innovation

Since the 2007 Energy White Paper, approximately €273 million was invested in Ireland in relation to energy research, technological development and innovation. This has been done in a manner that followed both the commitments made in the previous White Paper, and the recommendations of the 2012 IEA Country Review.

Other notable developments in Irish energy research include Science Foundation Ireland's addition of Energy and Environment to its priority support themes, and University College Dublin's Electricity Research Centre achievement of SFI Strategic Research Cluster status.

The Irish research community, home to several world-class, world-scale centres of energy research excellence, has seen significant expansion in recent years, including the establishment of the Beaufort Centre in Haulbowline, Cork, incorporating the Naval Service facilities there, and the Hydraulic and Marine Research Centre at University College Cork. United Technologies launched an International Energy Research Centre at the Tyndall Institute in Cork.

On a national level, Forfás has been leading a national research prioritisation exercise and has identified priority areas for energy research funding: in Smart Grids/Smart Cities and Marine Energy. National strategies for these areas are now being developed by cross-agency groups chaired by SEAI.

SEAI maintains an energy research portal that provides an overview of all research being undertaken in Ireland on energy topics (www.seai.ie/Renewables/Energy_Research_Portal/).

At European level, the Strategic Energy Technology Plan (SET-Plan) has set the high-level energy technology policy for Europe, and as part of its implementing, the European Commission has issued a Communication on Energy Technology and Innovation. The statement articulates various potential modalities for ensuring greater convergence between national and EU research support programmes. It has also shaped the recent call for proposals under the Horizon 2020 and LIFE research programmes, the successor to the Framework Programmes for Research and Technological Development.

Since the 2007 Energy White Paper, significant effort, led by Department of Communications, Energy and Natural Resources, has gone into integrating various research, development and commercialisation support activities into one coherent energy innovation process. Inter-agency and, to a lesser extent, inter-departmental, co-operation has been achieved in the energy space. The change of Science Foundation Ireland (SFI) policy to recognise relevance to national policy as a criterion for supporting basic research was a major factor in progressing this policy objective. It will be important to maintain momentum in securing the integrity of the 'innovation chain'.

The priority for future national work will be to ensure continuity of appropriate work as support mechanisms change, and to leverage Horizon 2020 funding for priority areas.

6.6 Modelling

Consistent, dependable policy is key to mobilising energy investment, providing the certainty that investors need. Within the EU, national authorities must ensure a uniform approach to evidence-supported decision-making. In addition, tracking of climate targets and EU energy framework compliance will become more critical over the next decade. Energy price comparison and analysis must be nuanced to reflect local, national and regional circumstances and characteristics.

The 2012 International Energy Agency Review of Ireland's Energy Policy urged the Government to undertake more energy modelling and energy systems analysis, and to become more involved with relevant international work. As a result, Ireland has ramped up its energy modelling work, and developed a suite of 'top-down' economic models and 'bottom-up' technical models, which have the ability to examine a large number of potential energy scenarios up to 2050. The quality of this work has been internationally recognised, and Ireland now chairs the IEA Energy Technology Systems Analysis Project.

SEAI's energy modelling group was established to provide analysis and modelling support to policy decision-makers, investors and the market. The group has developed a suite of models of the Irish energy system, and uses these to provide annual updates on Ireland's progress towards key targets in both the supply of and demand for energy. The group also undertakes cost-benefit analyses and evaluations in support of Department's own expertise and policy development. The SEAI co-funds energy modelling in a number of other research groups in the universities.

There is increasing recognition that this work can provide solid evidence for policy decisions; it helps to inform climate-change policy as well as energy policy. There is a need to foster more collaboration and provide for ongoing structured interaction between researchers, modellers and policymakers, in a two-way process of engagement. This would ensure that such research work addresses the real energy problems, their impacts on citizens and challenges for policy makers in resolving such issues. In addition, publications have relevance and can underpin a more informed policy debate.

While the situation is much improved since 2007, a sustained, consistent approach to energy modelling is required to improve decision-making and consensus-building. To achieve this, the Government will encourage the development of a sustained, consistent national level framework for integrated energy modelling and encourage the standardisation of information and definitions. Such a framework should leverage existing energy models at international and national levels in terms of inputs and outputs in critical modelling domains (e.g. energy system, economic, social, environmental impact) and with regard to demand/supply scenarios. Government will also consider using national-level energy modelling structures as a hub or national clearing house, particularly in order to enhance North-South co-operation and regional energy planning.

6.7 Energy Data as an Enabler of Innovation

The sharing of energy data and intellectual property has the potential to unleash innovation and creativity in the energy sector, and nowhere more so than in reducing unnecessary energy usage. As an example, the national Building Energy Rating dataset is being made available, on an anonymised basis, to researchers who wish to examine the patterns of energy performance in Irish homes and buildings. Also, SEAI has published interactive digital maps of renewable energy resources, such as wind and bioenergy that can be used by researchers, businesses and energy users. The introduction of digital, individualised, postcodes will provide many opportunities to collaborate across government departments and agencies, in order to generate information on the geography of energy supply and demand, and on the energy performance of buildings in Ireland, subject to the appropriate data protection. Linking the building energy ratings (BER) database to CSO data via postcodes, will, for example, greatly enrich information on energy affordability and how best to tackle the issue and target supports. To enhance the possibilities of finding new and exciting opportunities, the following possibilities will be explored:

- provision of free access to energy system and modelling data at a national level, with adequate control structures (establish a forum to complete a report within 6 months),
- for existing information and data-sharing protocols, consider how best to allow wider dissemination of data (including a shared approach with SEAI and other agencies if necessary), and
- any future IGAs could include data-sharing agreements at minimal cost.

6.8 People and Process: Cross-Government Collaboration

Ireland has many opportunities that could be exploited when seeking to facilitate employment creation through energy policy. In addition to abundant renewable energy sources, Ireland has a proven track record in ICT software development, and a responsive, flexible administrative system which can quickly solve challenges preventing progress. To maximise the potential benefits of these characteristics, the Department of Communications, Energy and Natural Resources proposes to establish an informal ad-hoc group that would meet from time to time to consider, and seek to resolve, issues that may be preventing energy related projects that could give rise to investment and employment. Government Departments (e.g. the Department of Communications, Energy and Natural Resources, Department of the Environment, Community and Local Government and the Department of Jobs, Enterprise and Innovation) and agencies (e.g. Industrial Authority of Ireland, Enterprise Ireland, Forfás, Sustainable Energy Authority of Ireland and the Commission for Energy Regulation) will seek to be as flexible and adaptable as possible, while respecting the regulatory and statutory remits of all bodies, in their pursuit of solutions to remove barriers to investment. The Department of Communications, Energy and Natural Resources proposes that the ad-hoc group of civil and public servants would work collaboratively to overcome obstacles and explore new opportunities in the energy sector.

The group will be guided by two key principles: (i) a spirit of flexibility and adaptability, and (ii) the need to execute, maintain momentum and progress.

Climate action and energy policy are cross-cutting issues that will affect nearly all Departments. The ramifications of energy and climate policy will be felt as they translate into economic opportunity and activity and the potential welfare gains to society. In the coming years, the energy sector will become more central to the Irish economy and more Government Departments, such as Agriculture, Health and Social Protection, will be affected and can be expected to become more engaged in energy policy decision-making.

Priority 6 – Driving Economic Opportunity: *Questions and Policy Options*

40. What skills and training are required to underpin the energy system in 2020?
How should training for the energy sector be organised?
41. How can energy policy be designed to maximise and grow Irish employment in the sector in the long term?
42. How can Government funding for R&D in the energy field be best targeted to maximise the potential for the commercialisation of IP emerging from such R&D?
43. How should research funding organisations modify their support programmes?
44. How should Ireland best position itself to maximise the benefit from Horizon 2020?
45. What else should be done to maintain and improve the integrated innovation support process, from basic research to commercialisation?
46. How can there be more collaboration and ongoing structured interaction between researchers, modellers and policymakers to ensure that energy research and modelling address the real energy policy problems including impacts on citizens, and challenges as policymakers perceive them, and that the resulting analysis and publications have policy relevance?
47. Do any other areas within the energy/enterprise policy space need to be addressed in the forthcoming Energy White Paper?

Appendix 1:

Glossary

AD	Anaerobic digestion
ACER	Agency for the Co-operation of Energy Regulators
BER	Building Energy Rating
BGÉ	Bord Gáis Éireann
BUSI	Build Up Skills Ireland
CO₂	Carbon dioxide
CACM	Capacity allocation and congestion management
CAG	Common Arrangements for Gas
CCGT	Combined-cycle gas turbine
CEF	Connecting Europe Facility
CER	Commission for Energy Regulation
CHP	Combined heat and power
CNG	Compressed natural gas
DCENR	Department of Communications, Energy and Natural Resources
DELG	Department of Environment, Community and Local Government
DETINI	Department of Enterprise, Trade and Investment Northern Ireland
DJEI	Department of Jobs, Enterprise and Innovation
DSO	Distribution systems operator
DS3	Delivering a Secure Sustainable Energy System
ENSREG	European Nuclear Safety Regulators Group
EPA	Environmental Protection Agency
ERC	Electricity Research Council
ESB	Electricity Supply Board
EU/IMF	European Union/International Monetary Fund
EVs	Electric vehicles
EWIC	East-West Interconnector
ESRI	Economic and Social Research Institute
ETS	Emissions Trading Scheme
FOU	Full ownership unbundling
GDP	Gross Domestic Product
GHG	Greenhouse gas
GWh	Gigawatt hour
IAEA	International Atomic Energy Agency
ICT	Information and communication technologies

IEA	International Energy Agency
IEM	International Energy Market
IGA	Intergovernmental Agreement
ITO	Independent transmission operator
IMP	Integrated Marine Plan
LEU	Large Energy Users
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MWh	Megawatt hour
NEEAP	National Energy Efficiency Action Plan
NESC	National Economic and Social Council
NIE	Northern Ireland Electricity
NPP	Nuclear power plant
NRA	National Regulatory Authority
NREAP	National Renewable Energy Action Plan
NORA	National Oil Reserves Agency
OECD	Organisation for Economic Co-operation and Development
OJEU	Official Journal of the European Union
PAYS	Pay-as-you-save
PCI	Projects of Common Interest
PSO	Public Service Obligation
R&D	Research and development
REFIT	Renewable Energy Feed-In Tariff
REMIT	EU Regulation No 1227/2011 on wholesale energy market integrity and transparency
RES-E	Renewable Energy Sources in Electricity
RES-T	Renewable Energy Sources in Transport
SEAI	Sustainable Energy Authority of Ireland
SEM	Single Electricity Market
SEMC	Single Electricity Market Committee
SET-Plan	European Strategic Energy Technology Plan
SFI	Science Foundation Ireland
SONI	System Operator for Northern Ireland
TPER	Total Primary Energy Requirement
TSO	Transmission system operator
UCD	University College Dublin
VRT	Vehicle Registration Tax
WACC	Weighted Average Cost of Capital

Appendix 2: Key Department Publications since 2007

The First National Energy Efficiency Action Plan (NEEAP)

The Second National Energy Efficiency Action Plan (NEEAP 2)

'Warmer Homes' – A Strategy for Affordable Energy in Ireland

Offshore Renewable Energy Development Plan

National Renewable Energy Action Plan

First Progress Report on the National Renewable Energy Action Plan

Second Progress Report on the National Renewable Energy Action Plan

Strategy for Renewable Energy 2012-2020

Study of the Strategic Case for Oil Refining Requirements on the Island of Ireland

Review of the Security of Ireland's Access to Commercial Oil Supplies

Department of Communications, Energy and Natural Resources, 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure', July 2012

Frontier Economics Transmission Assets Analysis, 2011

Study on Common Approach to Natural Gas Storage and Liquefied Natural Gas on an All-Island Basis, 2007

All Island Electricity Grid Study, January 2008. (Published jointly by the Department of Communications, Energy and Natural Resources and the Department of Enterprise, Trade and Investment of Northern Ireland)

Appendix 3:²⁷

Other Relevant Publications

Ireland

- Sustainable Energy Authority of Ireland, 2014, 'Renewable Energy in Ireland'
- Sustainable Energy Authority of Ireland, 2013, 'Energy in Ireland 1990-2012'
- Sustainable Energy Authority of Ireland, 2013, 'Energy in the Residential Sector – 2013 Report'
- Sustainable Energy Authority of Ireland, 2012, 'Large Industry Energy Network Annual Report 2011'
- Sustainable Energy Authority of Ireland, 2012, 'Better Energy Homes Scheme Impact Report – Billing Analysis'
- Sustainable Energy Authority of Ireland, 2011, 'Energy Forecasts for Ireland to 2020'
- ESRI, 'A Review of Irish Energy Policy, 2011'
- Forthcoming NESC Report 'Wind Energy in Ireland: The Challenge of Community Engagement and Social Support'
- Our Sustainable Future – A Framework for Sustainable Development for Ireland, 2012

EU

- Commission Communication, 'Energy Roadmap 2050' [COM(2011)885 – 15.12.2011]
- Commission Communication, 'Making the Internal Energy Market Work' [COM(2012)663 – 15.12.2012]
- Commission Communication, 'Delivering the Internal Electricity Market and making the most of public interventions' [C(2013)7243 – 5.11.2013]
- Commission Communication, 'A Policy Framework for Climate and Energy in the period from 2020 to 2030' [COM(2014)15 – 22.1.2014]
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²⁷ The list of publications is indicative but not exhaustive.

²⁸ The IPCC Fifth Report is comprised of a series of documents published by three Working Parties and a Synthesis Report to be finalised in October 2014. Working Group I of the IPCC released the Summary for Policymakers of its report, on the Physical Science Basis of Climate Change, in September 2013, and published the full report in January 2014. Working Group II released its report on Impacts, Adaptation and Vulnerability, on 31st March 2014. Working Group III, which assesses options for the Mitigation of Climate Change, published its report on 13th April 2014.

