Green Paper on Energy Policy in Ireland

Environmental Protection Agency

Response to Public Consultation

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1. Introduction

The development of energy policy in Ireland is central to achievement of key environmental, societal and economic goals, and the Environmental Protection Agency (EPA) welcomes this opportunity to comment on the Energy Green Paper. The paper outlines a number of issues and provides a series of questions in relation to priority areas. Commentary and responses are provided on a number of the identified issues which also address aspects of the related questions. Issues that are outside of the remit of the EPA are not addressed.

The Energy Green Paper itself provides a clear context for the EPA response, including the following:

- Energy in Ireland is currently mainly provided by imported fossil-fuel, at a cost of €6.5 billion annually;
- Use of fossil fuels produces key greenhouse gas emissions and air pollutants that threaten Ireland's climate, its environment and the health of its people;
- The dependence on fossil fuels leaves Irish energy consumers open to considerable uncertainty and price volatility;
- Ireland's renewable energy resources are significantly greater than Ireland's national energy requirements;
- There is considerable opportunity for green economic development and the generation of skills and employment in national energy sector.

These points, along with Ireland's obligations and targets under various EU Directives and its commitments under the UN Framework Convention on Climate Change (UNFCCC) underpin the requirement for further development of energy policy.

The Green Paper also reflects different policy issues that exist in the context of future energy policy and decision making. In particular the EGP highlights (i) the need to decarbonise energy supply and use and (ii) the goal to exploit fossil hydrocarbon reserves. While it is possible to have these goals at Government level it may not be satisfactory to address both in one policy document. An approach to this may be to address these in separate policy documents. Links and trade-offs can then be addressed in other fora or developed as part of a series of energy scenarios/pathways for Ireland. Here, the EPA addresses energy policy issues rather than fossil hydrocarbon exploitation issues.

In addition the EPA recognises that there are different challenges for energy policy in electrical power generation, heating and transport. Elements of these are not fully within the

scope of Department of Communications, Energy and Natural Resources (DCENR). A wider national policy framework needs to reflect these issues in an integrated manner.

2. Context for the EPA submission

The recent publication by the Intergovernmental Panel on Climate Change (IPCC) of its 5th Assessment Report (AR5) provides a clear context for international action to address climate change. Ireland has to play its role in protecting the Earth's climate system in the context of actions at European Union (EU) and United Nations (UN) levels. This, as the AR5 shows, requires a transformation of the energy sector involving the phase out of fossil energy use.

Ireland also requires a high quality energy supply that is sufficient for the needs of its people, its business and its social and economic development. This requires the establishment of systems for the generation, storage and use of non-fossil energy sources. As outlined in the EGP this has already started and is enabling new industry and employment. However, a major step-up is required which entails planning and investment. The analysis of such investments should include consideration of the co-benefits for areas such as; energy security, human health, the environment and overall sustainable economic development.

The resilience of the future energy system to climate change impacts and extremes is also an emerging issue which must be addressed as part of national policy. This issue is not well reflected in the EGP but needs to be factored into long lived investments such as are required in the energy sector.

3. The Energy Green Paper and an Energy Vision for Ireland

The Energy Green Paper identifies that a major transformation of energy systems and energy use is required. While the timescale for this is not identified, it is considered that the period to 2050 is key for this transformation. The transformation requires the involvement of citizens and stakeholders in business, communities, institutions and Governments. It is also part of global transformation and, therefore, gives rise to opportunities both to export solutions and to avail of solutions and technologies developed elsewhere. Future energy policy can act to catalyse and shape the required move to zero carbon emission energy by 2050. In this context the EPA looks forward to the low carbon roadmap to be provided by DCENR later in 2014.

The trend in decoupling of energy from emissions, as outlined in the Energy Green Paper, is welcome. This is due to domestic policies, availability of new and improved technologies, and changing behaviours. These will be a key feature of the transition and transformation of the energy sector in Ireland. However, the pace of this change will need to increase significantly. This is required both to meet targets under the current EU 2020 Climate and Energy Package and to provide a cost effective basis for future emissions reductions. EPA projections of greenhouse gas emissions for the period to 2030 are provided in Appendix 1

along with mitigation options. These show that Ireland is not on a pathway to a low emission society and economy and, without further policy development, targets under the current EU Climate and Energy will be missed. The need for accelerating such a transition is also highlighted by the IPCC AR5 in the Working Group III Report published in April, which states that scenarios in line with the EU and global policy goal require "rapid improvements of energy efficiency, a tripling to nearly a quadrupling of the share of zero- and low-carbon energy supply from renewables… by the year 2050".

The challenge in Ireland is similar to the global challenge. An unprecedented transformation of energy generation, distribution and use is required:

- The EPA considers that a more proactive approach to decarbonisation of energy generation and use in Ireland is needed to enable the required transition to a low emission energy system.

All citizens and sectors have an interest in achieving this in a cost-effective and positive manner. This requires a ranges of measures including effective policy, strategic planning and investment, and rigorous implementation. A number of the issues, including structural and process issues, are reflected in the Energy Green Paper and need to be addressed through the future policy framework.

The transition has to be enabled by national policy and practice. In this context the articulation of a vision for clean energy generation, supply and use is needed. From the EPA perspective elements of this vision should include:

- Zero fossil carbon by 2050 at the latest
- A reliable, cost-effective and secure energy system from individual to national scales
- Flexibility in energy generation, distribution and use
- Availing of Ireland's renewable energy potentials at all scales

The vision needs to encompass requirements arising from the EU actions and targets in this area while reflecting the distinctive features of Ireland's challenges and opportunities. Principles that could assist in this transition would include:

- Empowerment of the provision of energy services across all levels of scale i.e. from micro-generation to large-scale energy production
- Access to detailed data and information on options to manage energy use
- The use of incentives and penalties to advance structural and behaviour changes
- Innovative funding schemes and the sustainable elimination of energy poverty in Ireland

The Energy Green Paper outlines a large number of schemes and processes that are currently on-going in Ireland. These are welcome but need to be advanced more actively in a structured manner as part of a "collective delivery" process. The policy can provide the framework for this in the context of the longer term vision. Data and information are central to this process and need to be more readily available and accessible to decision-makers from homes to businesses and institutions. Linked targets, metrics and indicators on progress need to be part of this iterative decision-making process.

4. Priority areas

The priority areas identified in the Energy Green Paper serve to highlight key elements of the likely policy response. Commentary on these is provided here.

Priority 1: Empowering Energy Citizens

The fact that 'Empowering Energy Citizens' is identified as the first priority in the paper is welcome. Engagement with the citizens of Ireland is essential to the required development and transformation.

The questions raised on 'Empowering Energy Citizens' are best addressed in the context of an overall vision as outlined above. This must be attractive to citizens and enable their engagement. Citizens are likely to respond positively to a vision of transformation of their homes that enhances quality of life, at low running costs and potentially provide opportunity to be self-financing through micro-generation schemes.

- The EPA view is that sustainable elimination of energy poverty should be a key future policy goal.

A goal of the sustainable elimination of energy poverty can be a component of positive engagement with citizens. Other elements would be:

- Incentives for best energy performance e.g. low cost energy to an average consumption level with significantly higher tariffs for consumption above this level.
- Enabling distributed generation and micro-generation that increases energy independence of communities and households has the potential to engage citizens in the zero carbon transformation.

This will require a suite of funding schemes from Government that are realistic for a spectrum of household types from rural to urban areas.

- Energy management systems will also be crucial to mitigation in the energy sector by enabling enhanced performance in energy efficiency.

A number of countries including Germany, Sweden and Denmark can provide lessons on engagement of citizens. Overall a more rapid and proactive engagement with citizens is needed. The further development of the roles of the Commission for Energy Regulation (CER) and the Sustainable Energy Authority of Ireland (SEAI) can be an avenue to enable this in the context of a national vision underpinned by enabling policy. New technologies and social media can also contribute to this process.

The information in the Energy Green Paper on the level of low-income, and other households, that have been upgraded *via* existing schemes is of interest. A wider context for this statement is, however, needed. For example, what is percentage of total households, timeline for addressing all households and quality of the upgrades, costs and expected saving in energy use and reduction in emissions. It is suggested that, if not already carried out, all such work should be accompanied by an assessment of how to refit such housing to a state of the art efficiency and costs for this. This would contribute to determining the levels of investments that are needed to achieve the sustainable elimination of energy poverty. The wider benefits for this investment should also be included in this analysis. Financial schemes to enable this should then be identified.

- The EPA considers that future energy policy has to enable Ireland to realise the maximum potential of its renewable energy resources in a cost-effective and environmentally sustainable manner.

The capture of the renewable potential of Ireland requires that citizens, communities and regions are empowered and engaged in this. Therefore it is a priority to enable renewable options including micro-generation and storage systems at these levels and enabling grid linkages as necessary. While the Energy Green Paper notes that detailed consideration of this is required, lessons from other EU countries and pilot schemes can inform such considerations. Smart and flexible metering is part of this process and should be advanced more rapidly than is currently envisaged.

Priority 2: Markets and Regulation

The EPA considers that policy and regulation should set the context for energy markets. The EU Emissions Trading Scheme (ETS) is a key example of regulation in which a long-term phase out of fossil emissions is envisioned at a pan EU level. Advances made under the ETS and its future development are outlined in Appendix 2. While the power generation system in Ireland is part of the ETS a clear definition of long term national energy policy goals is required that includes or transcends what is contained in the ETS. Markets for enhanced energy efficiency performance of households, businesses and industry need to be created and enhanced through policy and regulation. This will provide the basis for investment and stability at various levels ensuring security and enhancing quality. The Single Electricity Market (SEM) is clearly an opportunity to improve links with the UK and Europe which can have benefits for energy security and competitiveness. There is a clear need for Ireland to be part of the wider European energy networks.

The EPA notes the complexity of the Commission for Energy Regulation (CER) roles which are outlined in the Energy Green Paper. These can evolve in the context of the need of future policy development to ensure that the various roles are addressed in the manner required in the context of future policy. It is also noted that the Geological Survey of Ireland also has potential for development in relation to areas linked to energy policy including in the areas of geothermal energy and future Carbon Capture and Storage work if this were required in the future.

Priority 3: Planning and Implementing Essential Energy Infrastructure

Planning for energy infrastructure needs to accommodate a range of requirements but must be effective in enabling rapid up-scaling of renewable at various levels of generation and use. Issues of pathways for effective and acceptable energy infrastructure development are complex but these need to be addressed to enable the required energy infrastructure to enable systems integration of diverse capacity and transformation.

It is a priority to increase the level of renewable electricity that can be integrated to the Irish electricity grid while at the same time meet increasing electricity demand. There is a need to explore various storage systems that can be used in the context of renewable energies including piloting of innovative systems at various levels.

Resilience to climate change is also an issue that must be addressed in planning our energy system. As is noted "Irish energy networks … have met the test of severe weather episodes…" and this is welcome. However, as with all essential infrastructure, the impacts of future climate conditions, including issues of flooding and erosion, must be mainstreamed into planning and development. It is anticipated that DCENR will also provide a sectoral adaptation plan which will address these and other issues.

The development of the current gas infrastructure to better enable the production of bio-methane from a range of sources, including from farm waste, should be examined as part of policy development in this area. In this context, the EPA recognises that barriers have been identified to effective development of Anaerobic Digestion (AD) systems for bio-waste from farms e.g. the distributed nature of farming in Ireland. However, the EPA would cite the success of cooperatives in milk production in addressing a similar problem, and there are some examples already in place in Ireland where anaerobic digestion is providing a service to local farmers and gas for local energy use. These may be enabled *via* the LARES or similar local schemes. Lessons from these systems can be applied to waste management and the EPA considers that available analysis supports the development of AD systems including the material provided in the 2011 report by the Joint Committee on Communications, Energy and Natural resources on the Development of Anaerobic Digestion in Ireland. Selected elements of this paper are provided in Appendix 3.

Priority 4: Ensuring a Balanced and Secure Energy Mix

Elements of this priority area address hydrocarbon exploration and exploitation issues that the EPA considers should be addressed in a separate policy paper. Linkages can be examined further *via* scenario and pathways analyses. These issues are not commented on here.

The fact that fossil energy is estimated to cost about €6.5 billion annually to the Irish economy provides an economic context for actions to reduce this dependence. Issues also arise with respect to the volatility of global markets and their impacts on choices made in Ireland. For example the increased use of coal in 2012 by comparison to 2011 is a retrograde step arising from changes in world markets for coal.

- The EPA considers that there is a need for more effective pricing of fossil carbon emissions at a level commensurate with their impacts on climate, environment and human health and subsidies that support fossil energy use need to be removed.

The EPA recognises that Ireland may also wish to review nuclear power options. The public perception of nuclear energy is negative. There are risks with this technology including waste management and storage issues. However, there are also clear and major risks with continued use of unabated fossil energy. Use of Carbon Capture and Storage (CCS) can assist in reduction of emissions and may be part of a future suite of Carbon Dioxide Removal Technologies if used with sustainable bio-energy (BECCS). However, the long-term geological storage of carbon-dioxide requires significant investment and guarantees in relation to the security and safety of major geological storage over period of hundreds of years. This is, in a sense, is similar to the considerations that arise for addressing the safe management, disposal or storage of nuclear waste.

- The EPA considers that all the options for achievement of decarbonisation of the energy sector in a sustainable manner need to be assessed as part of the on-going development of a national energy policy.

In relation to heating and transport three key approaches are considered essential.

1. Policies and incentives to increase the production and use of renewable energy.
2. A move to much greater energy efficiency in all future building and through retrofit of existing building infrastructure to the highest possible standard
3. Incentives to enhance the take-up of electric and low emissions vehicles including the development of required infrastructure for these vehicles.

New approaches to energy storage are needed including using innovative storage technologies and distributed storage to address security. These may involve advance pilot schemes for certain communities or groups who wish to take a leading role in the required transformation. This is seen to include micro-generation systems as well as potential grid connections.

Priority 5: Putting the Energy System on a Sustainable Pathway

It is a global priority to move from dependence on fossil energy sources in order to protect our climate system. The IPCC in its Special Report on Renewable Energy (SRREN) has identified a series of options that can address energy needs. The Energy Green Paper states that Ireland's renewable energy resources are significantly greater than Ireland's national energy requirements. Realisation of this potential must also be achieved in a sustainable manner i.e. issues of sustainable land management, protection of habitats, biodiversity and other environmental services, need to be factored into decision making processes. It must also identify key targets for Ireland that exist at EU level and the necessity of meeting these and future targets e.g. for 2030 which are part of the EU pathway to 2050.

The EPA considers that decarbonisation and greater energy efficiency need to be central to the future national energy policy, and this will provide a clear signal to energy practitioners in relation to the actions and investments that are required. This is also recognised by the IPCC in its 5th Assessment Report which highlights the need for investment in both the energy supply and energy end use sectors. The report cites retrofit of established building stock as a key part of mitigation strategy with reductions in heating/cooling energy use of 50-90% having being already achieved.

Decarbonisation would require identification of, and enabling, a pathway for using the range of renewable energy resources that are available and enable the deployment of these at the scale required to enable the transition from a fossil dependent energy system to a zero fossil energy system by 2050. In tandem with this is the identification of the range of actions and investment required to radically transform the way that we use energy resulting in much greater levels of efficiency. The costs for both decarbonisation and energy efficiency need to be discounted over a long timescale recognising that the longer term benefits and savings as well as co-benefits for energy security, human health and the environment.

It is recognised that for various reasons some groups have not moved as rapidly as required towards more efficient use of energy and penalties e.g. progressive pricing of energy use relative to sectoral norms and or other standards that can be used to encourage greater movement to efficiency should be considered. In this context the EPA looks forward to the low carbon roadmap to be produced by DCENR later in 2014.

Priority 6: Driving Economic Opportunity

The EPA considers that Ireland has considerable economic opportunities arising from a national vision of clean and secure energy for Ireland. This should enable the effective transformation to renewable energies and greater efficiency. The transition will entail investment, must be planned and have buy-in from citizens and key stake holders. Elements of how this transition may occur have been provided by modelling analysis carried out by the Irish TIMES modelling group which has been funded by the EPA and SEAI (see next section). This shows that, even with existing technologies, a major transition can be envisioned by 2050. The overall costs of this transition are difficult to assess over the time scales being considered and it is recognised that new technologies will emerge in this period. However, Ireland, along with its EU and global partners, needs to provide a clear policy signal about ambition and intent to carry out this transition.

5. Other information

The EPA has produced a number of reports on renewable energy options and analysis of pathways to reduce or eliminate greenhouse gas emissions. These include:

Pathways analysis

The Irish TIMES model provides insights on alternative future energy system pathways for: (i) the Irish economy (technology choices, prices, output, etc.), (ii) Ireland's energy mix and energy dependence and (iii) the environment. It is used in this project to assess the implications of emerging technologies and of mobilising alternative policy choices such as meeting renewable energy targets and carbon-mitigation strategies. The two key new perspectives that this research project gives are: (i) a full energy-systems modelling approach and (ii) a focus on the medium term (to 2050) as well as the short term (to 2020).

Global and EU policy on climate change is in transition as the first commitment period of the Kyoto Protocol comes to an end and the United Nations Framework Convention on Climate Change (UNFCCC) works to shape a future agreement on global actions to address climate change post-2020. Ireland is also at a critical point in decision-making on how to move to a

low-carbon and resource efficient economy and society. As a Party to the UNFCCC and an EU Member State, Ireland is committed to key climate-protection goals, including ensuring that the average global temperature increase is kept below 2°C. Adoption of this goal implies that developed country greenhouse gas emissions will be reduced by 80–95% relative to 1990 levels by 2050. Consideration of 2050 goals is, therefore, essential for planning and achieving the mitigation targets established under the EU 2020 Climate and Energy Package.

EPA supported research on behaviour and transition including in the areas of energy use can be accessed via http://www.consensus.ie/energy/ and via http://www.greenhome.ie/energy.

Renewable options

Current grass species and cultivation practices are favourable for anaerobic digestion (AD) which is a mature technology. Upgrading biogas to biomethane, injecting into the gas grid, leads to an effective bioenergy system complete with distribution to all major cities and 620,000 houses. The Renewable Energy Directive allows a double credit for biofuels derived from residues and lignocellulosic material (such as grass). It is shown that 100,000 ha of grass (2.3% of agricultural land) will allow compliance with the 10% renewable energy in transport target for 2010. Alternatively, this would substitute for 35% of residential gas consumption. Reactor design must take account of the specific feedstock or combinations of feedstock; the reactor must be suited to the feedstock.

http://www.epa.ie/pubs/reports/research/climate/ccrp11-thepotentialforgrassbiomethaneasabiofuel.html (Also see Appendix 3)

The EPA continues to support research in this area on its own and in cooperation with other agencies and bodies.

6. Conclusions and Key Recommendations

The EPA considers that the green paper on energy policy is an important step in the development of a long term positive energy policy for Ireland. It considers that the outcome should be a clean energy vision for Ireland which provides a pathway for zero fossil and resource efficient energy for Ireland by 2050 at the latest. This should be attractive to the citizens of Ireland and key economic and social sectors.

The policy should inform investment and innovation at all scales. The remit of key agencies such as the CER and SEAI may be further aligned with policy to provide the necessary enabling environment to achieve the policy goals. Clear metrics are required to show how progress is being made from an individual to national levels with clear disaggregation of data to inform choices at various scales i.e. individual, community, regional levels. There will need to be significant investment to ensure that this policy will be implemented. The analysis of the costs of this investment should include the overall benefits e.g. for energy security, human health, environmental protection, sustainable development and economic opportunities.

Key recommendations include:

- A proactive approach to decarbonisation of energy generation and use to enable the required transition to a low emission high efficiency energy system
- A goal of zero fossil carbon energy by 2050 leading to a reliable, cost effective and secure clean energy system for Ireland
- Enabling citizen buy-in to the transformation through positive engagement and enabling innovation that eliminates energy poverty and provide societal benefits

Appendix 1: Greenhouse Gas Emissions Projections

The EPA's projections published in May 2014 give two possible pathways for greenhouse gas emission trends out to 2030. These two scenarios represent the outer bounds for greenhouse gas emissions with actual emissions likely to occur somewhere in between the two. These projections show that Ireland is not on track to meeting our EU 2020 targets and therefore not on the pathway required to transition to a low-carbon economy.

Greenhouse gas emissions to 2020

There is a significant risk that Ireland will not meet its 2020 EU targets even under the most ambitious scenario. The most important energy-related sectors covered by these targets are:

- Transport
- Residential
- Industry and commercial sectors

Transport

The transport sector is projected to grow by 15%-23% depending on policy implementation. This is significant growth from a sector that contributes a large share to Ireland's greenhouse gas emissions.

The EPA would like to see concerted action to halt the growth in transport emissions and ultimately decouple transport emissions from economic growth. This will require joined-up policy development from both the Department of Communications, Energy and Natural Resources and the Department of Transport, Tourism and Sport.

The EPA, in particular, supports the proposals in the Energy Green Paper for diversifying the fuel mix for transport as a means of decarbonising the sector. In particular, the EPA welcomes the proposals to undertake a thorough examination of the costs, benefits and implications 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.

Natural gas has proven a viable fuel alternative in other countries such as Germany and Spain particularly in freight transport and buses. Freight transport is a significant source of greenhouse gas emissions in Ireland and, therefore, any measures that can mitigate emissions from this sector will have a potentially large impact in the context of a recovering economy.

Residential

Greenhouse gas emissions from the residential sector are projected to decrease by 5%-30% on current levels.

Under the more ambitious scenario (i.e. 30% reduction), significant emission reductions are assumed to come from retrofitting homes. There is an urgent need for supporting programmes to be maintained to encourage continued retrofitting and to ensure that this ambitious level of retrofitting is achieved with the associated emissions reductions.

Industry and Commercial Services

Greenhouse gas emissions from the Industry and Commercial Services sectors are projected to increase by 3% under the worst-case scenario and decrease by 9% under the best case scenario.

Under the most ambitious scenario, retrofitting also features strongly as a means to reduce emissions. In addition, penetration of renewable heat in industrial and commercial sites is also included in the projections. Both of these need supporting policies and measures to be delivered.

Electricity generation

Greenhouse gas emissions from electricity generation in Ireland are under the scope of the EU Emissions Trading Scheme and are therefore not included in the sectors covered by the national EU 2020 targets for non-ETS sectors.

The projections indicate that greenhouse gas emissions from electricity generation will decrease by 11%-16% by 2020 on current levels. This is largely attributable to increased penetration of natural gas and renewables relative to more carbon-intensive fuels such as coal and peat. The EPA welcomes the continued promotion of renewable energy in the power generation sector as a means of decarbonising electricity generation and moving Ireland to a low-carbon economy.

Greenhouse gas emissions to 2030

The EPA's projections show that greenhouse gas emissions are projected to increase between 2020 and 2030 in the absence of further Government policy and measures. These figures emphasise the importance of implementing ambitious policy options out to 2030 (and beyond) to halt this projected growth in emissions and, in this context, the Energy Green Paper is particularly welcome.

Appendix 2: State of Play on ETS and its future development

Emissions trading is a "Cap and Trade" scheme where an EU wide limit or cap is set for participating installations. The cap is reduced over time so that total emissions fall. Within that limit "allowances" for emissions are auctioned or allocated for free (outside the power generation sector). Individual installations must report their CO_2 emissions each year and surrender sufficient allowances to cover their emissions. If their available allowances are exceeded an installation must purchase allowances. If an installation has succeeded in reducing its emissions, it can sell its leftover allowances. The system is designed to bring about reductions in emissions at least cost, and is envisaged to play an increasingly important role in assisting European industry implement the type of reductions envisaged in the EU Commission's limit of at least an overall 20 per cent reduction of greenhouse gas emissions in the EU by 2020.

The Environmental Protection Agency is the competent authority for implementation of the Emissions Trading Scheme in Ireland including the administering of accounts on Ireland's domain in the Union Registry.

Ireland's verified ETS emissions since 2005 were as follows (from year to year the scope of the scheme can change somewhat as some installations close and new ones open):

Verified Greenhouse Gas Emissions (Mtonnes CO_2)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Emissions	22.43	21.7	21.25	20.38	17.22	17.36	15.77	16.89	15.68

Participants in the EU Emissions Trading Scheme based in Ireland reported 7% fewer greenhouse gas emissions for 2013 than in 2012. Almost 100 major industrial and institutional sites in Ireland participate in the Emissions Trading Scheme. These include sites operating in the power generation, cement, lime, and oil refining sectors. Also included are large companies in sectors such as food & drink, pharmaceuticals and semi-conductors. Companies participating in the scheme are required to report their emissions (to the EPA) by 31 March each year.

The decrease in reported emissions for 2013 is largely due to lower emissions from the power generation sector (a decrease of 11.5% from the conventional power plants). This decrease may be partly due to extended shutdowns of units at Moneypoint coal-fired power station, coupled with the availability of renewables. Emissions from the cement production industry decreased by 4% due to lower production levels. Companies in the Food & Drink sector reported an overall increase (4%) in their emissions last year, reflecting strong growth in this sector .

The EU ETS covers more than 11,000 power stations and industrial plants in 31 countries, as well as airlines. Altogether the EU ETS covers around 45% of total greenhouse gas emissions from the 28 EU countries. In Ireland the share of emissions is much lower due to our lower industrial base and the relative importance of the agricultural sector. In 2012 Ireland's ETS emissions accounted for 28.9% of the total greenhouse gas emissions.

The ETS can only be an efficient instrument to promote low-carbon investment in Europe when there is an adequate price for carbon. Due to the economic crisis and the use of grandfathering as a method for free allocation in the past there was a surplus of about 2 billion allowances, over and above that required for compliance, in 2013, at the beginning of the third trading period. The result is that the price of carbon averaged at €4.53 per tonne in 2013.

The Commission has proposed to establish a market stability reserve from 2021 in order to address the surplus of allowances. A market stability reserve would function by putting excessive allowance volumes into a reserve in times of low demand and would provide for the option to increase supply (from reserve volumes) in times of high demand that would otherwise yield excessively high carbon prices. The triggers to be used for releasing allowances are under discussion.

Appendix 3: Key elements of Joint Committee on Communications, Energy and Natural resources on the Development of Anaerobic Digestion in Ireland

Introduction

The European Commission has concluded that 'well-adapted feed-in tariff regimes are generally the most efficient and effective support schemes for promoting renewable electricity'.[1] This conclusion is supported by work from other sources such as the International Energy Agency[2] and the European Renewable Energy Federation.[3]

The Irish Government has set at 40% the target figure for the contribution from renewable energy sourced electricity by 2020.[4] Currently, this figure stands at roughly 15%. Further, the 2007 Government White Paper on energy aspires to a 20% saving in energy usage by 2020.[5] Ireland's energy requirements arise from EC Directive 2009/28/EC on the promotion of energy from renewable sources and the Irish Government's plans to meet the requirement that 16% of overall energy consumption must come from renewable sources. The stated target is that 40% of Ireland's electricity will come from renewable sources in 2020 but adherence to the EU targets means that the actual requirement may be somewhat higher. According to the CER, achieving this target will require the installation of 5,800 MW of renewable capacity, most of which will be wind powered.[6]

The security of oil and gas supplies is an ongoing and real concern. Fossil fuels comprise 96% of Ireland's primary energy mix.[7] Indeed, Ireland is one of the few EU countries in which oil and gas combined account for over 80% of primary energy demand, hence leaving Ireland worryingly exposed to price shocks or any possible disruption to gas or oil supplies.[8] Unfortunately, Ireland is located at the tail end of what is a long and unstable supply chain, riddled with political, geopolitical and geographical instability. All gas imported into Ireland is *via* one inter-connector at Moffot in Scotland. Any disruption there will therefore cause havoc to Ireland's electricity generation. Couple this with the fact that Ireland has only the Corrib gas reserves, and merely a few days of commercial stocks of oil located on the island, and the future looks, at best, risky and at worst, alarmingly uncertain. What is certain however is that any disruption to energy imports would consequently have a significant impact on the Irish economy. It is predicted that Ireland will still be roughly 85% dependent

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[1] http://ec.europa.eu/energy/climate_actions/doc/2008_res_working_document_en.pdf

European Commission Staff Working Document (2008), *The Support of Electricity from Renewable Energy Sources.*

[2] de Jager, D. and Rathmann, M. (2008), *Policy Instrument Design to Reduce Financing Costs in Renewable Energy Technology Projects.* Paris: International Energy Agency.

[3] European Renewable Energy Federation (EREF 2007), *Prices for Renewable Energies in Europe for 2006/2007: Feed in Tariffs versus Quota Systems – a Comparison*.

[4] Government White Paper, 12th March 2007, *Delivering a Sustainable Energy Future for Ireland.* The original target set in this paper was 33%. This was increased to 40% in the Carbon Budget of October 2008.

[5] Full text of Government White Paper is available at http://www.dcmnr.gov.ie/Energy/Energy+Planning+Division/Energy+White+Paper.html

[6] K.H.S.K. Consultants, July 2010, *Assessment of Irish Offshore Wind Energy Support Scheme and Prospects for Investment in Offshore Wind Projects*.

[7] See www.kildarestreet.com/debates/ - 20th April, 2010

[8] Siemens Ireland, July 2010, *The Economic Impacts for Ireland of High Oil and Gas Prices; Pathways to Risk Mitigation and a Low Carbon Future.* Research project commissioned by Siemens Ireland.

on gas and oil to meet its primary energy demand by 2025, despite the existence of the Corrib gas reserves, and the efforts being made to promote wind energy.[9]

Whilst it is notable that much effort has been put into promoting wind energy in Ireland, and with much success, one only has to look back to winter 2009/2010 where the coldest period was also a period of little or no wind. Wind is unfortunately an unpredictable source, which can both under and overproduce. Its reliability as the main source of renewable energy in Ireland is therefore somewhat questionable, although its benefits are certainly recognised. This report will show that Anaerobic Digestion (AD) can provide a more secure and easily quantifiable source of renewable energy, which, in conjunction with the existing renewables, will lead Ireland towards a more secure renewable energy supply, and allow for the attainment of the 2020 targets set by the Irish Government.

As this report will show, the success of AD in other jurisdictions is proven. If implemented effectively, AD would lead to significant job creation in an evolving farming sector, and would inject much needed youth into the sector. Current agricultural output would not be affected, and there would be no initial capital investment required by the Government. This is an indigenous industry which can supply energy security, energy efficiency, job creation, reduction in budget spending in areas such as pollution and waste control, the reduction of greenhouse gas emissions and the attainment of 2020 targets.

The Mechanisms of Anaerobic Digestion

At its most basic, anaerobic digestion involves the breaking down of feedstock by various types of bacteria in the absence of oxygen to form biogas. The residues of this process, called digestate, can also be used as a fertiliser. The model this report will focus on utilises Ireland's most renewable natural resource, green grass, in 1,000 small 380 kilowatt (kW) farm-based generation plants nationwide know as digesters. Each 380 kW plant would generate enough electricity to power roughly 400 houses. The process involves the feedstock (silage and slurry) being fed into an anaerobic digester, which then produces biogas and digestate. The biogas is then converted into electricity and heat whilst the digestate is utilised as fertiliser.[10]

Feedstock Required

The annual powering of a 380 kW digester requires 8000 tonnes of grass silage plus 1300 tonnes of maize silage, along with 4000 tonnes of slurry. An individual farmer could therefore build a plant on his own land or alternatively form a co-op with other likeminded farmers. The cost of the feedstock required to power such a plant stands at *circa* €250,000 per year. This feedstock should be produced locally to negate any transport costs. Producing such feedstock locally should not pose a challenge, as these plants utilise Ireland's richest and most abundant natural resources. It should be noted that Ireland has the third highest level of bovinity in the world. Couple this with the fact that 91% of Ireland's agricultural land is under grass and it can clearly be seen that this is an untapped natural resource, which is both

[9] Graphs reproduced from; Siemens Ireland, July 2010, *The Economic Impacts for Ireland of High Oil and Gas Prices; Pathways to Risk Mitigation and a Low Carbon Future*. Research project commissioned by Siemens Ireland.

[10] Graph reproduced from; Presentation to the Joint Oireachtas Committee on Agriculture, Fisheries and Food, 24th March 2010, *Anaerobic Digestion in Ireland: The Potential and the Problems*.

indigenous and reliable. It is striking that, at the present time, the monies required to purchase this feedstock to generate this electricity are leaving the country and being spent on the importation of fossil fuels.[11]

Land Required

As a general rule of thumb, 1 acre per kW is required. Hence, a 380 kW plant would require some 380 acres of land to produce the feedstock, namely grass silage and maize silage.

Investment Required

There would be no initial Government funding required for the establishment of such a network of AD plants. The capital investment required would be in the region of €4,000 per kW. Therefore, a 380 kW plant would require *circa* €1.5 million capital investment, which cost could be spread between a co-op of farmers. To create 1 Megawatt (MW) of AD generated electricity, a cost of 4 million euro is estimated. This is in comparison to an estimate of 3.5 million per MW of offshore wind energy.[12] Whilst AD may therefore seem a more expensive form of generation, it should be highlighted that the establishment of AD generated electricity is not dependent on a costly National Grid upgrade. Moreover, AD is a constant source, and is not dependent on wind blowing.

Output

Taking the demonstration number of 1,000 380 kW plants nationwide, 380 MW of electricity could be produced, which is equivalent to circa 12% of the National Grid daily average usage, and 8.5% of the National Grid daily peak usage.[13] By 2009, wind energy accounted for 11% of electricity produced in Ireland.[14] The use of AD as a means of generating electricity could therefore be used in conjunction with wind to provide a significant portion of Ireland's daily electricity requirements from the renewable sector by 2020.[15]

Conclusions

The European experience has taught us that AD is a viable industry, but only if substantial and adequate returns are achievable for investors. Our REFIT must be at least in line with, if not higher than those being offered by our European counterparts. The increase in the REFIT will require no start-up cost, yet will reap immeasurable benefits in relation to employment, security of energy supply, exchequer returns, greenhouse emissions, EU environmental targets, budget spending and energy efficiency.

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[11] Presentation to the Joint Oireachtas Committee on Agriculture, Fisheries and Food, 24th March 2010, *Anaerobic Digestion in Ireland: The Potential and the Problems*.

[12] K.H.S.K. Consultants, July 2010, *Assessment of Irish Offshore Wind Energy Support Scheme and Prospects for Investment in Offshore Wind Projects*.

[13] See appendix 4 for an indication of the percentage of National energy requirements that AD can provide. Graph reproduced from; Presentation to the Joint Oireachtas Committee on Agriculture, Fisheries and Food, 24th March 2010, *Anaerobic Digestion in Ireland: The Potential and the Problems*.

[14] SEAI Provisional Energy Balance 2009 – 31st Mach 2010. See www.seai.ie

[15] It has been predicted by the SEAI that wind energy could provide 30% of Ireland's electricity requirements by 2020.

It is predicted that by 2020, wind energy alone will provide up to 30% of Ireland's electricity requirements.[16] Couple this with the 12% of Ireland's electricity requirements that just 1,000 380kW plants would produce if developed over the next ten years and Ireland should meet its 2020 EU requirements in relation to renewable energy, whilst creating employment and ensuring security of energy supply without any need for additional capital Government investment.

[16] Fitzgerald, J., Bergin, A., Conefrey, T., Diffney, S., Duffy, D., Kearney, I., Lyons, S., Malaguzzi Valeri L., Mayor, K. and Tol, R., *Medium Term Review 2008 – 2015* (Dublin: Economic and Social Research Institute – ESRI, 2008)