

Irish Academy of Engineering

Policy Advisory

The Future of Oil and Gas in Ireland

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The Irish Academy of Engineering

The Irish Academy of Engineering is an all-Ireland body, concerned with long-term issues where the engineering profession can make a unique contribution to economic, social and technological development.

Its members are Irish engineers of distinction, drawn from a wide range of disciplines and membership currently stands at approximately 140.

Drawing on the experience and knowledge of its distinguished members, the Academy works to facilitate communication and dialogue on engineering-related matters. It publishes reports and analyses, some jointly with other learned and professional bodies.

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The members of the Standing Committee and Sub-Group participated in extensive discussions in the course of the series of meetings and submitted comments on a series of drafts of the report. Its content conveys the general tone and direction of the discussion, but its recommendations do not necessarily reflect a common position reached by all members of the Standing Committee and Sub-Group, nor do they necessarily represent the views of the organisations to which the members belong.

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Introduction

In March 2006 the Irish Academy of Engineering published a report on future Energy Policy in Ireland. The report addressed three main areas of energy use - electricity production and distribution, transport and energy use in buildings. The Academy issued a follow-up report in June 2009 entitled 'Review of Ireland's Energy Policy in the Context of the Changing Economy' with recommendations to address the major economic challenges of the following four to five years.

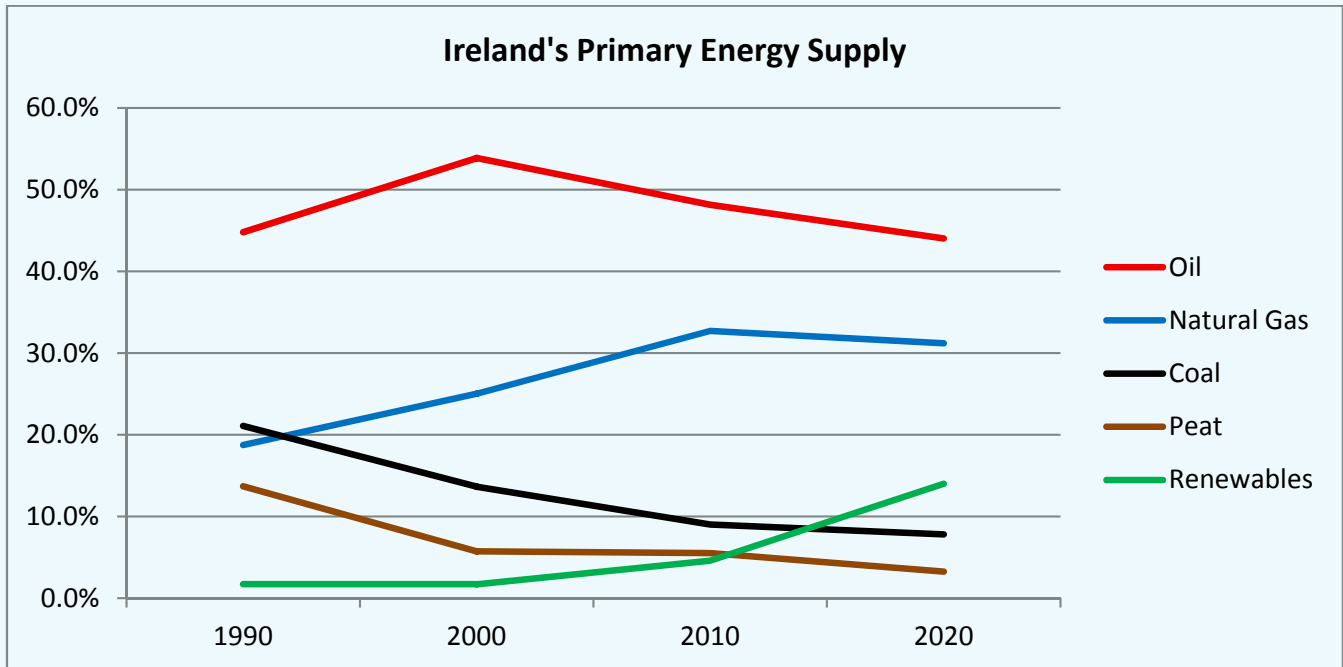
The Academy believes that the future of oil and gas in Ireland's primary fuel mix warrants considerable attention in the Government's next white paper on energy. Ireland's renewable energy supply has grown steadily in recent years but oil and gas continue to provide over 80% of Ireland's energy supply. The country's dependence on these fossil fuels will continue for several decades to come and policy decisions which are taken now will impact significantly on Ireland's future economic competitiveness.

This energy policy advisory focuses on the medium to long term with a time horizon of around 20 years i.e. up to 2035. Investments in major oil and gas developments are based on long time horizons, typically 25 to 50 years, and energy policies in this area need to have certainty and a long-term focus. This report sets out eight advisory principles which the Academy believes should be adopted in the upcoming review of government energy policy:

1. Oil and gas will continue to provide approximately three quarters of Ireland's energy for at least the next 20 years and probably well beyond that. Government planning and investment decisions must recognize this.
2. Government policies should promote further development of the natural gas market in Ireland as well as investment in strategic gas infrastructure. Natural gas has many advantages – it emits less CO₂ than either oil or coal; it is better suited as back-up for renewables; and the world's natural gas resources are sufficient for another 250 years.
3. Ireland's natural gas supply needs to be better secured for the long term. Our dependence on a single stretch of pipeline in Scotland for over 90% of our gas supply is unacceptable.
4. More needs to be done by Government to attract oil companies with the technical and financial capacity to explore and develop Ireland's offshore hydrocarbon resources.
5. A robust regulatory framework should be established for shale gas exploration and best practices adopted from other countries.
6. Ireland's energy import costs can potentially be reduced by over €300 million each year by switching from oil to natural gas in the residential, commercial and industrial sectors.
7. Government strategy on the future of the Whitegate Refinery should be formulated and published. Ireland's oil storage and distribution infrastructure need to be enhanced to ensure supply in emergency situations.
8. Permitting and regulatory processes for oil and gas developments should be streamlined and a single authority should be responsible for construction planning consents.

I. The Criticality of Oil and Gas for Ireland's Energy Supply

Oil and natural gas provided 80.6% of Ireland's primary energy supply in 2010 with coal, peat and renewables making up the balance¹. The International Energy Agency's July 2012 country report on Ireland includes a forecast of Ireland's energy supply in 2020 – see chart below.



Renewables – biofuels, wind and hydro – are forecast to increase significantly and provide 14.3% of the country's energy in 2020 compared with 4.6% in 2010. Oil and natural gas will provide 77.7% of Ireland's energy in 2020 – little changed from current levels. Both coal and peat continue to decline.

The International Energy Agency's World Energy Outlook 2012² was published on the 12th November 2012 and provides projections of the world's energy trends up to 2035. The report highlights the major changes in the global energy map with the resurgence of oil and gas production in the United States, a retreat from nuclear power in some countries, rapid growth in renewables and the global spread of unconventional gas production. The IEA projects that fossil fuels will remain dominant in the global energy mix — providing 75% of the world's energy in 2035 compared with 81% at present.

The IEA country report on Ireland did not project energy supply and demand beyond 2020. However, based on the projection for Ireland up to 2020 and trends in the IEA's Energy Outlook to 2035, it is clear that Ireland's dependence on oil and gas for most of the country's energy needs will continue for many decades to come.

¹ Energy Policies of IEA Countries – Ireland – 2012 Review <http://www.iea.org/publications/freepublications/publication/name,3725,en.html> International

² Energy Agency World Energy Outlook 2012 (published 12th November 2012) <http://www.iea.org/W/bookshop/add.aspx?id=433%20>

Advisory Principle 1

Oil and gas will be critical to Ireland's energy supply until at least 2035. The Government's upcoming white paper and energy investment decisions should reflect the crucial importance of oil and gas for the country's energy supply and economy for several more decades.

2. Natural Gas – Changed Global Outlook***The world's natural gas resources are sufficient for 250 years at current rates of output.***

Innovations and technology developments in North America have unlocked huge resources of unconventional gas – comprising shale gas, tight sandstone gas and coal-bed methane gas. Unconventional gas accounted for 30% of total US natural gas production in 2011, compared with less than 2% in 2001. North America is now self-sufficient in natural gas and is expected to become a major gas exporter – something which would have been inconceivable just a few years ago.

Unconventional gas is providing US industries with a large competitive advantage in terms of low cost energy. Shale oil and gas developments now support over 1.75 million jobs in the US³. A recent study by the American Chemistry Council points out that the unconventional gas bonanza has reversed the fortunes of the chemicals, plastics, metals, rubber and glass industries. With US natural gas prices just one third of European levels, the German chemicals group, BASF, recently stated that it had become impossible to match the US on production costs. There is a growing realization that EU policies have not given sufficient attention to the needs of energy-intensive industries in a competitive global economy.

The natural gas revolution in the US has boosted unconventional gas exploration in other parts of the world. The world's total natural gas resources are now estimated to be around 800 trillion cubic metres or sufficient for another 250 years at current rates of demand. Over 40% of the world's natural gas resources are classified as unconventional. The International Energy Agency reported in May 2012 that the world is now poised to enter a '**Golden Age of Gas**'⁴.

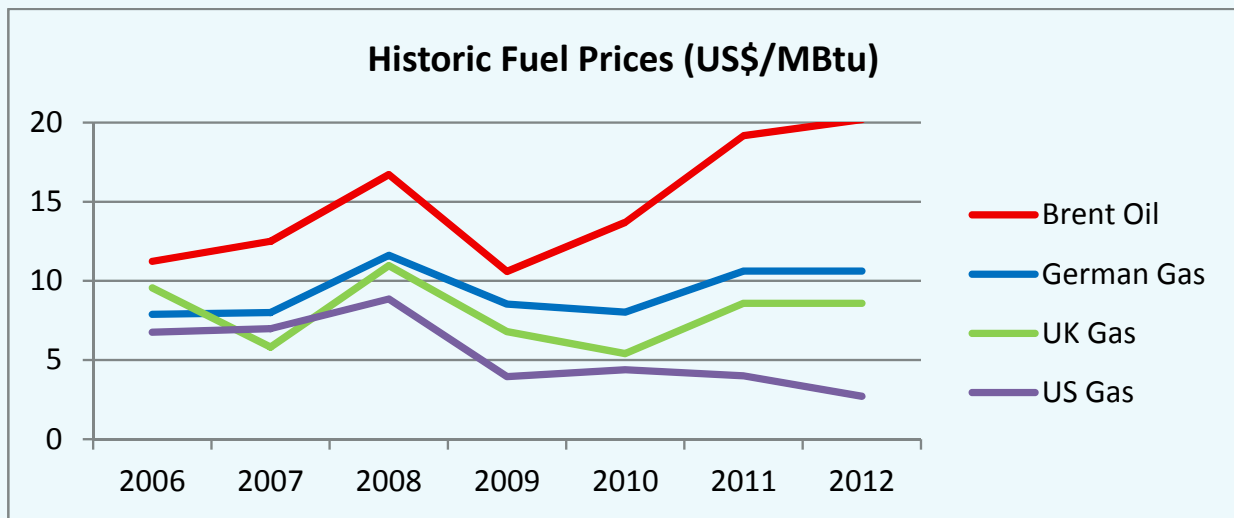
Natural gas is cheaper than oil

Historically, natural gas prices were directly linked to oil prices. Deregulation in the US gas market since the early 1990s has resulted in natural gas prices becoming decoupled from oil prices. The rapid development of unconventional gas in the US in the last five years has caused natural gas prices to fall steeply. At one stage in 2012, natural gas in the US was trading at around one-fifth of European import prices and one-eighth of those in Japan. Internationally, pricing arrangements for natural gas are also beginning to change. The increase in supply of Liquefied Natural Gas (LNG), construction of inter-regional pipelines and the development of spot markets for natural gas have created greater competition amongst suppliers.

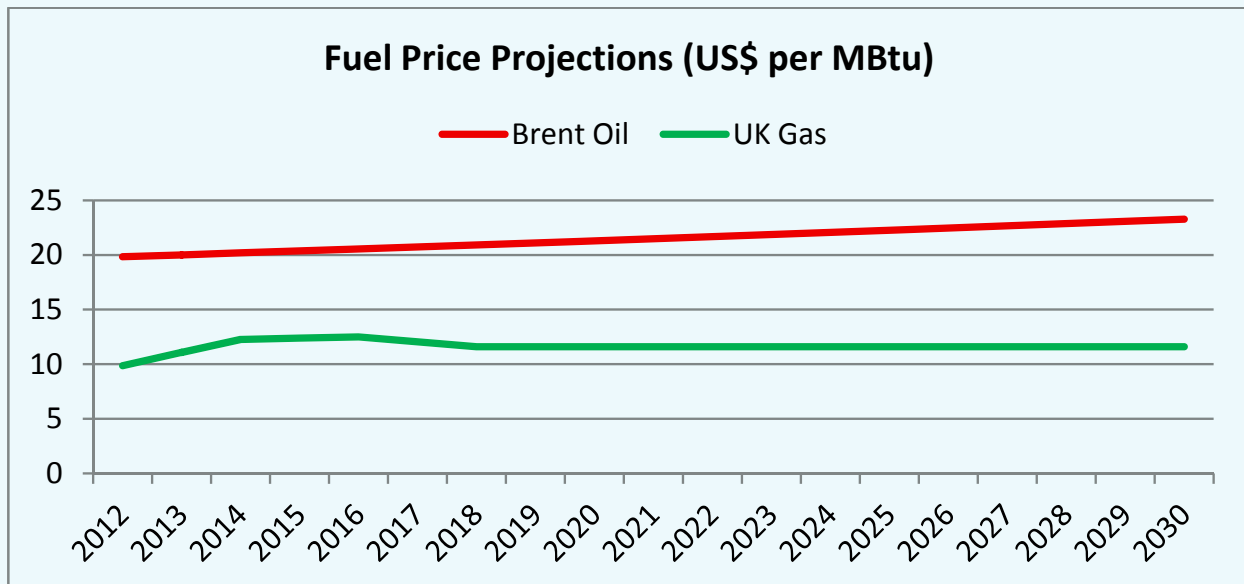
³ US Chamber of Commerce Report published 23rd October 2012. (<http://www.energyxxi.org/americas-energy-future>)

⁴ IEA Report 'Golden Rules for a Golden Age of Gas'. Released 29th May 2012. http://www.worldenergyoutlook.org/media/weowebbsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf

Natural gas prices are now being decoupled from oil prices in long-term contracts as major suppliers, especially Russia, respond to competition. Natural gas prices⁵ have been much lower than oil prices in recent years in the US and Europe – see chart below.



Each year, the UK’s Department of Energy and Climate Change (DECC) publishes long-term fossil fuel prices scenarios. The latest DECC report⁶, issued in October 2012, projects fossil fuel prices up to 2030 under various scenarios. In the base-case scenario, which is shown in the chart below, DECC project that the UK wholesale natural gas price will be approximately half that of the oil price between now and 2030.



DECC’s other scenarios also project that future wholesale gas prices will be at least 50% below oil prices. Fuel price projections in the IEA World Energy Outlook 2012² are very similar to those of DECC with gas prices approximately half of oil prices in all scenarios between now and 2035. US gas prices are projected by the IEA to be even lower – ranging from US\$4 per MBtu in 2012 to US\$8 per MBtu in 2035.

⁵ Spot wholesale market prices – Henry Hub (US Gas); National Balancing Point (UK Gas), German Border Price (German Gas) and Brent oil UK spot market price. Conversion factor – 1 barrel oil = 5,800 British thermal units.

⁶ UK Department of Energy and Climate Change (DECC) Fossil Fuel Price Projections. October 2012. (<http://www.decc.gov.uk>) <http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/2933-fossil-fuel-price-projections-summary.pdf>

Natural Gas has lower CO₂ emissions than other fossil fuels

Natural gas has the lowest carbon content of any fossil fuel – it emits 22% less carbon dioxide than oil and 40% less than coal for the equivalent thermal output. CO₂ emissions from coal in the US have fallen to their lowest levels since 1983 – mainly due to utilities switching from coal to natural gas for electricity generation. Modern gas-fired combined cycle generating plants are the most efficient form of thermal power generation and provide the flexibility to support renewable generation capacity on electricity grids. The fact that approximately 60% of Ireland's electricity is generated in modern, efficient, gas-fired combined cycle gas plants can provide the Irish economy with a substantial competitive advantage.

Advisory Principle 2

The world's outlook for natural gas has changed dramatically in the last five years. The International Energy Agency reported in May 2012 that the world is now poised to enter a '**Golden Age of Gas**'. There is an abundance of gas resources in the world – sufficient for another 250 years. Natural gas is cheaper than oil and is forecast to remain so in the long term. Natural gas has the lowest CO₂ emissions of all fossil fuels. Ireland's next energy white paper should reflect the new realities concerning natural gas and Government policies should be set on the basis that natural gas will continue to be one of Ireland's primary energy sources for many decades to come. Natural gas should be treated more as a 'Destination Fuel' rather than a 'Transition Fuel' and government policies should promote further development of the natural gas market and investment in strategic gas infrastructure.

3. Natural Gas Supply Needs to be Secured

Natural gas currently provides 33% of Ireland's total energy supply and generates 60% of Ireland's electricity. Around 95% of Ireland's gas supply is currently imported from the UK, via an 'Entry Point' at Moffat in Scotland. The UK in turn is becoming increasingly dependent on imports. In 2011, the UK imported more natural gas than it produced – the first time this has happened since 1967. It is forecast that the UK will import approximately 80% of its natural gas by 2016, much of it as LNG.

The Academy highlights three areas of concern:

- capacity constraints in the Scottish onshore system;
- changes in UK gas supply to Moffat due to the decline in North Sea production;
- insufficient gas storage in Ireland.

Scottish Onshore System

Gaslink's latest Network Development Statement⁷ indicates that the capacity limits of the Moffat Entry Point will be approached in the coming winters and reached in 2014/2015. The limitation is the technical capacity of the 50-kilometre stretch of 30" diameter pipeline between Cluden, close to Moffat, and Brighthouse Bay on the Scottish coast. The situation will improve when the Corrib Field starts production in 2015. But, difficulties will arise again from 2018 onwards as Corrib production starts to decline.

Ireland's reliance on a single source of supply and single entry point for most of the country's gas supply contrasts unfavourably with the UK which has diversified its supplies with indigenous production from the North Sea, pipeline imports from Norway and continental Europe, LNG imports as well as multiple entry points.

The Academy believes that dependence on a single source of supply and a system with anticipated capacity constraints for most of Ireland's gas supply and a third of Ireland's total energy supply poses an unacceptable risk.

UK Gas Supply to Moffat

St Fergus, in north east Scotland, is the main receiving terminal for North Sea gas. Supplies from St Fergus have greatly reduced over the last 10 years due to the decline in North Sea production. St Fergus supply will continue to decline in the coming years and gas supplies in the UK will then have to be routed from south to north while the UK transmission system was historically designed to flow north to south. The UK National Grid has stated in its Gas Ten Year Statement 2011⁸ that it is **"approaching a point where, without additional network capability to deliver 'south to north' flows, the National Grid will not be able to meet 1-in-20 demand obligations in Scotland"**. This would have very serious implications for gas supply via Moffat to Ireland.

Insufficient Gas Storage in Ireland

Ireland has limited gas storage capacity compared with other countries in Western Europe. See Appendix I for details⁹. Countries in Western Europe had an average of 50 days of gas supply in storage in May 2012 compared with about 17 days' supply in Ireland. France and Germany were the highest with approximately 100 days' supply of natural gas in storage. The UK is one of the lowest with around 16 days' supply. In the past, North Sea fields were regarded as strategic storage for the UK. But with the decline of North Sea production the UK is now planning to increase gas storage.

Ireland has only one gas storage facility – depleted reservoirs in the Kinsale fields. At present, approximately 230 million cubic metres of gas can be stored in Kinsale. This equates to about 17 days' supply based on Ireland's annual consumption of 5 billion cubic metres (average over last 3 years) but only 10 days of peak or winter demand. Working capacity (or withdrawal rate) of 2.6 million cubic metres/day would meet around 20% of Ireland's average demand in the event of a major interruption in supply from the UK.

⁷ Gaslink Network Development Statement 2011/12 to 2020/2021, published July 2012 (<http://www.gaslink.ie>) http://www.gaslink.ie/files/Copy%20of%20library/20120814125905_Network%20Development%20Statement%20.pdf

⁸ National Grid Gas Ten Year Statement – UK Gas Transmission (National Grid, December 2011). Ref page 63 <http://www.nationalgrid.com/uk/Gas/TYS/current/TYS2009.htm>

⁹ Source: Gas Infrastructure Europe (www.gie.eu.com)

In the Academy's view, several options exist to improve Ireland's security of supply:

Reinforce the Scottish Onshore System

Reinforcement of the single 50-kilometre pipeline between Cluden and Brighthouse Bay by twinning the section of unparallelled line would enhance the capacity and reliability of this critical section of the supply network. Other measures have also been proposed to enhance the reliability of the Scottish onshore system¹⁰.

Develop LNG Import Facilities in Ireland

Development of LNG import facilities in Ireland would help with both the security and diversity of Ireland's natural gas supply and give Ireland direct access to the competitive global LNG prices. Little or no state investment should be required to establish LNG import facilities in Ireland – an important consideration in the current economic climate. There has been a significant growth in global LNG supplies in recent years - mainly from Qatar. Global LNG supply is projected to continue to grow in the next decade with large developments in Australia, East Africa and North America. Europe now imports over 20% of natural gas as LNG with import terminals in many countries as listed below.

UK	4
France	3
Spain	6 (plus 1 under construction)
Italy	2 (plus 1 under construction)
Belgium	1
Netherlands	1
Portugal	1 (plus 1 under construction)

Development of an LNG import facility in Ireland would also provide a means of gas storage. According to the developers, the proposed Shannon LNG terminal would have up to four LNG storage tanks, each with a capacity of 4 bcf or a total of around 450 million cubic metres, although only two are planned in the initial phase of development.

Increase Gas Storage in Ireland

Gas storage in the Kinsale fields could be increased to 280 million cubic metres by installing additional compression facilities. This would provide approximately 20 days' supply based on annual consumption of 5 billion cubic metres.

Islandmagee Storage Limited was recently granted planning approval for a £400 million natural gas storage facility at Islandmagee, Co.Antrim¹¹. The facility will have the capability to store 500 million cubic metres of gas. The Islandmagee developers have indicated 2017/2018 as a possible start date for commercial operation.

¹⁰ CER Draft National Preventive Action Plan (www.cer.ie) <http://www.cer.ie/en/gas-storage-current-consultations.aspx?article=2e2b751b-592d-41d7-a7bf-d4fd5572b86>

¹¹ Northern Ireland Department of Environment press release, 18th October 2012. http://www.islandmageestorage.com/index2.php?option=com_content&do_pdf=1&id=191

Increase Stocks of Secondary Fuels at Gas-fired Power Stations

At present about 60% of Ireland's total natural gas consumption is used for power generation. Arrangements are currently in place to ensure that gas generators in Ireland can switch from their primary fuel to secondary fuel while operating continuously and run on their secondary fuel for up to 5 days. Increasing the volumes of secondary fuel held at power stations could be an alternative to developing additional gas storage in Ireland.

Develop Indigenous Gas Resources

Completion of the Corrib Field development will improve Ireland's security of supply and also encourage further investment in exploration drilling. There are no other gas field developments planned at present and there have been no commercial gas discoveries since Corrib in 1996. Shale gas may become a source of supply in the medium to long term but there are significant challenges which need to be addressed – technical, environmental, regulatory, societal concerns and community acceptance. Lessons must be learned from the delays in bringing Corrib gas into production so that any future gas discoveries can be developed and brought on stream as expeditiously as possible.

Advisory Principle 3

Ireland is vulnerable to disruption in gas supply. Security of supply needs to be ensured and a diversity of supply sources and entry points to Ireland is essential. Reliance on a single pipeline in Scotland with known capacity constraints for the country's gas supply is unacceptable. The Academy believes that Government should ensure that a comprehensive risk assessment is carried out on all existing and planned gas supply and storage options. Based on the conclusions of this risk assessment, Government should develop a long-term strategy to ensure both the security and diversity of Ireland's natural gas supply. The Academy considers that this issue needs urgent attention in view of the long lead times associated with large gas infrastructure developments.

4. Ireland's Hydrocarbon Potential

The Department of Communications, Energy and Natural Resources (DCENR) estimates that Ireland's offshore area has "potential, yet-to-find" recoverable reserves of some 10 billion barrels of oil equivalent. Around 130 exploration wells have been drilled offshore Ireland since 1970. There have been a number of hydrocarbon discoveries but no oilfields have been developed and only two gas fields (Kinsale and Corrib) have been developed to date. There has been no commercial discovery since Corrib in 1996. The "proven" recoverable reserves in offshore Ireland amount to less than 5% of the DCENR estimate¹².

The very low rate of success in exploration over the last 40 years has discouraged exploration companies. The delays in completing the Corrib development, the harsh offshore environment, high operating costs and a complex regulatory regime have also deterred investment in Irish offshore exploration. Only one exploration/appraisal well was drilled offshore Ireland in 2012. By comparison, approximately 50 exploration/appraisal wells were drilled in the UK sector of the North Sea in 2012 and 30 offshore Norway. None of the world's major oil companies applied for licences in the Atlantic Margin licensing round in 2010 – a clear indication of the lack of interest in Ireland. Ireland's oil and gas potential can only be properly assessed if exploration

¹² Irish Offshore Operators Association Statement, May 2012

companies are attracted and there is a significant increase in exploration drilling. In view of the size of Ireland's offshore area a very large number of wells will be needed and this will require huge investment by the oil industry.

There has been much speculation and debate about the amount of oil and gas resources off the Irish coast. This has also generated a great deal of discussion about Ireland's licensing terms and how they compare with other countries. The reality is that Ireland is not able to attract oil companies to explore here, even with tax rates which appear generous compared with other countries. A broader discussion on the reasons for Ireland's lack of success in attracting exploration investment is needed and a new approach developed.

Oil and gas developments provide significant employment and economic benefits. The availability of natural gas from Kinsale helped grow many of the chemical and pharmaceutical industries in Cork Harbour. The Corrib development has created 1250 full-time jobs over the period 2004 to 2010 and will provide an average of 1465 jobs between 2011 and completion in 2014/2015. Corrib will contribute €6 billion to Ireland's GDP over its lifespan¹³. DCENR estimates that a major oil discovery off the northwest coast of the order of 750 million barrels, would deliver €16.5 billion in taxes to the State over the field's lifetime.

Advances in deep-water seismic and drilling technologies coupled with higher oil prices may boost Irish offshore exploration. Recent announcements about the Barryroe Field appraisal and Dunquin exploration drilling programme in 2013 are encouraging. Hopefully, this will herald a more successful period in Ireland's offshore oil and gas development.

Advisory Principle 4

The Academy believes that much more needs to be done by Government to attract companies with the technical and financial capacity to explore and develop Ireland's offshore resources. In addition, the Government needs to lead a more informed debate about Ireland's licensing terms on oil and gas resources and about the very significant employment and economic benefits which oil and gas projects can deliver. The Academy is of the view that the necessary resources need to be put in place by Government to promote exploration and development of Ireland's offshore hydrocarbon resources.

5. Shale Gas Potential

As with Ireland's offshore oil and gas resources, the country's shale gas potential has yet to be assessed. Potential shale gas accumulations have been identified in the northwest and exploration licensing options were granted to three companies in 2011. One of the licensees, Tamboran Resources, has looked at a number of development scenarios and has indicated that an 'expected' development could mean potential for ultimate production of up to 2.2 trillion cubic feet of gas between 2017 and 2050 - about twice the volume of gas which will be produced from the Corrib Field.

¹³ Goodbody Report: Economic Benefits of Corrib Gas Project, February 2012
http://www.corribgaspipeline.com/uploads/file/further-information/goodbody_report%20November%202007.pdf

Shale gas developments and especially hydraulic fracturing (“fracking”) have become very contentious in several states in the US – particularly those in the northeast which have no history of oil or gas production – and in some other countries. A number of environmental incidents have occurred – some as a result of insufficient regulatory supervision – and this has triggered understandable concerns in the local communities. Shale gas exploration companies face intense scrutiny on environmental issues and tighter regulations and greater oversight are now being applied. Environmental protection and community acceptance are now the two greatest challenges in most shale gas developments. A number of important studies have been or are being carried out to assess the environmental and health risks associated with shale gas exploration and development.

The Academy commends the initiative by Government and the Environmental Protection Agency to commission a study by Aberdeen University into the use of fracking. The Academy agrees with the main findings of that study – particularly the importance of well integrity, the consideration of regulatory approaches in other countries and the emphasis on establishing best practices. The Academy notes a more comprehensive study is planned to be commissioned by the EPA in co-operation with the Department of Communications, Energy and Natural Resources and with the involvement of other Government departments and the CER. An EU Technical Working Group has been established to exchange views and information on shale gas activities across the EU and establish best practices and this report will be published in 2013. Participation in this initiative will be important for the future of shale gas exploration and development in Ireland.

Our sister organization in the United Kingdom, the Royal Academy of Engineering in association with the Royal Society, published a very detailed review of fracking in June 2012¹⁴. The review concluded that the “health, safety and environmental issues associated with fracking can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation”. The study also pointed out that fracking is an established technology that has been used in the oil and gas industry for many decades. The UK Department of Energy and Climate Change stated that the review “was a very valuable addition to public information since it has been carried out by authoritative bodies independent of the industry and regulators”. The Academy considers this UK review to be an excellent reference with many recommendations which would be applicable to shale gas activities in Ireland.

Advisory Principle 5

The Academy believes that Government should adopt the recommendations in the UK Royal Society and Royal Academy of Engineering report on fracking. It will be important to build public confidence by having robust regulatory frameworks, adopting best practices from other countries and insisting on exemplary industry performance. The Academy is pleased to see the co-ordination between Government departments and state agencies on this issue as well as Ireland’s participation in the EU Working Group on shale gas activities.

¹⁴ Report ‘Shale gas extraction in the UK: a review of hydraulic fracturing’ published in June 2012 (www.royalsociety.org/policy/projects/shale-gas-extraction)

6. Switching from Oil to Gas

Oil provides half of Ireland's total energy supply at present. Ireland has the third highest share of oil in the energy mix among the 28 IEA member countries - only Luxembourg and Greece have higher shares of oil in their fuel mix. Oil represents only a third of total energy supply in the UK. Natural gas has many advantages over oil as already described and opportunities to switch from oil to natural gas are examined below.

Residential Sector

Based on data in the 2011 CSO census, oil is used for central heating in over 700,000 households in Ireland, including 300,000 households in urban areas which have natural gas supply (a third of these households are within 20 metres of a gas supply line). Natural gas is used in around 550,000 households – almost all in urban areas. [See details in Appendix 2](#). Over the period 2009 to 2011, SEAI reports that Irish households used an average of 1,100 ktoes of oil each year for central heating and 635 ktoe of natural gas¹⁵. Thus, oil usage for central heating in Ireland was close to twice that of natural gas. This is in sharp contrast to the pattern in most EU countries – Eurostat reports that natural gas usage in the residential sector in EU27 is 2.7 times higher than oil use.

Industrial and Commercial Sectors

SEAI reports that industrial gas use in Ireland in 2011 totalled 735 ktoe - excluding gas used by Aughinish because of its scale. Oil used in the industrial and commercial sector in 2011 was 712 ktoe. Given the wide availability of natural gas in most parts of Ireland, it is surprising that oil usage is still so high – again in contrast to many other countries in Europe where the ratio of natural gas to oil in the industrial and commercial sector is 70:30.

Switching from oil to natural gas would have several benefits:

Reduction in Ireland's Oil Dependency

As stated earlier, Ireland has a greater dependency on oil than most other IEA member countries. According to IEA and various other projections, the world's oil resources will not last as long as natural gas resources and supply may not be as reliable. For this reason, natural gas should be used instead of oil wherever possible and oil use prioritised for transport where there are currently few economic alternatives.

Reduction in Energy Import Costs

European market prices for kerosene and gasoil averaged €733 per tonne over the period October 2011 to March 2012. Wholesale natural gas averaged €303 per tonne of oil equivalent over the same period – see Appendix 3. In terms of import or acquisition costs, oil is more than twice the cost of natural gas. Converting households from oil to natural gas central heating would result in an average saving of €700/household on energy import costs. Switching all 300,000 oil-fired households in urban areas to natural gas would save over €200 million each year on energy import costs and significantly reduce heating bills. Increasing natural gas penetration in the industrial and commercial sector to EU averages would save a further €100 million each year on energy import costs and increase the competitiveness of these sectors.

¹⁵ Energy Balance Statistics Annual Report from Sustainable Energy Authority of Ireland.

Efficiency Gains

An efficiency improvement of at least 10% is achievable by switching to a new gas boiler. Gains also result from indirect costs of transporting and storing central heating oils in depots and homes.

Lower CO₂ Emissions

Natural gas emits 22% less CO₂ than oil for the same thermal output. This, coupled with a conservative estimate of a 10% improvement in efficiency in gas-fired central heating systems, could result in a reduction of 30% in CO₂ emissions by switching from oil to gas.

Advisory Principle 6

Oil is still used extensively in the industrial, commercial and residential sectors in Ireland whereas in the EU27 natural gas is the dominant fuel in these sectors. Conversion to natural gas has many advantages – lower import costs, a reduction in Ireland’s oil dependency, lower CO₂ emissions, higher boiler efficiencies, lower heating bills and increased competitiveness for industry. The Academy believes that increasing the penetration of natural gas should be treated as a Government priority for environmental and economic reasons. Changes should be made to the regulatory processes and commercial frameworks so that domestic pricing provides an incentive to consumers to switch from oil to natural gas.

7. Oil Supply, Storage and Refining

Oil will continue to be the dominant component of Ireland’s energy mix for a considerable time to come. Oil’s share of total energy supply was 48% in 2010 and is forecast to be 46% in 2020. The transport sector is the largest oil-consuming sector with 55% of total demand.

Whilst Ireland continues to implement a long-term strategy to reduce the country’s oil dependence, it is imperative that a reliable oil infrastructure is maintained to deliver secure and cost effective energy to Ireland’s economy. In the Academy’s view, the key issues are the security of oil supply and future of refining in Ireland.

Security of Supply

Ireland’s oil supply depends on the Whitegate Refinery delivering about one third of the country’s demand with the balance of supply imported as finished product from the UK and elsewhere in Europe. This import dependence on finished product is unusual compared with most other EU countries. There are no oil distribution pipelines in Ireland and two locations, Dublin and Whitegate account for 80% of all supply.

A comprehensive review of Ireland’s security of oil supply was carried out in 2008 by consultants, Purvin & Gertz and Byrne O’Cleirigh, on behalf of the Department of Communications, Energy and Natural Resources¹⁶. One of the main conclusions of the report was that **“there are significant risks to Ireland’s ability to physically access oil supplies – as distinct from the ability to procure these supplies commercially.**

¹⁶ Review of the Security of Ireland’s access to commercial oil supplies (Purvin & Guertz/Byrne O’Cleirigh).

See full report on <http://www.dcenr.gov.ie/energy/oil>

<http://www.dcenr.gov.ie/NR/rdonlyres/7D7CBC93-47BD-406B-9098-BABC35C8B740/0/ReviewofSecurityofAccesstoCommercialOilFinalReport.pdf>

These arise from the fragile nature of certain links in the infrastructure for importing, storing and distributing commercial oil and not from any other external cause of disruption". The 2008 review recommended that the quantity of strategic stocks held in Ireland should be maximized.

The Academy notes that the National Oil Reserves Agency (NORA) has met its oil stockholding obligations in recent years in line with IEA and EU requirements – typically around 90 days' supply. Excellent progress has been made by NORA in replacing stock tickets with physical stocks (stock tickets are short-term contracts to purchase oil and are less secure than physical ownership of stocks)¹⁷. But, the Academy notes that half of Ireland's strategic oil stocks in 2011 were stored outside Ireland and this is of concern.

NORA has made considerable progress in increasing storage capacity on the island of Ireland with additional capacity of 320,000 tonnes developed in 2011 and 2012. Further increases in storage capacity are required but finding suitable locations will be difficult and planning and regulatory approvals will not be straightforward. In addition, local taxation levied on oil storage facilities in Ireland is higher than in many other European countries. The Academy is of the view that increasing storage in Ireland should be given a high priority by Government.

Having an efficient oil importation and distribution system is also essential. The 2008 Purvin & Gertz and Byrne O'Cleirigh review highlighted concerns around the adequacy of Ireland's oil importing and distribution infrastructure and presented a number of options for further consideration e.g. development of at least one storage facility with a capacity of the order of 200,000 tonnes mixed product in the Dublin area, developing a 30,000 to 40,000 tonne berth in Dublin Port, and a pipeline between Whitegate and Dublin. The Academy believes that these issues should be addressed in the Government's next white paper and strategic decisions made to ensure security of Ireland's oil supply in the longer term.

The crucial role of the commercial oil companies in supply and distribution needs to be recognized. A number of the major integrated oil companies have exited the Irish retail market in recent years. Significant investments in oil supply and distribution will be needed in the next 20 years and Government policies should encourage the oil companies to make these long-term investment decisions.

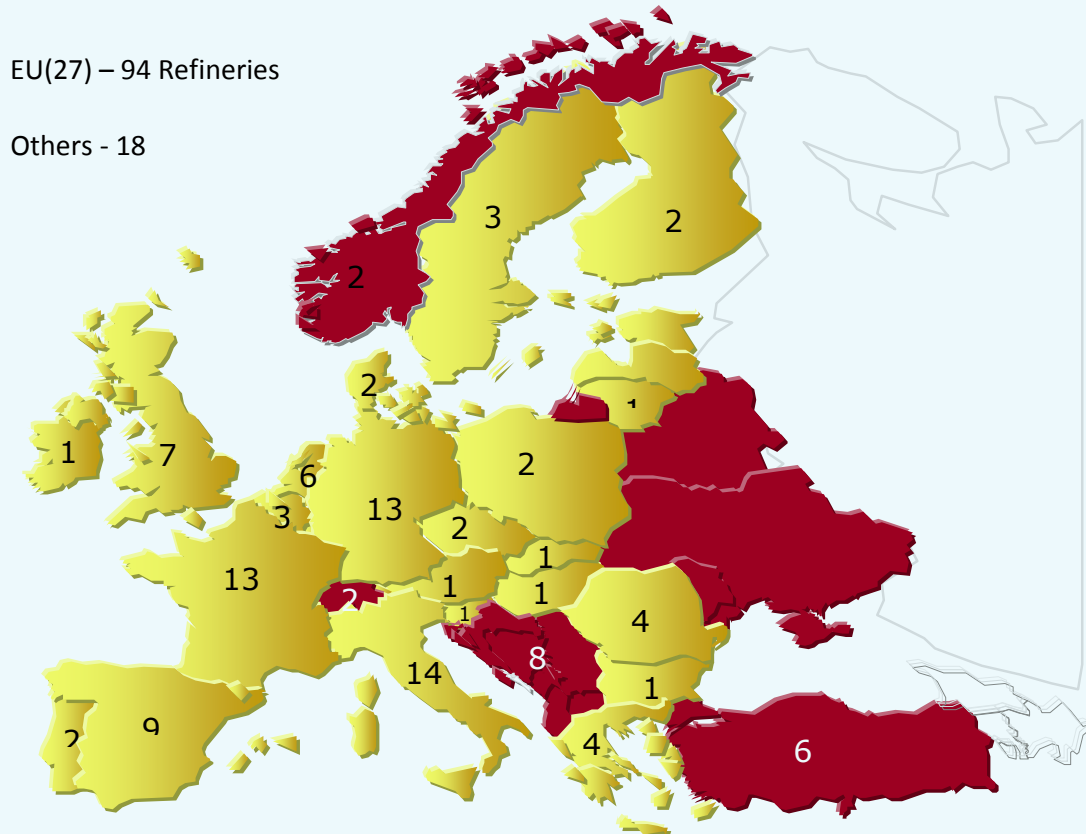
Refining – The Future of Whitegate

The Whitegate refinery began operations in 1959 and has a processing capacity of 75,000 barrels of oil per day or approximately 3.5 million tonnes per year. Whitegate produces a range of petroleum products including unleaded petrol, auto diesel, gas oil, kerosene and LPG. The refinery also produces and blends biofuels. Whitegate has a storage capacity of 450,000 tonnes and deep-water port facilities.

Europe's oil refining industry is facing growing challenges due to falling demand, increasing legislative pressures and competition from refineries outside the EU. The number of refineries in the UK has reduced from 12 in 1980 to 7 with sale or shutdown of others planned. All countries in

¹⁷ Source: National Oil Reserves Agency Annual Reports

Europe, apart from Luxembourg, have at least one oil refinery at present – see map below.



The guarantee by Phillips 66, the owners, to retain an operating refinery at Whitegate expires in 2016. There is uncertainty regarding the future of Whitegate post 2016. Various scenarios exist ranging from maintaining existing refining and storage capabilities to full closure. There are many important considerations which will need to be examined, including:

- Refining capability offers diversity in processing crude into petroleum products in the event of a product supply disruption.
- Ireland’s remoteness from the centre of Europe’s oil trading hub.
- Employment (250 staff) and economic benefits (€60 million annual spend).
- Potential for use in event of an oil or gas development off the south coast of Ireland (e.g. Barryroe or Dunquin)
- Retention and development of petroleum and process engineering expertise and biofuel production capability.
- Synergies with other energy infrastructure in Cork (Aghada and Whitegate gas-fired power stations, Kinsale Gas).
- Decommissioning costs.

The Academy will be very interested in the conclusions of the study commissioned by Government into the future of refining in Ireland. The Academy recognizes that this is a very complex issue which will have major implications for Ireland’s oil security and diversity of supply as well as the future of the energy hub in the Cork area.

Advisory Principle 7

The Academy is of the view that Ireland would be vulnerable in the event of a serious international oil supply disruption. Plans to enhance Ireland's oil storage and distribution infrastructure should be included in the Government's energy white paper based on assessments of recommendations in the 2008 security of supply review. It is essential that investment is made to ensure that there is an efficient and reliable oil storage and distribution infrastructure for several more decades. Regulation and taxation of storage facilities should be in line with international norms. The Academy welcomes the fact that the Government has commissioned a strategic report on the future of refining in Ireland and believes that this report should be published and debated. Retaining refining capability in Ireland in case of supply disruptions should be a key consideration.

8. Consenting and Regulatory Processes

A number of strategic oil and gas developments have encountered major difficulties in recent years due to delays in obtaining planning approvals and statutory consents. This has resulted in significant cost increases, cancellation or postponement of planned investments and loss of employment opportunities. Ireland's reputation amongst the international oil and gas industry has suffered considerable damage as a result.

Key issues are:

- Requirement for separate consents for construction from different Government departments and state agencies for the same project.
- Duplication and overlap between Government departments and state agencies.
- Complex and unpredictable permitting and consenting processes.
- Delays in transposition of EU Directives into Irish legislation e.g. the Environmental Impact Assessment Directive.
- Certain EU or international standards have not yet been incorporated in Irish legislation e.g. Dangerous Substances Act or Bulk Storage legislation.
- Gaining local community acceptance for large-scale oil and gas developments.

The Academy believes that the following measures would enhance Ireland's consenting and regulatory processes for oil and gas developments:

- A single 'competent authority' should be responsible for granting approval to commence construction of strategic oil and gas infrastructure. This 'competent authority' should be responsible for environmental assessment, with all relevant parties, e.g. the EPA providing their inputs as part of this assessment.
- Consenting processes should be streamlined and defined timelines set for permitting and regulatory approvals.
- Established international or EU safety and environmental standards should be used wherever possible. The temptation to customize these standards should be avoided.
- International best practices should be used by Government for safety regulation

of the oil and gas industry. For example, the International Regulators Forum¹⁸, comprising US, Canada, UK, Norway, Netherlands, Denmark, Australia and Brazil published guidelines for assessing and improving offshore safety in 2010 following the Macondo incident in the Gulf of Mexico.

- Government guidelines should be developed for community gain. These guidelines should reflect best practice in other developed countries. The Strategic Infrastructure Development Act includes a provision for An Bord Pleanála to impose a ‘community gain’ condition when granting planning permission but definition of affected community and amount of funding are left open to interpretation. Community acceptance of oil and gas developments is one of the major challenges for developers and more specific guidance on community gain investments is needed for developers, planners, Local Authorities and an Bord Pleanála.

Advisory Principle 8

The Academy is of the view that planning of major oil and gas developments would be enhanced if there was a single competent authority with overall responsibility for planning approval to commence construction. The Academy believes that international best practices should be used by Government for safety regulation of the oil and gas industry and that accepted international standards should be applied. In view of the increasing challenges relating to community acceptance of major oil and gas developments, Government needs to provide more specific guidance and criteria on community gain investments.

¹⁸ International Regulators Forum (<http://www.irffshoresafety.com>)

Appendix I

Gas Storage – EU Countries

Country	Working Volume (million m ³)	Working Capacity (million m ³ / day)	Annual Consumption (billion m ³)	Days' Supply
Belgium	700	15	17.2	15
Denmark	1025	18	4.5	83
France	12700	337	43.1	107
Germany	20455	491	77.9	97
Ireland	230	2.6	4.9	17
Italy	11306	284	73.0	57
Netherlands	5258	215	40.2	48
Portugal	171	7	4.9	13
Spain	4629	179	33.8	50
UK	3778	84	87.0	16

Average Days' Supply 50

Notes

1. Working (Gas) Volumes and Working Capacity data from Gas Infrastructure Europe (www.gie.eu.com). Storage includes depleted fields, salt caverns and LNG peak shaving.
2. Annual consumption for last 3 years (2009-2011) from BP 2011 Review.

Appendix 2

Form of Heating Number of Households (thousands)

	Town Areas	Rural Areas	Total	Percentage
Oil	299	412	711	45%
Natural Gas	537	13	550	35%
Electricity	122	18	140	9%
Coal	37	42	79	5%
Peat	11	67	78	5%
Wood	3	18	21	1%
LPG	4	6	10	1%
Total	1,016	576	1,590	100%

Quantities of fuel used for central heating (ktoe¹). Source SEAI Energy Balance Statistics

	2009	2010	2011	Annual Average
Oil ²	1127	1216	992	1111
Natural Gas	625	710	569	635
Coal	283	261	241	262
Peat	272	254	241	256
Wood	28	32	29	39
LPG	55	37	33	42

Ireland uses more petroleum products for residential heating than most other EU countries as shown in the table below

Oil and LPG	1153 ktoe	64%	41.7 Mtoe	37%
Natural Gas	635 ktoe	36%	113 Mtoe	73%

Ireland (2009-2011)

EU 27 (2007)

Notes

1. ktoe (thousand tonnes of oil equivalent)
2. Oil includes kerosene and gasoline

Appendix 3

Ireland's Oil and Gas Acquisition Costs

	Kerosene	Gasoil	Natural Gas
Annual fuel use (2009 – 2011)	914 ktoe	197 ktoe	635 ktoe
Converted to product units	866 kt	190 kt	280 million therms
Average market prices	\$1035 per tonne	\$971 per tonne	58 pence/therm
Total Import Cost	€675 million	€139 million	€192 million
Unit Cost per toe	€738	€707	€303
Weighted average cost per toe	€733		€303

Notes

Conversion factors

1 tonne oil equivalent = 0.9473 tonne kerosene

1 tonne oil equivalent = 0.9667 tonne gasoil

1 tonne oil equivalent = 444 therms gas

Market prices

Oil – ARA (Rotterdam) over period October 2011 to March 2012

Gas – UK National Balancing Point (NBP) over period October 2011 to March 2012

Exchange Rates

1 Euro = US\$ 1.328

1 GBP = €1.183

