

**OPPORTUNITIES FOR ENHANCING DIVERSITY AND SECURITY
OF SUPPLY IN THE IRISH ENERGY MARKET**

*A Response to the Green Paper from
The Department of Communications,
Marine and Natural Resources:*

'Towards a Sustainable Energy Future For Ireland'

Submitted by ConocoPhillips Ireland Ltd.

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EXECUTIVE SUMMARY

ConocoPhillips Ireland (COPI) is pleased to respond to the themes and issues raised in the Green Paper *Towards A Sustainable Energy Future For Ireland* published in October 2006 by the Department of Communications, Marine and Natural Resources.

The facilities operated by COPI are key components in Ireland's energy strategic infrastructure. Whitegate is Ireland's only crude-oil refinery, supplying around 35% of demand for transport and heating fuels¹ and planning is already underway to increase throughput by a third. Whitegate, which is served by a deep-sea jetty for crude oil & petroleum products, and a road-loading rack through which almost all of its product can be distributed, is located 1.5 km from the Aghada power station, and is adjacent to the national transmission system for natural gas. It also has a sizeable land bank and is a prime location for an energy park. Between them, Whitegate and the COPI-owned Whiddy Island Terminal store much of Ireland's strategic oil reserves.

On a wider, global scale, ConocoPhillips holds very major reserves of oil and gas, including in the North Sea, from where much of Ireland's energy is sourced. The company is also a world leader in developing new energy technologies, including processes for clean coal and biofuels.

In this response, we highlight a number of ways in which the presence of ConocoPhillips in Ireland and, in particular the operations at Whitegate refinery and the Whiddy Oil Terminal can help to underpin the Government's strategic energy policy:

1. Ensuring continued access to secure oil supplies and the maintenance of strategic stocks.

¹ Excluding natural gas

2. The potential for an enlarged energy park at the Whitegate Refinery site.
3. The availability of a significant and *secure* supply of a by-product fuel as an alternative to imported natural gas in the power sector, with very significant environmental benefits over coal and milled peat.
4. The linking of Whiddy Island and Whitegate to a national fuel distribution network centred in the midlands that would greatly increase access to strategic stocks and help to alleviate traffic congestion in Dublin.
5. The development of an integrated biorefinery co-refining crude oil and biofuels from indigenous sources, by 2020, using the Whitegate refinery as a platform.

We look forward to an opportunity to develop the proposals contained in this document, in consultation with the Department.

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1 INTRODUCTION

The Government has invited comments from interested parties and individuals on the themes and issues raised in the Green Paper *Towards A Sustainable Energy Future For Ireland* published in October 2006 by the Department of Communications, Marine and Natural Resources.

The Green Paper concludes with a series of twenty-two questions which have been framed to elicit specific views within the three pillars of Irish energy policy:

- ✓ Ensuring the Security of Energy Supply;
- ✓ Promoting the Sustainability of Energy Supply;
- ✓ Enhancing the Competitiveness of Energy Supply.

This document presents the response of ConocoPhillips Ireland (COPI) to the Government's invitation. As the only refiner of crude oil in Ireland and the biggest supplier of petroleum products, COPI is eager to act in partnership with the Government in realising the policy objectives set out in the Green Paper.

We have endeavoured to structure our response in the form of answers to the those questions asked in the Green Paper which are of most relevance to our interests. Firstly, however, we wish to present some background material on the importance of COPI in the Irish energy market and the potential benefits which may be available to Ireland from our access to the technological and logistical resources, as well as the reserves of oil and gas, held by ConocoPhillips worldwide.

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2 CONOCOPHILLIPS AND THE IRISH ENERGY MARKET

2.1 Strategic Importance of COPI in Ireland

ConocoPhillips Ireland Ltd (COPI) owns and operates the only crude oil refinery in Ireland, at Whitegate. This is a hydroskimming refinery with a current capacity of seventy-five thousand barrels of crude per day. It currently supplies around 35% of the State's requirement for transport and heating fuels² most of which is now transported by truck across the road-loading rack where throughput is expected to reach 1.2 million tonnes in 2007: maximum capacity is around 1.5 million. COPI also stores much of the State's strategic oil reserves, between Whitegate and the COPI-owned Whiddy Oil Terminal in Bantry Bay.

The Whitegate site has been in operation since the late 1950's, with an enviable safety record. The site is served by a deepwater jetty that can accommodate crude oil tankers up to six-hundred-thousand bbl³. It is within 1.5 km of the Aghada power station⁴ and of the national transmission system for natural gas. There is ample land available for further development and COPI has already entered into an agreement to build a 440 MW gas-fired power station on refinery land, with BGÉ. Applications for grid-connection and Planning Permission have already been made and public consultation has commenced.

We believe that the combination of these facilities & infrastructure, the refinery's operating record and the expertise and experience of its workforce makes Whitegate a prime location for an enlarged energy park. We indicate specific opportunities for

² Excluding Natural Gas.

³ There is scope to increase this to 800,000 bbl and exploratory discussions are currently under way with the Port of Cork on removing the obstacles to this move.

⁴ Aghada comprises a 258 MW gas-fired, conventional steam-turbine plant that was originally designed for HFO, and three 90 MW distillate-fired OCGT peak-logging units.

developing this park in our answers to the individual questions posed in Section 3 of the Green Paper.

2.2 A Key Supplier of Transport and Heating Fuels in Ireland

Current capacity at Whitegate is 75,000 bpd and there is scope to increase throughput over the next two years reaching about 78,000 bpd in 2008. The measures necessary to achieve this increase are now being implemented.

A recent demonstration trial to produce biodiesel from soya oil, grant-supported by DCMNR, was very successful. The target of one million litres was throughput in a single month using ConocoPhillips technology developed at their R&D Centre in Oklahoma. This is a hydrogenation process and the product is almost undifferentiable from normal mineral diesel. We are pleased that our recent application for support for the production of biodiesel has been approved by DCMNR⁵. We anticipate that production of biofuels will commence within four weeks and the quantity allocated to Whitegate can be produced well within the two-year time frame. COPI's facilities remain ready to assist should the Government wish to increase the target volume or if there is any difficulty in meeting the current target elsewhere.

The production of transport and heating fuels (LPG, gasoline, heating kerosene⁶, gas oil/derv) from Whitegate, which is currently around 1920 ktoe, just about matches the demand for these products in the Cork Harbour Orbit area; that is, the whole of Munster, areas of South-West Leinster and even into Co. Galway. A recent study for the Port of Cork⁷ assessed the expected demand for these products out to 2020 and estimated that the growth will be 28% nationally. This represents a demand for these products of around 6,990 ktoe by 2020, of which 2,516 ktoe would be consumed within the Orbit area. The study also examined the likely penetration of biofuels, for both heating and transport purposes, and concluded that, by 2020, just over 13% of

⁵ This is an Excise Relief Programme, which is designed to meet Ireland's 2010 target for biofuels.

⁶ Whitegate does not produce jet kerosene at present.

⁷ 'Implications of Current & Future Trends in the Supply of Energy to the Irish Market for the Development of the Port of Cork': Byrne Ó Cléirigh Ltd, August, 2006.

the demand will be met by a combination of solid biomass for heating and liquid biofuels for transport⁸.

COPI's Management is evaluating plans to increase capacity to 100,000 bpd: preliminary engineering design work has commenced and a Project Proposal is being prepared with a recommendation to implement this investment during the 2009 turnaround, which is already in planning. The intention is to include a vacuum distillation unit to upgrade SRAR⁹ to vacuum gas oil (VGO) for export as cracker feed. VGO sells at a positive margin to crude oil whereas SRAR is currently negative.

If this proposed increase in throughput goes ahead, the refinery output would supply 44% of Ireland's demand for petroleum-sourced heating and transport fuels: gasoline, heating kerosene, gas oil & derv. Of this, 2186 ktoe would be supplied to the Orbit via the roadloading rack and the remainder would be shipped to other Irish ports¹⁰. Our intention is that the refinery would also supply most, if not all, of the demand for biofuels.

There is an interesting conclusion to be drawn here: while bio-sourced fuels, penetrate the market further as they substitute for fossil derived fuels, Ireland's dependence on oil will reduce as a percentage of energy consumption, *but the demand for petroleum products is set to increase, nonetheless*. Consequently, running parallel with the Government's stated policy of reducing dependence on oil and gas, there is a need to ensure secure access to more oil supplies.

⁸ In a recent publication, 'Biofuels in the European Union – A vision for 2030 and beyond' proposes that the EU should source twenty-five percent of its transport fuels from bio-sources by 2030: Biofuels Research Advisory Council 2006.

⁹ Straight-run-atmospheric-residue: this is the fraction of crude oil left over from vacuum distillation.

¹⁰ However, as the national road infrastructure improves, the Cork Harbour Orbit extends further into the rest of the country.

2.3 *ConocoPhillips Resources*

The total reserves of oil and gas held by ConocoPhillips is 10.0 BBOE¹¹. Worldwide, production is 1000 MBD¹² of crude oil, 5,175 MMCFD¹³ of natural gas and 158 MBD of natural gas liquids. The following table shows the level of ConocoPhillips production from the North Sea, the area from which almost all of Ireland's oil and gas is sourced.

| Sector | MMSCFD natural gas | MBD crude |
|---------------|---------------------------|------------------|
| UK | 820 | 60 |
| Norway | 272 | 197 |
| Netherlands | 57 | - |

There are also 4 MBD of natural gas liquids coming from the Norwegian sector. Apart from oil and gas, ConocoPhillips is also a significant generator of electricity. Our sister plant at Humberside in NE England operates a 760 MW plant and this is currently being expanded to 1,200 MW.

2.4 *ConocoPhillips Technology*

Apart from being a world leader in exploration & production, oil & gas logistics and refining, ConocoPhillips also pioneers the development of new technologies, like renewable bio-fuels, and clean coal, which broaden the diversity of energy supplies. The following are some examples with relevance for Ireland.

The recent demonstration trial at Whitegate to produce biodiesel from soya oil, grant-supported by DCMNR, was very successful. The target of one million litres was throughput in a single month using ConocoPhillips technology developed at their R&D Centre in Oklahoma. This is a hydrogenation process and the product is almost undifferentiable from normal mineral diesel.

ConocoPhillips E-Gas technology converts coal and other low-grade feedstocks, including petroleum coke, which may have a negative economic value, into a clean

¹¹ Billion barrels of oil equivalent

¹² million barrels per day

¹³ million standard cubic feet per day.

synthesis gas containing hydrogen. The process allows virtually all pollutant-forming impurities to be removed – including mercury from coal – and is readily adaptable for further removal of carbon in the future.

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3 ENSURING THE SECURITY OF ENERGY SUPPLY

3.1 *Question 3.2. In addition to enhancing the contribution of renewable energy, what actions could be taken to further diversify the fuel mix for electricity generation and reduce dependence on oil and gas?*

Dependence on Oil and Gas

We acknowledge the desirability of reducing Ireland's overall dependence on oil and gas through an enhanced contribution from renewable energy; and we intend to be at the forefront of this development, through our biofuels programme. However, we question whether the present share of the total electricity production held by oil represents an over dependence. According to EPA figures,¹⁴ only 6% of Ireland's electricity came from oil-fired plant in 2005 whereas in 1990 it was over twice this level. This compares with 49% from gas, 34% from coal, 8% from renewable with the remaining 3% coming across the NI interconnector, in 2005. The EPA figures forecast that the oil generated electricity will reduce to 5% by 2012, while gas will increase to 53%.

It is COPI's view that, instead of reducing the quantity of oil consumed in the fuel mix, maximum value should be extracted from those oil supplies to which Ireland has already secured access, or to which such access will be secured in the future.

As we have shown in paragraph 2.2, consumption of petroleum-based oil products will continue to grow in absolute terms even though biofuels may substitute for a significant portion of the total demand. Consequently, as the Green Paper acknowledges, it is essential that Ireland maintains secure access to oil supplies. Because crude oil is always going to be more easily available than refined product –

¹⁴ Ireland's National Allocation Plan 2008-2012 as notified to the EU Commission July 2006.

especially in an emergency – there is a distinct advantage in sourcing some of Ireland’s requirements for petroleum-based fuels in the form of crude; otherwise the country would be dependent on imports for 100% of its requirement. Fortunately, this strategy is feasible because there is an operating refinery on the Island.

Having secured these supplies, Ireland should then exploit them to the full and the potential expansion to the Whitegate refinery in 2009 offers an opportunity to do just that by using an Irish-produced fuel. As we have described in paragraph 2.2, the current residue from our atmospheric distillation process is SRAR and this material is far too valuable for use as a fuel in electricity generation. The residue from the vacuum-distillation process, on the other hand, will be a low-grade, low-sulphur, heavy fuel-oil (HFO) which is very suitable for electricity generation.

The important issue here is that using this HFO in the fuel mix for electricity *does not in any way increase Ireland’s dependency on oil*: crude oil *must* be imported for the production of transport and heating fuels anyway, *even allowing for substitution by biofuels*. HFO will be an inevitable by-product of the vacuum-distillation process and should be considered, essentially, as an indigenous fuel. By storing some of its strategic requirement as crude, the State has already secured a valuable fuel for electricity generation. The desire to reduce general dependency on oil is understandable; however, the availability of an already secured source of fuel for electricity generation should not be ignored.

The quantity of HFO produced will be just over 500,000 tpa, sufficient to fuel a 258 MW power plant for 8,000 hrs/annum using a conventional steam cycle at 37% cycle efficiency. This is an almost exact match for ESB’s existing, gas-fired station at Aghada, which is only 1.5 km from Whitegate refinery and was originally designed to burn oil. HFO could easily be supplied via a land pipeline, without the need for an oil jetty.

Oil can be easily stored, unlike gas; so too can coal and milled peat, but these fuels would have a much more serious impact on Ireland's greenhouse gas emissions. By comparison, a similarly sized coal- or peat-fired power station, operating at the same efficiency would emit far more CO₂, as the following table illustrates.

| Fuel | MW Hours Output | Million Tonnes of CO₂ |
|-------------|------------------------|---|
| HFO | 2,064,000 | 1.53 |
| Coal | 2,064,000 | 1.90 |
| Milled Peat | 2,064,000 | 2.31 |

This integration between the Whitegate Refinery and the nearby Aghada power station is an example of the potential for an enlarged energy park at Whitegate.

Clean Coal

COPI endorses the proposal, set out in paragraph 2.1.20 of the Green Paper that the application of 'clean coal' technology may be a valuable element in maintaining diversity in fuel supply within the Irish generation mix. With the support of our parent organisation, we could offer leading-edge technology in this area.

The Wabash River Coal Gasification Repowering Project, in West Terre Haute, Indiana, has been utilising ConocoPhillips' E-Gas technology on a commercial basis since 1995. A leader in the US Department of Energy's "Clean Coal Technology Program," the Wabash River Plant has gasified more than 3 million tons of coal and petroleum coke over the past eight years and can interchange between either fuel.

Excelsior Energy Inc. an energy development company based in Wayzata, Minnesota, has recently chosen E-Gas for its coal-fired power generating project which will be one of the cleanest and most efficient facilities in the world. The first unit of the project will be capable of producing a net output of approximately 532 megawatts (MW) of electricity and is expected to be operational in 2010.

Our colleagues at ConocoPhillips Humberside are currently examining the gasification of pet-coke and coal using E-Coal technology with the objective of burning the resultant syngas in the power station, using the existing gas turbines, and capturing the CO₂ for injection into an offshore gas-field, in order to boost production.

3.2 Question 3.2.7 Given the existing level of dependence on imported fossil fuels, what needs to be done to enhance contingency measures?

The recent disruption to fuel supplies in the southern states of the USA due to Hurricane Katrina was substantially mitigated by the IEA's release of strategic stocks. The lesson here is that adequate stockpiling of fuel and crude oil can help to even-out major disturbances in the supply chain.

Storage for Strategic Stocks

Much of Ireland's strategic stocks remains offshore and these should be located on the island. There is now very little, if any, spare tankage left in Ireland but the business case for building new tanks cannot be justified if the leasing charge necessary to justify such an investment is compared to the alternative of leasing redundant capacity in Great Britain, Scandinavia or on the European mainland. The cost of building oil tanks has risen very significantly in the past six years for two reasons: the increase in steel prices and the increasing cost of meeting tougher environmental and safety standards for the storage of oil and similar products.

If the Government, through NORA, wants to have assured, rapid access to secure strategic stocks, then it must be prepared to pay an economic leasing charge that encourages the construction of new tanks.

Distribution Infrastructure

There is already a very substantial storage capacity at Bantry but the location is remote. In an emergency, strategic supplies of crude would have to be shipped to Whitegate, and products shipped to a port with distribution facilities. Linking Bantry to Whitegate via a pipeline would provide almost instant access to over 1 million

tonnes, about 15% of the strategic requirement. This option should be included in the scope of the forthcoming review of the security of Ireland's access to oil which is mentioned in paragraph 2.1.10 of the Green Paper.

The Green Paper also mentions possible pipeline distribution within Ireland in the context of this review. Ireland is almost unique in the developed world in having no pipeline infrastructure for the distribution of fuel. In the Dublin area, the distribution of fuel by road tanker from a multiplicity of small, confined depots within the Port is a significant contributor to the city's traffic congestion. Moreover, as the lessons of the Buncefield incident are teased out, the location of some of these terminals may come under question.

Our recommendation is that the construction of a petroleum products distribution pipeline from Whitegate to a major, state-of-the-art, distribution terminal to be located in the midlands, and held in shared ownership, should be included within the scope of the review. Such a pipeline, if extended to other locations around Cork harbour, would also facilitate the development of a biofuels industry in the area.

Access to Energy Supplies in an Emergency

We propose that further opportunities to strengthen the existing business relationship between COPI and NORA be explored. One such opportunity might be the sharing of the inventory carrying costs of oil, in 'normal' times, in return for some level of priority access for Ireland to COP reserves of gas and oil, and to shipping logistics, in an emergency. For example, if the expansion at Whitegate goes ahead, up to one million tonnes of VGO (vacuum gas oil) will be produced per annum. In normal circumstances, this material would be exported as cracker feedstock but it could be used as a stand-by fuel for gas-fired plant, which is usually configured to burn distillate fuel in an emergency.

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4 PROMOTING THE SUSTAINABILITY OF ENERGY SUPPLY

4.1 Question 3.2.10 In addition to electricity generation, what actions should be taken to develop renewable energy usage in the transport and heat sectors?

The results of the recent demonstration run to produce biodiesel from soya oil showed that it would be possible to add the biodiesel at 10% and still meet the derv specification EN590. The biodiesel – while more expensive to produce – was, chemically, almost indistinguishable from petroleum diesel. Therefore, there is an immediate opportunity to increase the biodiesel content of derv to 10% using ConocoPhillips proprietary technology at Whitegate.

4.2 Question: 3.2.12 What additional policy measures should be introduced to significantly expand energy RTDI and what are the priority areas of research, which need to be targeted?

Ireland has an opportunity to develop a significant level of independence in its energy supplies and at the same time provide a new direction for the agricultural sector. This will involve the production of second generation biofuels using non-food crops or animal residues as raw material sources.

The recent report on biofuels by the EU Biofuels Advisory Council, (already referred to in footnote 8) foresees the emergence of integrated, bio-refining complexes where unit operations for processing a variety of feedstocks: biogas, natural gas, biocrude, crude oil, solid biomass and coal will complement each other in the production of energy, fuels and co-products. Integration will reduce costs, provide higher efficiency in energy use and better use of by-products.

COPI believes that the Whitegate complex provides a very suitable platform for such a development and is willing to co-operate in appropriate RTDI programmes.

4.3 3.2.13 *In light of the Government's Science, Technology and Innovation Strategy, what needs to be done to radically expand the national energy research capacity?*

As a first step in the development of a bio-refining complex in Ireland, there is the opportunity to locate an incubator pilot-plant for the development of biofuels and bioenergy at the Whitegate refinery.

4.4 *Question 3.2.15 Do we need to choose between mandatory targets and better incentives for renewable energy and energy efficiency - or is a mix of both the best way forward?*

Mandatory targets for renewable energy will not necessarily achieve the Government's stated objective of developing Ireland's bio-energy potential. They may be a short-cut approach to achieving a specific target – the level of substitution of transport fuel by biodiesel or bioethanol, for example – but may not encourage development of native production of these fuels if, in the short to medium term, the cost of importing the mandatory quantities was lower.

A combination of both mandatory targets and better incentives is essential.

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