



# **An Taisce – The National Trust for Ireland**

## **Objection to EPA proposed decision for the Corrib Gas Refinery**

**Applicant: Shell E&P Ireland Limited**

**Licence Register Number: P0738-01**

**Location of Installation:**

**Bellanaboy Bridge Gas Terminal Bellanaboy Bridge Bellagelly South  
County Mayo**



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19<sup>th</sup> February 2007

Reference Number P0738-01

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## SCOPE

This report outlines An Taisce objection to the Environmental Protection Agency, EPA, decision to grant approval for a gas refinery at Bellanaboy Co. Mayo.

## SUMMARY

Having considered the Inspectors report and other documents An Taisce recommends that the Board of the EPA refuse a licence to Shell for a gas processing terminal at Bellanaboy for the following reasons;

1. An Taisce finds that the Bellanaboy site does not comply with international codes of practice for siting gas processing terminals because it is located within the catchment of a major water supply. The Scottish EPA, SEPA, an organisation with considerable experience in licencing such facilities agrees with our recommendation that the terminal should not be located within a drinking water catchment.
2. The siting of the terminal at Bellanaboy is not in accordance with Best Available Techniques, BAT. The benchmark chosen by EPA at St. Fergus may accord with BAT but the Scottish site is sited adjacent to the coastline outside a water catchment and therefore does not conflict with environmental conditions within the codes of practice.
3. The Bellanaboy site is unacceptable to a large section of the local community because of its non compliance with best practice.
4. The Bellanaboy development is in conflict with Shell's own Business Principles of being "good neighbours".
5. The inland location of Bellanaboy could expose connecting production pipelines to terrorist attack.
6. The siting of the terminal inland will reduce the utility of the onshore and offshore pipeline infrastructure if the upstream pressure is restricted as recommended by Advantica. A coastal terminal would not have a pressure restriction and could therefore cater for future demands.
7. The flaring of gas in Nigeria and other regions by Shell is contributing significantly to global warming. Ireland's total gas requirements could be met by less than 25% of flared gas in Nigeria. We recommend, under the fit person provision, that the Board of the EPA refuse a licence to Shell while this practice prevails.

## COMPLIANCE WITH CODES OF PRACTICE (COP)

The site selected for the terminal is in breach of international codes of practice because of its location within the catchment of a major water supply. Appendix 1 details the environmental requirement of code of practice PD 8010. Other codes of practice contain similar requirements.

The developer did not at the time of the site selection carry out an objective analysis of alternative sites. An Bord Pleanála ABP inspector stated that: "The issue of the siting of a gas processing terminal in a remote location, inland at a significant . . . distance from the landfall, was avoided in my opinion and I would be strongly of the view that . . . any review of the documentation submitted would justify this conclusion . . ." He added: "There is no evidence in the totality of the documentation now before the board that . . . specific alternative terminal sites were seriously investigated." He stated that "the developer . . . ignored the board's request that it provide information about alternatives" and that the minister's consent for the pipeline "could reasonably be determined as being premature" and had "emphasised a perception to some degree that the granting of planning permission for the . . . processing terminal at the Ballanaboy site is a fait accompli". "As the connecting downstream pipeline from Ballanaboy to Galway was already decided and announced, this conclusion is unavoidable."<sup>1</sup> It is noteworthy that the site at Ballanaboy was selected without any involvement of the local community.

When ABP granted permission for the site it was unaware that the consents for the connecting upstream pipelines were essentially void, since the minister failed to include a requirement in his consents that the pipelines comply with a code of practice.

This is perhaps why Shell is seeking a new consent for the onshore pipeline.

Uniquely for a high-pressure gas pipeline, a code of practice was not specified by the minister. Likewise, the consent given under the foreshore licence for the offshore section of the upstream pipeline does not specify a code of practice.

At the time that they granted permission for the terminal ABP were aware that the minister had issued his consent for the connecting pipeline and they could reasonably have assumed that such consent was valid. However we now know that the consent issued by the minister in 2002 was in breach of the code of practice and in fact the consent uniquely did not contain a code of practice.<sup>3</sup>

Advantica, the consultants who reviewed the design of the pipeline, indicated that, as currently designed, the pipeline cannot comply with the code of practice BS 8010 - or its replacement, PD 8010.

1 An Bord Pleanála, "Inspector's Report on Gas Terminal at Bellagelly South, Ballanaboy Bridge, Belmullet, Co. Mayo," signed by Kevin Moore and dated April, 2003.

2 From Irish Times Article 25<sup>th</sup> October 2006, the full report is contained in Appendix 5

3 Appendix 6 Attached

They concluded that the Quantified Risk Assessment carried out on behalf of the developer "fails to recognise the uncertainty in the risk modelling for such high design pressures as 345 bar".<sup>4</sup> Consequently, they have recommended that the pipeline should not operate at the maximum allowable design pressure of 345 bar, and that it should be restricted to 144 bar and operate at a design factor no greater than 0.3.

The developer who is aware that the original consent is in breach of the code of practice is now seeking to apply for a new consent which may be in compliance with the proximity requirement. This application will be submitted to ABP sometime after July 2007. Under this new application for a new pipeline route the developer will make a statement that the pipeline is in compliance with the COP however the fundamental breach of the code regarding the location of the terminal will remain.

If the minister had included in his 2002 consent a requirement that the pipeline be in compliance with the COP then he could not have approved the routing of the pipeline to Bellanaboy because the terminal site is located within the water catchment. The ABP board in granting their approval of Bellanaboy relied upon the minister's consent. They had no reason to believe that the consent was invalid and could be expected to believe that the minister had obtained appropriate advice that the Bellanaboy site was suitable and complied with the COP.

We now understand that the minister did not seek or obtain advice on this important requirement and he issued his consent allowing ABP to believe that the consent complied with the COP. In the December 2006 issue of the Engineers Journal the President of Engineers Ireland, John McGowan, commenting on the Advantica report stated that "This report covers the conceptual pipeline design rather than the location of the terminal or the routing of the pipeline. Engineers Ireland does not have the resources to undertake fundamental research on the location of the terminal and is mindful of the fact that this issue was covered in depth in the permitting process"<sup>5</sup> It is noteworthy from the public records available that the issue of the site compliance with the COP was not covered in the permitting process. It would appear that all parties at the ABP oral hearing incorrectly assumed that the minister took professional advice on this matter.

The board of EPA cannot rely on the ABP approval of the site since the information relating to non compliance with the pipeline and the site only came to light during submissions to the Advantica review<sup>6</sup> of the pipeline in 2005 and during a publication in the Irish Times on 25<sup>th</sup> October 2006.<sup>7</sup> ABP gave their approval for the site in 2004. Advantica were precluded by the minister from examining the compliance with the COP of the refinery site at Bellanaboy.

4 Full report available at [www.dcmnr.gov.ie/.../2C9E7E78-C18E-481C-AB76-B58EEA47A071/0/CorribPipelineSafetyReviewR8391FINALHighRes.pdf](http://www.dcmnr.gov.ie/.../2C9E7E78-C18E-481C-AB76-B58EEA47A071/0/CorribPipelineSafetyReviewR8391FINALHighRes.pdf)

5 Engineers Journal I Volume 60: Issue 10 I December 2006 [www.engineersireland.ie/advantica](http://www.engineersireland.ie/advantica)

6 An Taisce submission to Advantica Appendix 3 attached

7 Appendix 6 attached



An Taisce would recommend that the inspector appointed by EPA to conduct an oral hearing should establish the facts regarding;

1. the advice if any obtained by the minister before he allowed Coillte to sell the Bellanaboy site to the developer,
2. advice if any received by the minister regarding the compliance of the site with the code of practice,
3. why a code of practice was not specified by the minister in his consents?
4. was compliance with the code of practice discussed at the ABP oral hearing?
5. what was the awareness of the Board of ABP regarding the compliance of the site with the code of practice?
6. and was the EPA inspector aware before she made her decision, that the Code of Practice was not followed in the site selection process?

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## BEST AVAILABLE TECHNIQUES (BAT)

The EPA inspector approval of the Bellanaboy terminal follows a visit to the St Fergus terminal in Scotland. She reported under Section 3,

"I have examined and assessed the application documentation and I am satisfied that the site, technologies and techniques specified in the application and as confirmed, modified or specified in the attached Recommended Determination comply with the requirements of BAT. I consider the technologies and techniques as described in this report, the application, and in the RD, the most effective in achieving a high level of protection of the environment having regard to the way the installation is or to be located, designed, built, managed, maintained, operated and decommissioned."

There are two significant differences between St Fergus and Bellanaboy. The St Fergus site is less than 500m from the landing point adjacent to the coastline and is not within a catchment of the water supply for the area. The Scottish EPA, SEPA, have stated that,

"When consulted on the location of major industrial facilities, SEPA would normally recommend against placing such facilities at locations which could affect public drinking water sources."<sup>8</sup>

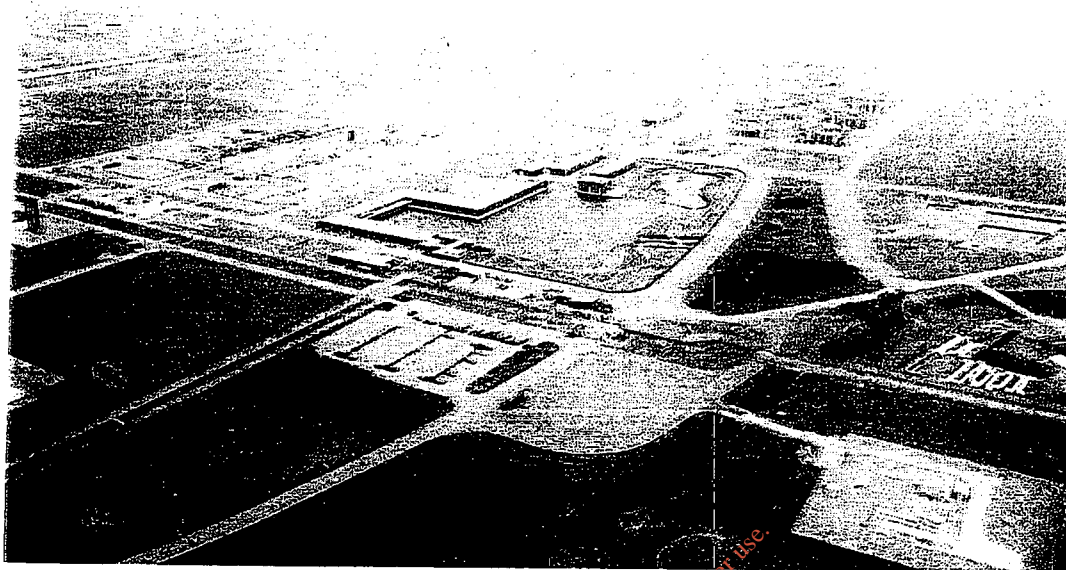
Clearly while St Fergus may comply with BAT the Bellanaboy site fails this critical tests of suitability. Coastal sites are readily available, are closer to the wells and are more sustainable.

In contrast to St Fergus the Bellanaboy site is 9km inland and traverses the SPA of Broadhaven Bay and the Sruwaddacon Bay SAC.

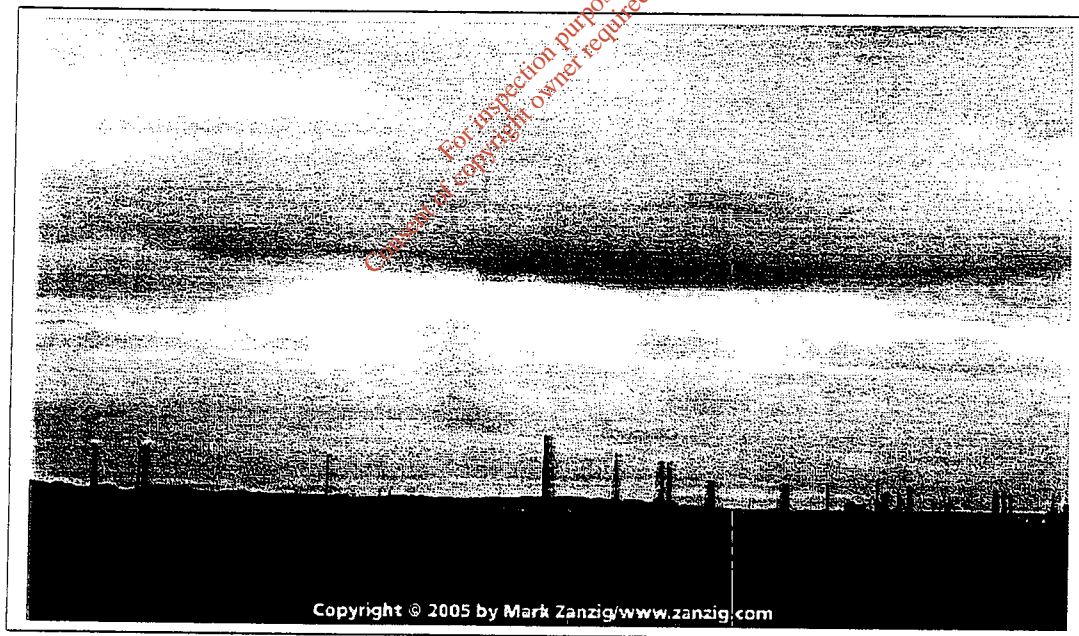
The St Fergus refinery may be observing BAT as this site would have been selected in accordance with a COP because it is near the coastline and most importantly it not located on a catchment for a water supply.

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8 Quote from an email on 6<sup>th</sup> February 2007 to the author from Martin Marsden Scottish EPA



Photograph of St Fergus Gas Processing Terminal.



St Fergus from the coast.

## STRATEGIC LOCATION FOR NATURAL RESOURCE FACILITIES

The Bellanaboy site could not be considered to be a strategic location for natural resource facilities for the following reasons;

- It is located within the catchment of major drinking water supply in breach of the code of practice.
- The site ground conditions are unsuitable.
- It is inland and not easily assessable to a suitable landfill.
- Its inland location exposes the proposed and future production pipelines to terrorist attack.
- It is necessary to traverse Special Areas of Conservation to access the site
- A large section of the local community are strenuously opposed to the breaches of the code of practice.
- The project is in breach of Shell's own Business Principles of being good neighbours. If they wish to be good neighbours they should comply with internationally accepted codes of practice.

In contrast the St Fergus site is designated by Aberdeenshire Council as "National Planning Policy Guidance as requiring to be safeguarded for large petrochemical development. Such safeguarding gives protection of these areas from development that could impact negatively on their current and potential operations. This is in both the local and national interest given the important role of these sites. See Appendix 2

**An Taisce recommends that the Government should identify a number of sites nationally which are strategically located adjacent to landfills for natural resources and satisfy the environmental and safety criteria contained within the codes of practice.**

**An alternative to Bellanaboy should be identified and in the meantime Shell should suspend all construction activity as it is most unlikely that it can develop this site as a viable location for processing the Corrib resource.**

In previous reports commenting on the Advantica safety review I recommended that the terminal should be located adjacent to the coast. A coastal location would not contain restrictions in operating pressures as recommended by Advantica and would therefore be a more strategic location for the facility.<sup>9</sup> Also, during its operation and in the event of a major accident a remote and isolated site will ensure a sustainable development. The proposed gas refinery is one of the largest industrial projects undertaken in Ireland on one of the most unsuitable sites in the country. This development will set an unacceptable precedence in Ireland, that is no longer acceptable in countries that are knowledgeable of the enforceable codes and facts that exist for such industries.

<sup>9</sup> Appendix 3 contains the author's comments on the Advantica review.



## CLIMATE CHANGE IMPACT

The decision to grant a licence to the Bellanaboy terminal will have an impact on global warming,

The licencing of the developer Shell to process gas for sale within Europe while this company is flaring associated gas in Nigeria and other locations is in direct conflict with their ethical, moral and legal responsibilities to minimise the impact of their activities on global warming.

A recent report on the activities of Shell in the Niger Delta by National Geographic Magazine does not give us confidence that Shell are a fit company to exploit the Corrib resource. This report is contained in Appendix 4. detailed extracts from the Stern Review outlining the harmful effects of global warming are contained in Appendix 5

### Gas Flaring

Over the past 2 decades the World Bank has sought to eliminate unnecessary gas flaring associated with the production of oil. Nigeria is the worst offender in Sub Saharan Africa and flared in excess of 24 billion cubic meters (bcm) of gas during 2006<sup>10</sup>.

From both a global warming impact and the need to conserve valuable finite resources this activity is immoral and unsustainable. Flaring maximises short term returns to the companies engaged in this activity but it contributes unnecessarily to global warming. The activity could be eliminated if Governments in the developed world did not grant exploration licences and permits to companies which engaged in this practice. The Board of the EPA could take a lead by refusing to grant a licence to Shell, under the Fit Person provision, until it stops flaring gas in other regions. Ireland could insist that we will not purchase gas from Corrib at market prices until all continuous gas flaring has ceased. If other countries followed this lead it would force energy companies to eliminate this practice and contribute significantly to minimising its effect on global warming.

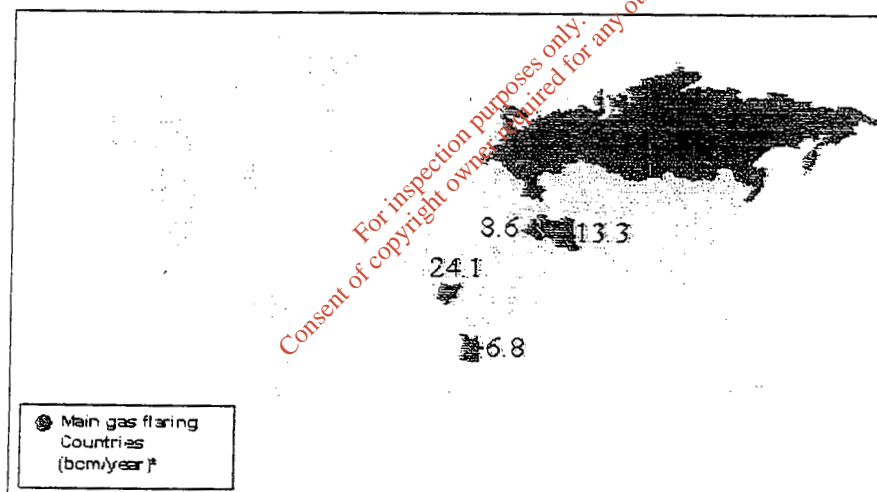
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10 The World Bank estimates that over 150 billion cubic meters (bcm) of natural gas are being flared and vented annually. That is the equivalent of the combined annual gas consumption of France and Germany.



Gas Flaring by energy companies has increased rather than decreased in recent years. In 1984 the Nigerian government banned continuous gas flaring. However Shell and other companies ignored the ban and continued to flare. The World Bank is proactive in promoting the elimination of flaring by 2008. Shell agreed to this deadline but now are citing funding issues in order to extend the time limit beyond 2008. Ireland's total gas requirements could be met by less than 25% of flared gas in Nigeria.

2001: 105 Billion cubic meters (bcm) gas flared  
 2003: 110 bcm gas flared  
 2006: 150 bcm gas flared



\*There is no data for Egypt, but it is a significant gas flaring country.

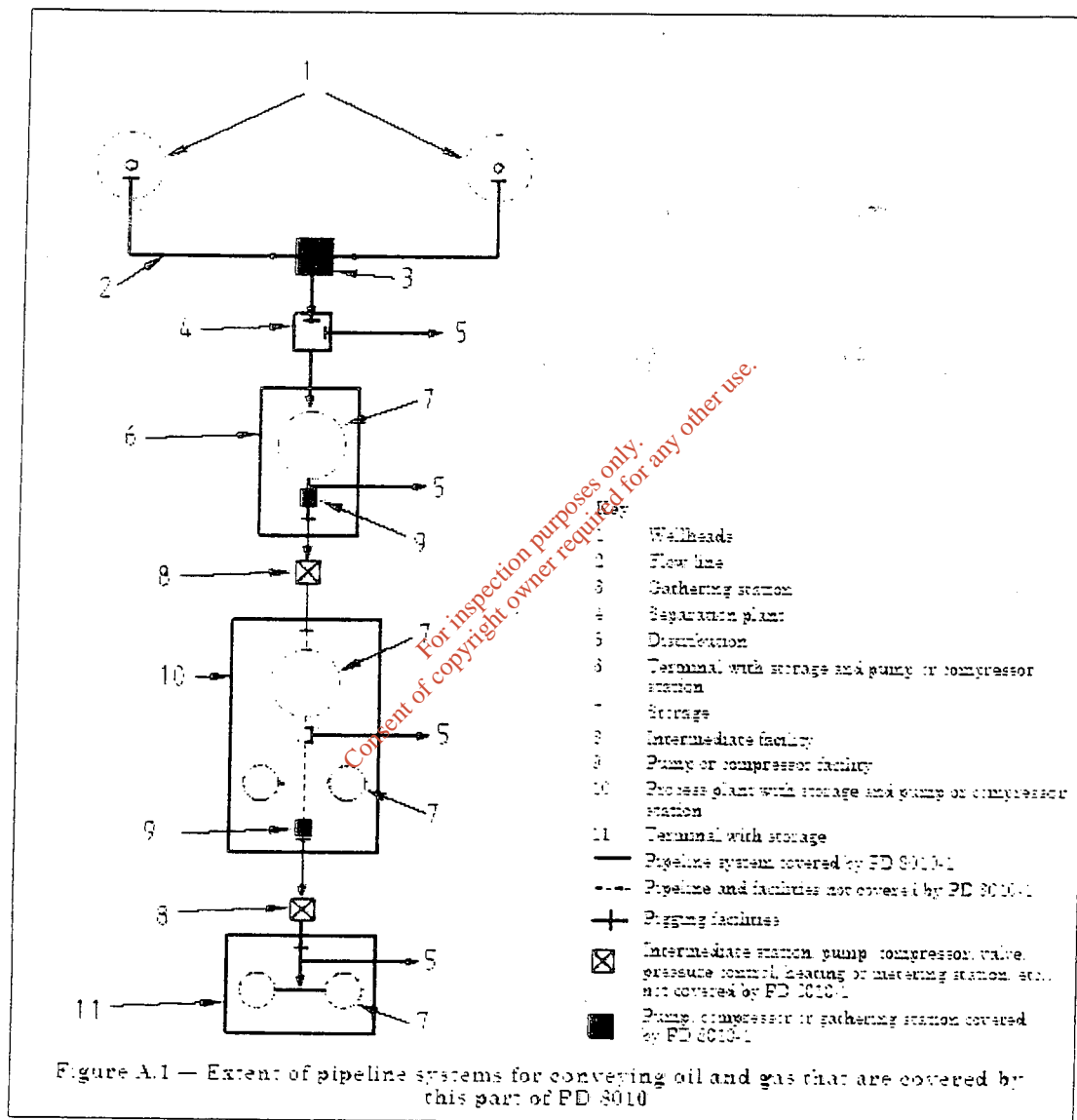
## APPENDIX 1 EXTRACTS FROM CODE OF PRACTICE

The extent of pipeline systems covered by this part of PD

Annex A (informative)

Extent of pipeline systems for conveying oil and gas that are covered by this part of PD 8010

Figure A.1 shows the full range of onshore oil and gas pipeline systems covered by this part of PD 8010.



From page 36 of PD 8010

## **“7 Design — Stations and terminals**

### **7.1 Selection of location**

In selecting the locations for stations and terminals on land, consideration should be given to factors including, but not limited to:

- a) topography;
- b) ground conditions;
- c) geohazards;
- d) ease of access;
- e) availability of services;
- f) necessity for inlet and outlet connections to and from the pipeline;
- g) hazards from other activities and adjacent property;
- h) public safety and the environment;**
- i) anticipated developments.

An assessment of noise levels should be made for a proposed station or terminal and account taken of predicted noise levels compared with existing background noise levels in the intended sites.

Stations and terminals should be located such that the facilities constructed on the site can be protected from fires on adjacent properties that are not under the control of the pipeline operating company.

The location of pipeline facilities within installations should be determined as part of an overall layout review of the installation, taking into account the results of safety evaluations. Possible consequences on personnel accommodation and evacuation in the case of explosion or fire should be minimized.

## 7.2 Layout

Open space should be provided around stations and terminals for the free movement of fire-fighting equipment. Access and clearance should be provided at stations and terminals for movement of fire-fighting and other emergency equipment.

Layouts of stations and terminals should be based on minimizing the spread and consequences of fire. Areas within stations and terminals with possible explosive gas mixtures should be classified in accordance with BS EN 60079-10 and the requirements for plant and equipment specified accordingly.

Spacing of tankage should be in accordance with NFPA 30.

Piping should be routed such that trip or overhead hazards to personnel are avoided, and access to piping and equipment for inspection and maintenance is not hindered. The necessity for access for replacement of equipment should also be taken into account when routing primary piping. Vent and drain lines should be designed to minimize the hazards associated with venting and with the discharge of fluids.

.....  
From page 113 of PD 8010

...F.2.2

### *Environmental impact*

Detailed assessments should be undertaken to ascertain the impact of the pipeline on environmentally sensitive areas. When selecting the route and station locations, care should be taken to identify and minimize any possible effects on:

- a) Ramsar sites;
- b) sites of special scientific interest (SSSIs);
- c) national parks and country parks;
- d) areas of outstanding natural beauty (AONBs);
- e) ancient monuments, archaeological and ornamental sites;
- f) **natural resources, such as catchment areas** and forests;
- g) flora and fauna;



## APPENDIX 2

### EXTRACTS FROM ABERDEENSHIRE COUNCIL PLANNING FOR ST FERGUS TERMINAL



<http://www.aberdeenshire.gov.uk/planning/finalised/chapter2.asp>

#### *Policy Emp11*

#### **Major Oil and Gas Sites**

Oil and gas related development within St. Fergus Gas Terminal or on land allocated for related development will be approved, in principle. Non oil and gas related development in or adjacent to these two sites will be approved, in principle, if it is ancillary to their operation.

### Justification

The aim of this policy is to safeguard the major oil and gas sites at St Fergus North and North Collielaw for oil and gas related development. Their site boundaries are shown in the Buchan section of Chapter 8, although they do not strictly meet the definition of a rural service centre.

Both St Fergus North and North Collielaw have been identified in National Planning Policy Guidance as requiring to be safeguarded for large petrochemical development. Such safeguarding gives protection of these areas from development that could impact negatively on their current and potential operations. This is in both the local and national interest given the important role of these sites.

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## APPENDIX 3

# Corrib Gas Pipeline

## Comments on the Advantica Safety Review

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Leo Corcoran

20<sup>th</sup> December 2005



## Comments on the Advanticia Review

### Summary

Within the restricted terms of reference of the Advanticia review, i.e. as outlined in Item 9 of their executive summary, an excellent report has been produced.

The report addresses issues raised by the author relating to proximity to buildings, fatigue, design of road crossings but does not fully address issues identified in my 1<sup>st</sup> Report concerning the granting of the Letter of Consent. The review addresses design issues relating to the beach valve station but does not address the planning requirements for this station.

It is unfortunate that Advantica were restricted from commenting on alternative design options as I believe, with their expertise they could make a valuable contribution which would facilitate a resolution to the impasse that currently exists.

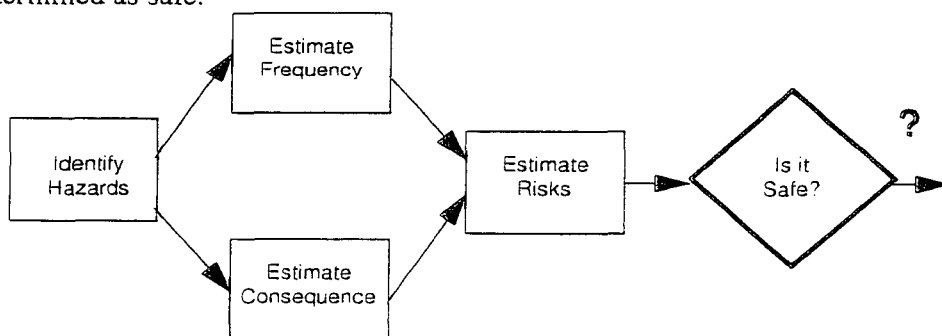
The following are my comments on the review.

### Beach Valve Station

To date the developer has not applied for planning permission of the beach valve station. The beach valve station will be similar in design to a standard transmission block valve station with a requirement for an access road and security fence. All existing block valve stations require planning permission. Although this station is located on the upstream pipeline there are no provisions under the Planning or Gas Acts which would exempt it from the requirement to have planning permission. Similar beach valve stations in the UK require and obtain planning permission. Quantified Risk Assessment QRA

Advantica have determined that the QRA carried out on behalf of the developer ***"fails to recognise the uncertainty in the risk modelling for such high design pressures as 345 bar, and takes no account of societal risk to the local population as a whole."***

Classical QRA methodologies require the following analysis before a facility can be determined as safe.



The above analysis clearly requires the designer to have accurate and realistic historical data records on the failure frequency and event consequences. For the

Corrib Gas Pipeline, operating at 345 bar, historical data sources are not available to enable a reliable and realistic QRA to be carried out.

For this reason QRA is not appropriate for this pipeline and therefore a more prudent and realistic prescriptive approach to the design, as recommended by Advantica and as contained in the codes of practice, should have been used.

#### **Terminal Selection Process**

The selection of the Bellanaboy site should be reviewed given that the design of the upstream pipeline servicing the terminal is now different from the original. Advantica have now recommended a pressure limit of 144 bar and a design factor limit of 0.3. The location was also selected in advance of the Gas Act 2002 under which a more appropriate coastal site could have been selected and acquired. Prior to the Gas Act 2002 the developer could not exercise CPO powers to acquire an optimum coastal location for the terminal. The acquisition of the Bellanaboy site, from Coillte a Government agency, may have been a short term expedient, but it has shown itself to be a sub-optimal solution given the problems of routing upstream pipeline through populated areas unprecedented in pipeline practice.

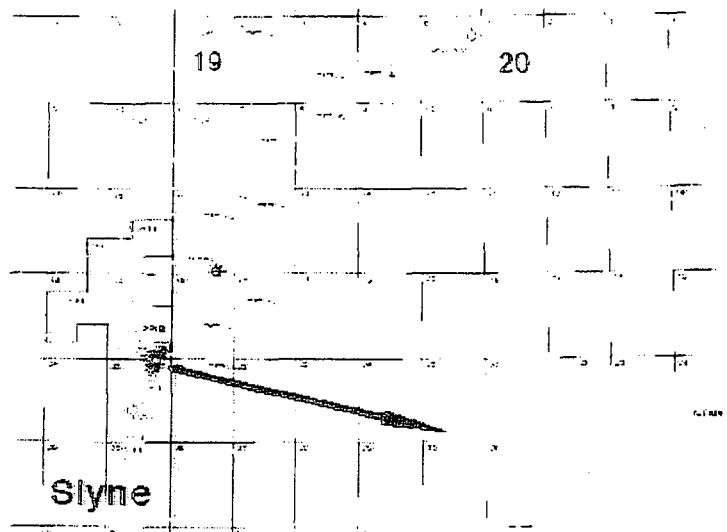
Advantica have stated that

***“it was important to minimise the length of the pipeline between the wells and the terminal. This meant that there was a preference for a landfall and terminal location that provided the shortest practical length of pipeline between the wells and the terminal.”***

This important requirement is not apparent in the original design. If it was, it is more likely that a coastal location would have been selected by the developer as is the practice in other countries.

In the light of the above and considering that the shortest distance between the wells and landfall is on the western coast of the Erris Peninsula it would be worthwhile to extend the scope of the Advantica review to identify or confirm the optimum location for the terminal.





A coastal location for the terminal would also be in the interests of Shell as it would not contain operating pressure restrictions which could prevent them from offshore tie-ins to future discoveries in deeper waters and at higher operating pressures. From a purely financial perspective a restriction of the upstream pipeline at 144 bar could devalue the current considerable offshore investment in pipelines and exploration. It also means that any future discoveries operating at a higher pressure would require an additional terminal at a coastal site, together with addition upstream pipelines requiring considerable additional unnecessary expense and planning. There are technical limits to pressure reduction facilities which can be installed at the wellhead due to problems associated with adiabatic cooling and hydrate formation. Shell should also now review the terminal location, regardless of the fact that it is in our human nature to continue to justify decisions already committed to rather than review the project in current circumstances. Considering the new restriction in upstream pressure, any additional cost of selecting a coastal location may be offset by the retention of the high value of offshore assets. The new site would require a new planning application, but a new planning application will be required in any event for the beach valve station in the current location.

Acquiring planning permission for the Bellanaboy site is one of the reasons why the project is behind schedule and even though this site was granted approval an alternative and more appropriate site could obtain approval in a much shorter timeframe as many of the issues relating to the terminal itself have been address in the current approval process. A change of site location would then only require site specific issues to be addressed.

The upstream pipeline and terminal are designed to have a life of between 30 - 40 years even though the Corrib field has an economic life of 17 - 20 years. Shell will be interested in utilizing the terminal and upstream pipeline to process future discoveries and therefore the design and location should anticipate this future requirement.

People living in close proximity to the upstream pipeline are concerned that any agreement for this pipeline, as recommended by Advantica could be reviewed, under current and future versions of PD 8010 by allowing an increase in operating pressure beyond 144 bar, following additional discoveries, particularly as the Corrib field has a life of 17 years, the pipeline has a design life of up to 40 years and the CPO grants a wayleave in perpetuity.

### **Letter of Consent**

The letter of consent should be reviewed by Advantica as it is the document which underpins and gives legal effect to the safety provisions of this pipeline and so is part of the current scope of the Advantica review.

The letter of consent is the document under the Gas Act which permits the developer to build and operate the pipeline.

The submission on which the letter of consent was sought including,

- the maximum allowable operating pressure,
- the inappropriate design factor,
- the discredited QRA,
- the independence of the original technical reviews,
- the flawed design on which the consent was sought,
- the absence of an appropriate design code,
- the absence of a formal integrity management plan,

indicates that the Letter of Consent granted by the Minister for the Marine and Natural Resources in 2002 was based on an unreliable design and inappropriate submission by the developer, and inadequate oversight by the Department for the Marine and Natural Resources.

Clearly the substantial matters on which consent was granted are in question and it is now necessary to set aside the current document and replace it with a consent for a pipeline which has integrity and which is legally enforceable. Advantica should outline the key conditions which would be contained in a new letter of consent.

Overall the Advantica review has applied sound engineering analysis to a difficult problem. If the above comments are taken on board I believe that a resolution to this controversy can be found.

Leo Corcoran CEng MBA FIEI

20<sup>th</sup> December 2005

## APPENDIX 4

### IMPACT OF SHELL ACTIVITIES IN NIGERIA

In February 2007 National Geographic Magazine reviewed the activities of Shell and other energy companies in Nigeria.



By **Tom O'Neill** Photographs by **Ed Kashi**

The Niger Delta holds some of the world's richest oil deposits, yet Nigerians living there are poorer than ever, violence is rampant, and the land and water are fouled. What went wrong?

Oil fouls everything in southern Nigeria. It spills from the pipelines, poisoning soil and water. It stains the hands of politicians and generals, who siphon off its profits. It taints the ambitions of the young, who will try anything to scoop up a share of the liquid riches—fire a gun, sabotage a pipeline, kidnap a foreigner.

Nigeria had all the makings of an uplifting tale: poor African nation blessed with enormous sudden wealth. Visions of prosperity rose with the same force as the oil that first gushed from the Niger Delta's marshy ground in 1956. The world market craved delta crude, a "sweet," low-sulfur liquid called Bonny Light, easily refined into gasoline and diesel. By the mid-1970s, Nigeria had joined OPEC (Organization of Petroleum Exporting Countries), and the government's budget bulged with petrodollars.

Everything looked possible—but everything went wrong.

Dense, garbage-heaped slums stretch for miles. Choking black smoke from an open-air slaughterhouse rolls over housetops. Streets are cratered with potholes and ruts. Vicious gangs roam school grounds. Peddlers and beggars rush up to vehicles stalled in gas lines. This is Port Harcourt, Nigeria's oil hub, capital of Rivers state, smack-dab in the middle of oil reserves bigger than the United States' and Mexico's combined. Port Harcourt should gleam; instead, it rots.

Beyond the city, within the labyrinth of creeks, rivers, and pipeline channels that vein the delta—one of the world's largest wetlands—exists a netherworld. Villages and towns cling to the banks, little more than heaps of mud-walled huts and rusty shacks. Groups of hungry, half-naked children and sullen, idle adults wander dirt paths. There is no electricity, no clean water, no medicine, no schools. Fishing nets hang dry; dugout canoes sit unused on muddy banks. Decades of oil spills, acid rain from gas flares, and the stripping away of mangroves for pipelines have killed off fish.

Nigeria has been subverted by the very thing that gave it promise—oil, which accounts for 95 percent of the country's export earnings and 80 percent of its revenue. In 1960, agricultural products such as palm oil and cacao beans made up nearly all Nigeria's exports; today, they barely register as trade items, and Africa's most populous country, with 130 million people, has gone from being self-sufficient in food to importing more than it produces. Because its refineries are constantly breaking down, oil-rich Nigeria must also import the bulk of its fuel. But even then, gas stations are often closed for want of supply. A recent United Nations report shows that in quality of life, Nigeria rates below all other major oil nations, from Libya to Indonesia. Its annual per capita income of \$1,400 is less than that of Senegal, which exports mainly fish and nuts. The World Bank categorizes Nigeria as a "fragile state," beset by risk of armed conflict, epidemic disease, and failed governance.

The sense of relentless crisis has deepened since last year, when a secretive group of armed, hooded rebels operating under the name of the Movement for the Emancipation of the Niger Delta, or MEND, intensified attacks on oil platforms and pumping stations, most operated by Shell Nigeria. Militants from MEND and other groups have killed soldiers and security guards, kidnapped foreign oil workers, set off car bombs in the delta city of Warri to protest the visit of Chinese oil executives, and, to show off their reach, overrun an oil rig 40 miles (64 kilometers) offshore in the Gulf of Guinea. The attacks have shut down the daily flow of more than 500,000 barrels of oil, leading the country to tap offshore reserves to make up for lost revenue. With each disruption, the daily price of oil on the world market climbed. According to the Brussels-based International Crisis Group, escalating violence in a region teeming with angry, frustrated people is

creating a "militant time bomb."

From a potential model nation, Nigeria has become a dangerous country, addicted to oil money, with people increasingly willing to turn to corruption, sabotage, and murder to get a fix of the wealth. The cruelest twist is that half a century of oil extraction in the delta has failed to make the lives of the people better. Instead, they are poorer still, and hopeless.

Every day at Bonny Island, oceangoing tankers line up in Cawthorne Channel like massive parade floats. They're each waiting to fill up with close to a million barrels of the coveted Bonny Light, drawing the oil from a nearby export terminal. Ships have been gathering at this 15-mile-long (24 kilometers) barrier island since the mid-1500s, when slave trading between West Africa and the New World began. Beneath the contemporary cacophony—the yammer of motorcycle taxis, the call of Christian preachers from the market stalls, the throb of drums and guitars from boomboxes inside shacks—strains of anger and sorrow echo the tragedy of exploitation.

"It's not fair," Felix James Harry muttered in a meetinghouse in the village of Finima on the western end of the island, close to the oil and gas complex. "We can hardly catch fish anymore. Surviving is very hard." Harry, a 30-year-old father of two children, should have been in his canoe this afternoon, throwing out nets to snare crayfish and sardines. But he was sitting in an airless concrete-block shelter with half a dozen other fishermen, none of whom had much to do.

Their fishing community once stood on the other side of a small inlet, where fuel storage tanks the size of cathedral domes now loom, and where the superstructure of a liquefied natural gas plant juts higher than any tree in the forest. The relocation of Finima in the early 1990s jarred loose the community's economic moorings. "We can't support our families anymore," Harry said.

Houses in the new village are tightly packed, leaving little room for gardens. Windows look out on walls. In this claustrophobic setting, the men talked about nature. "The forest where the gas plant is protected us from the east wind," Solomon David, the community chairman, said. "Now, the rain and wind ruin our thatched roofs every three months. They lasted more than twice as long before." Another fisherman mentioned how construction and increased ship traffic changed local wave patterns, causing shore erosion and forcing fish into deeper water. "We would need a 55-horsepower engine to get to those places." No one in the room could afford such an engine.

The meetinghouse had no electricity, but a battery-powered wall clock, the only decoration, showed that another day was ebbing away. Forced to give up fishing, the young men of the village put their hope in landing a job with the oil industry.



But offers are scarce. "People from the outside get all the jobs," Harry said, alluding to members of Nigeria's majority ethnic groups—the Igbo, Yoruba, Hausa, and Fulani—who are the country's political and economic elite. "We have diploma holders, but they have nothing to do."

Grievances crowded the dim room. Bernard Cosmos, a strapping young man in a striped polo shirt, spoke out: "I have a degree in petrochemical engineering from Rivers State University in Port Harcourt. I've applied many times with the oil companies for a good job. It's always no. They tell me that I can work in an oil field as an unskilled laborer but not as an engineer. I have no money to get other training."

Isaac Asume Osuoka, director of Social Action, Nigeria, believes that callousness toward the people of the delta stems from their economic irrelevance. "With all the oil money coming in, the state doesn't need taxes from people. Rather than being a resource for the state, the people are impediments. There is no incentive anymore for the government to build schools or hospitals."

"I can say this," Osuoka said firmly. "Nigeria was a much better place without oil."

Such a stark indictment would surely draw reaction from the government and oil companies. But repeated efforts to arrange on-the-record interviews with officialdom—oil company executives, the governor of Rivers state, the commander of the Joint Task Force, which is the military arm responsible for security in the delta—were foiled. Shell and Total, a French company, had offered tours of their facilities, but soon after I arrived in the delta, a spate of kidnappings of foreign oil workers, especially around Port Harcourt, prompted the multinationals to restrict the movements of personnel. Amid the violence, the oil companies have hunkered down in silence.

At the Finima meetinghouse, the men grew restless and, one by one, drifted into the dusk. Before he left, Felix Harry declared that faith in God would reward the community. That belief must be deep on Bonny Island, judging from the barrage of signs for revival meetings and church services along island roads. One church promoted PUSH: Pray Until Something Happens. Christianity has found fertile ground in the delta after Protestant missionaries arrived in force in the mid-1800s, and it is now the dominant faith.

Harry recited Psalm 91, praising God with a flourish: "He is my refuge and my fortress." We walked outside. There, stranded on the shore, were the village fishing boats, several dozen of them. Only a miracle would get them into the water.

Across the delta, people are hoping that someone will pay attention to the region's problems and intervene. The U.S. and western Europe, the major consumers of

Nigerian oil, are watching closely. With the U.S. consulate in Lagos warning of a possible rebel attack on Bonny Island, diplomats are urging greater military security. Stockholders of the oil companies are asking why the situation has turned so perilous. Who is to blame? The answers are as complicated and murky as the water trails in the delta.

When the oil curse began with that first great gusher in the creekside village of Oloibiri, 50 miles (80 kilometers) west of Port Harcourt, Nigeria was still a British colony. At independence in 1960, few observers expected that Nigeria would mature into an oil giant. But in subsequent decades, the oil companies, led by five multinational firms—Royal Dutch Shell, Total, Italy's Agip, and ExxonMobil and Chevron from the U.S.—transformed a remote, nearly inaccessible wetland into industrial wilderness. The imprint: 4,500 miles (7,200 kilometers) of pipelines, 159 oil fields, and 275 flow stations, their gas flares visible day and night from miles away.

No one can deny the sheer technological achievement of building an infrastructure to extract oil from a waterlogged equatorial forest. Intense swampy heat, nearly impenetrable mangrove thickets, swarming insects, and torrential downpours bedevil operations to this day. But mastering the physical environment has proved almost simple compared with dealing with the social and cultural landscape. The oil firms entered a region splintered by ethnic rivalries. More than two dozen ethnic groups inhabit the delta, among them the Ijaw, the largest group, and the Igbo, Itsekiri, Ogoni, Isoko, and Urhobo. These groups have a history of fighting over the spoils of the delta, from slaves to palm oil—and now, crude oil. The companies disturbed a fragile landscape that supported fishing and farming. Engineers and project managers constructing pipelines through a mangrove swamp, or laying roads through marshland, could disrupt spawning grounds or change the course of a stream, threatening a village's livelihood.

Recent reports by the United Nations Development Program and the International Crisis Group identify some of the questionable strategies employed by oil companies: paying off village chiefs for drilling rights; building a road or dredging a canal without an adequate environmental impact study; tying up compensation cases—for resource damages or land purchases—for years in court; dispatching security forces to violently break up protests; patching up oil leaks without cleaning up sites.

"After 50 years, the oil companies are still searching for a way to operate successfully with communities," says Antony Goldman, a London-based risk consultant. The delta is littered with failed projects started by oil companies and government agencies—water tanks without operating pumps, clinics with no medicine, schools with no teachers or books, fishponds with no fish.

"The companies didn't consult with villagers," says Michael Watts, director of the African Studies Program at the University of California, Berkeley. "They basically handed out cash to chiefs. It wasn't effective at all."

Last summer, skittish oil prices hit \$78 a barrel, partly because of an attack on a Shell flow station. The high prices more than offset production losses caused by the growing instability, helping earn Shell and the other multinationals record profits in 2006. Meanwhile, more oil fields continue to open, many of them offshore where the infrastructure, though far more expensive than on land, is much safer from sabotage and theft. The deepwater fields are attracting aggressive new investors as well. China, India, and South Korea, all energy-hungry, have begun buying stakes in Nigeria's offshore blocks. "Most Western companies in Nigeria will find it difficult to compete, especially with China," Goldman says. That's because oil purchases by the Chinese come with their commitment to finance large infrastructure projects, such as rehabilitating a railroad line.

The largest new petroleum endeavor on the delta is taking shape along the Nun River, a tributary of the Niger. Operated by Shell, the Gbaran Integrated Oil and Gas Project, scheduled to begin producing in 2008, will encompass 15 new oil and gas fields, more than 200 miles (320 kilometers) of pipeline, and a sizable gas-gathering plant. New roads are already gashing the forest. Mounds of long black pipes await burial. Near a bank of the Nun, Nigerian soldiers crouch behind a ring of sandbags, a .60-caliber machine gun facing the road as they guard the entrance to the construction site of the gas plant. Cranes and bulldozers crawl over a cleared space large enough to fit two shopping malls. From the air, it must look as if a patch of skin has been removed from the face of the forest.

Activists with human rights groups are pressuring Shell to learn from past mistakes and treat this high-profile project, which affects 90 villages, as a chance to work better with communities. Michael Watts is advising NGOs on how to educate the local people about their rights. "For Shell to conduct business as usual would be a public relations disaster," Watts says. "Folks say, 'Look, these oil companies are making billions by taking out this black stuff from our territory—they should have some ethical and social responsibilities.'"

A cautionary tale unfolds at Oloibiri, where a wellhead, or "Christmas tree," stands in an overgrown plot. Nothing has flowed from it for years. A weathered sign states the facts: "Oloibiri Well No. 1. Drilled June, 1956. Depth: 12,000 feet (3,700 meters)." Nearby, a plaque dating from 2001 commemorates a presidential visit and the laying of a foundation stone for the Oloibiri Oil and Gas Research Institute, a projected government-funded museum and library. The stone is still there, but nothing else. A few local youths guard the site, not so much to protect it as to demand money from anyone who wants to snap a picture.

In the town of Oloibiri, whose population has dropped from 10,000 to fewer than 1,000 in the past 30 years, a dirt road passes between rough-hewn houses, some roofed with thatch, others with sheets of corroding metal. A small shop offers a few bananas and yams. Inside the only freshly painted structure, a lemon yellow, two-story house, Chief Osobere Inengite of the Ijaw tribe apologizes for the appearance of his town: "Oloibiri is supposed to be compared to Texas," he said. "I ask you, in Texas have the people in 50 years seen one second of darkness? But look here, we have no light, no water, no food, no jobs."

The chief looked prosperous. He was wearing an ornate black-and-purple robe, a chunky coral necklace, and a black derby, his outfit for a neighboring chief's coronation downriver in Nembe later that day. Like most chiefs, Inengite has a business—dredging sand from the river for roadbuilding. He always keeps an eye out for visitors to Nigeria's historic Well No. 1. He wants them to leave Oloibiri with a message for Shell, which owns the local oil fields. "Tell them to help us. Tell them to train 50 boys and girls from here for jobs," the chief pleaded. Then he sighed, "If we had never seen oil, we would have been better off."

Where does all the oil money go? That question is asked in every village, town, and city in the Niger Delta. The blame spreads, moving from the oil companies to a bigger, more elusive, target: the Nigerian government. Ever since it nationalized the oil industry in 1971, the government has controlled the energy purse. In a joint venture arrangement, the state, in the name of the Nigerian National Petroleum Corporation, owns 55 to 60 percent of multinational oil operations onshore. The windfall in revenues from this arrangement has grown in real dollars from 250 million a year to more than 60 billion in 2005. During that time, even though the government has evolved from a military dictatorship to a democracy (the latest attempt at civil governance began in 1999), what has not changed is what an International Crisis Group report calls a "cancer of corruption." A Western diplomat quoted in the report was even more direct, referring to "the institutionalized looting of national wealth." The money involved is staggering. The head of Nigeria's anticorruption agency estimated that in 2003, 70 percent of oil revenues, more than 14 billion dollars, was stolen or wasted.

On paper, a mechanism does exist for distributing oil revenues somewhat fairly. The federal government retains roughly half and gives out the rest each month, on a sliding scale, to the 36 state governments. The core oil producers—Rivers, Delta, Bayelsa, and Akwa Ibom—receive the most. During the month I was in the delta, those four states divided up more than 650 million dollars.

But there is no discernible trickle down.

Newspaper articles and court cases document spectacular misuses of the money by military men and public office holders—such as the now imprisoned former

Bayelsa governor Diepreye Alamieyeseigha—who stash hundreds of millions of dollars in foreign bank accounts to buy mansions in the U.S. and send their children to private schools in London. For the delta's 30 million people—most of whom struggle on less than a dollar a day—seeing this kind of money coming into their states with essentially none of it reaching them has created conditions for insurrection.

Nigeria's oil money won't keep coming, of course—perhaps another 40 years, the experts say. Natural gas is a fallback. Nigeria's reserves are estimated at 184 trillion cubic feet (five trillion cubic meters), good for an estimated 240 years of production at current levels. In the meantime, Antony Goldman says, "The government is following a simple plan for oil extraction: We've got to get what we can now, now."

Isaac Osuoka remembers the first time he saw frozen fish. It was the late 1970s, and he was five. A peddler caused a stir as he entered Osuoka's delta town of Oeliabi (now Akinima) with a carton of what he called ice fish. "We never had fish brought in from outside," said Osuoka, who now lives in Port Harcourt. "We had no idea what frozen fish meant. There were rumors that this fish was kept in a mortuary."

Frozen fish was a harbinger of the changes that would traumatize Osuoka's community. "As a boy, I could stroll to the rivers or back swamps with a rod and a net and come back with enough fish to feed my family," he recalled. "There was usually enough left over to sell, providing income for us to go to school." This bounty would not survive the coming of oil. Leaks from pipelines and wells, and the building of roads and canals, have disrupted the wetlands. "The degree and rate of degradation," the UN report warns, "are pushing the delta towards ecological disaster."

In 1996, Osuoka joined Environmental Rights Action, an advocacy group that helps communities defend their resources and learn their legal rights so they can avoid Oeliabi's fate. "We're seeing that environmental damages often happen silently, with their effects not coming out until years later," Osuoka said. "Today, there is not a single person in my community you could describe as a fisherman. We depend almost totally on frozen fish." At market stalls, a piece of frozen croaker or mackerel, most of it imported, goes for almost a dollar, unaffordable for most villagers.

The best environmental studies of the delta were done at least 30 years ago, according to Jimmy Adegoke, a Nigerian-born research scientist at the University of Missouri. To help fill the void, he and a team of researchers conducted fieldwork and a satellite-based study of the delta. They found that between 1986 and 2003, more than 50,000 acres (20,000 hectares) of mangroves disappeared from the coast.



largely because of land clearing and canal dredging for oil and gas exploration. "That is a significant amount given how valuable the mangrove ecosystem is," Adegoke said, referring to the coastal forest's high productivity for fish populations. "I think the loss of one acre is too much. You're wiping out the means for people to sustain themselves."

Oil companies operated in the delta for years with little environmental oversight. There was no federal environmental protection agency until 1988, and environmental impact assessments weren't mandated until 1992. What pressure the government exerts now is directed mostly at halting gas flares. Delta oil fields contain large amounts of natural gas that companies have traditionally elected to burn off rather than store or reinject into the ground, more costly measures. Hundreds of flares have burned nonstop for decades, releasing greenhouse gases and causing acid rain. Communities complain of corroded roofs, crop failures, and respiratory diseases. After first ordering companies to eliminate flaring by 1984, the government keeps pushing back the deadline. Shell, the main offender, recently announced that despite making considerable progress, it could not meet the latest target date of 2008.

On land, there are oil spills, polluting groundwater and ruining cropland. The government documented 6,817 spills between 1976 and 2001—practically one a day for 25 years—but analysts suspect that the real number may be ten times higher. Old, improperly maintained equipment causes many of the leaks, but oil operators blame sabotage and theft, speculating that disaffected community members deliberately cause oil spills to collect compensation money.

Well 13 in Shell's Yorla field had been leaking for five days when I got there. Members of the nearby Ogoni village of Kpean had assembled around a five-foot-high (1.5 meters) wellhead that stood in the midst of high grass. Puffs of smoke drifted from the iron structure. Oil dripped from its sides into a spreading lake.

"We're expecting Shell, but no one has come yet," a villager said. "Soon the oil will leak into the creek over there and spoil our drinking water."

Shell and Ogoniland share a tragic history. Nigeria's first mass protest against the oil industry emerged in these tribal lands southeast of Port Harcourt. In 1990, the charismatic writer Ken Saro-Wiwa, outraged by oil spills in Ogoniland, founded the Movement for the Survival of Ogoni People. The organization demanded control of the oil on Ogoni lands and an end to environmental damage. A quarter of a million Ogoni, nearly half the population, rallied in early 1993 to support the cause. Later that year, Shell, citing security concerns, halted production from its 96 wells in Ogoniland—though oil from wells outside the area continued to flow in pipelines through Ogoni territory.

Alarmed by Saro-Wiwa's popular support, Nigeria's military government brought charges of murder against him and fellow activists. The government accused them of instigating the mob killings of four Ogoni leaders from a rival faction. At a tribunal widely regarded as a sham, and with the alleged complicity of Shell, Saro-Wiwa and eight others were found guilty and hanged in 1995. Though the world community reacted with outrage, and Saro-Wiwa's son initiated a lawsuit against Shell for human rights abuses (which is ongoing), the situation has not improved. In fact, Isaac Osuoka told me, "things have gotten worse since Ken was murdered."

To this day, safety concerns and lengthy, often hostile negotiations with community leaders over access fees and compensation payments hamper Shell's response to spills. When I heard that the leak at Well 13 had become a fire, I returned to Kpean. Black smoke was flooding the sky above the palm trees. This time I couldn't get close to the well—a group of angry Ogoni youths blocked my vehicle.

"Get out, white man! You work for Shell!" one yelled.

"You want to see it? Give us 100,000 naira," another shouted. He was demanding \$800.

A few days later, I asked Patrick Naagbantton, an Ogoni journalist who had marched with Saro-Wiwa, to convince the village chief to let us in. Naagbantton led the way, shoving through the crowd toward the well. A fireball was erupting from the ground. The flames roared. Within the inferno, the iron Christmas tree was melting like an effigy thrown on a funeral pyre. Letam Nwinek, one of the villagers, pulled us away from the heat. "We're afraid that if the fire enters the pipeline, the whole community could go up," he said. "Shell keeps promising to come, but they say they need more foam and special equipment because the fire has grown so large."

Suddenly, the crowd began scattering. A man dressed for the city in a pink shirt and black beret came up to us.

"You'd better leave. Now!"

Our evictor, Marvin Yobana, was president of the Ogoni Youth Council. As he spoke, five men surrounded us in a threatening stance.

"Yobana is what passes as an Ogoni leader today," Naagbantton said as we retreated. "He's a thug. I believe he's negotiating with Shell to gain a lucrative clean-up contract and doesn't want journalists around." Taking a last look at the fire, Naagbantton said with disgust, "He's just part of the predatory, parasitic struggle to get oil money."

Well 13 would burn for two more months before a Shell team arrived to extinguish it.

"Is anyone listening?" Ken Saro-Wiwa had asked in his final newspaper column. "The delta people must be allowed to join in the lucrative sale of crude oil," he wrote. "Only in this way can the cataclysm that is building up in the delta be avoided."

The cataclysm is upon the delta. As I write this, 70 militants have just attacked a Shell convoy in the Cawthorne Channel, taking 25 oil workers hostage. Rebels have killed nine Nigerian soldiers in a firefight near Brass Island, the site of a large, vulnerable export terminal. Meanwhile, east of Port Harcourt, gunmen have raided an ExxonMobil residential compound and abducted four Scottish oil workers, demanding ten million dollars each for their release.

The number and severity of attacks in the delta have been building, led by youth groups demanding access to the oil wealth in their territories. This surge in militancy is emblematic of a continent-wide frustration among the young, says Michael Watts, of the University of California. "Across Africa you have a huge number of alienated youths, politically footloose, who thought they could achieve something with their countries' moves to independence and democracy. Those hopes have been almost everywhere violently snuffed out. The youth are pissed off and willing to up the ante."

In the Niger Delta, escalating violence has undermined the country's financial stability and its ability to supply crude to the Western world. Shipments from new offshore rigs are making up for some of the oil lost to sabotage, but rebels identified with MEND have threatened to shut down everything. The day the U.S. consulate warned of the possible attack on Bonny Island, a spokesman for MEND boasted to the press: "We will wipe out the Nigerian oil export industry in one swipe."

Late one night in a darkened neighborhood in central Port Harcourt (the city was experiencing one of its regular blackouts), an angry young man, who asked for anonymity, explained his outrage. "Nigeria made its greatest mistake taking the life of that man Ken Saro-Wiwa. It will not be forgiven. When the Nigerian state overreacted like that, the thinking became, We have to carry weapons unless we want to die. Violence begets violence. When someone loses hope, he is devastated, and he will say, 'Either I fight, or I leave this world.'"

This young Nigerian is a university lecturer, who says the time for talking has passed. "When the situation in the delta threatens to turn into another Middle East, then the world will finally intervene."

Another night in Port Harcourt, a prolonged gun battle erupted outside my compound. Volleys from AK-47s, answered by the booms of pump-action shotguns, sent me running to barricade my door. The gunmen abducted four expatriates from Goodfellas, a nightclub nearby. (It was this incident that led the oil companies to cancel their tours.) A Dutch oil worker on contract to Shell, who makes \$80,000 a year as a pipeline construction supervisor, told me he has to travel everywhere with an armed escort. "You must keep it in your mind that people out there may kill you," he said.

With every assault by the insurgents, the Nigerian military seems to answer with devastation. One evening, a gang of kidnappers dressed in army camouflage came by boat to a waterside neighborhood called Aker Base on the outskirts of Port Harcourt, stormed into a bar, and snatched an Italian construction worker employed by Saipem, an oil-servicing company. During the grab, the assailants killed a soldier. Within hours, troops swept into the shantytown and burned down every structure except a bank. Days later, stunned residents wandered through the charred ruins like ghosts; some 3,000 had lost their homes.

A woman clutching her melted cell phone moaned, "I have to tell my mother, my brothers and sisters what happened. I don't know where to start and where to end." In front of a collapsed church, the village chief implored a crowd to "Let God fight this case." A lawyer hired by the village provided little comfort when he said that Saipem would meet with the community "maybe in a week" and ask for a list of everything lost.

"I blame the government," said Caroline Mathias, the owner of the bar, staring at a pile of melted bottles and the crumpled metal roof where her business had stood. "The government should help us. I'm begging them. We are not the ones who killed that soldier."

The Italian worker was freed five days after the sack of Aker Base. That month, 18 foreigners were abducted; all were released, reportedly after hefty ransom payments.

No one is sure how many delta people have picked up the gun to fight for their rights. Estimates range from the low hundreds to the low thousands. What is certain is that each time the military reacts with extreme measures, the number rises.

The rebels seem unafraid, as when a hundred or so MEND members and supporters gathered openly at a morgue in the city of Warri for the funeral service of nine militants killed on the water in an ambush by the Nigerian military. Afterward, MEND leaders invited the press to accompany boats taking the caskets to villages for burial. Along the way, men waved guns from jetties, and white flags

flew from huts. The men wore conspicuous red-and-white ties knotted around their arms. The ties and flags were symbols of Egbesu, the Ijaw god of war. Warriors wear the knots as protection against death, believing that having taken an oath to Egbesu, nothing metal—neither bullet nor machete—can harm them. Farther on, a rebel camp sat brazenly on a riverbank, the blue roofs of its barracks plainly visible to oil company helicopters.

No solution seems in sight for the Niger Delta. The oil companies are keeping their heads down, desperate to safeguard their employees and the flow of oil. The military, ordered to meet force with force, have stepped up patrols in cities and on waterways. The militants are intensifying a deadly guerrilla offensive, hoping that rising casualties and oil prices will force the government to negotiate. National elections in April could exacerbate the violence, especially if politicians resort to the practice of hiring youth gangs to deliver votes at gunpoint.

Optimism is as scarce as blue sky in the sodden delta. "Everyone was sure they would be blessed with the coming of the black gold and live as well as people in other parts of the world," said Patrick Amaopusanibo, a retired businessman who now farms near the village of Oloama. He had to speak loudly to compete with the "black noise," the hissing and roaring of a gas flare near his cassava field. "But we have nothing. I feel cheated."

In some parts of the Niger Delta, oil still looks like a miracle. In the run-down fishing village of Oweikorogba on the Nun River, where families of ten sleep in a single room under leaky thatch roofs, hope materialized a year ago in the form of Chinese prospectors. They left without finding oil, but the people of Oweikorogba want them back, confident that they'll find a pot of gold. And if a stranger warns these villagers that oil is a curse in Nigeria, they will look at him and say: "We want oil here. It will make everything better."



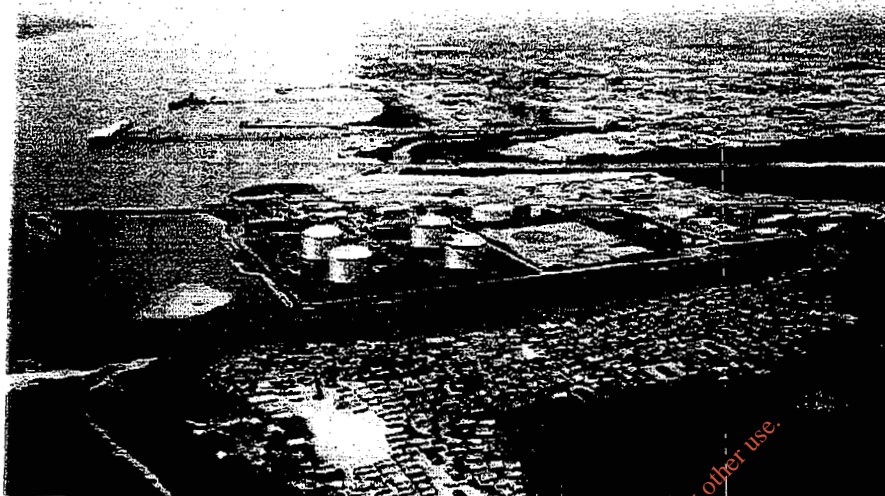
### From Bad to Worse

Photograph by Ed Kashi

Heat and smoke force back villagers who have come to check on an oil fire erupting from a leaking wellhead in Ogoniland. The wellhead had been spilling oil for a week, coating the ground around it before catching fire. The fire burned for more than two months before an oil company team could make



arrangements to quell it. Fifty years of oil spills have turned the delta into one of the most polluted areas in the world



### Island Strife

Photograph by Ed Kashi

Uprooted to make room for a liquefied natural gas plant, people in the village of Finima on Bonny Island complain that the facility has damaged fishing grounds, with few jobs offered in return.



### On the Outside

Photograph by Ed Kashi

Villagers in Fi ima live within sight of giant fuel tanks and a polluting gas flare, part of the sprawling energy infrastructure on Bonny Island. Ships loaded with millions of dollars' worth of crude oil and natural gas depart regularly from an island where most people subsist on a few dollars a day





## Company Town

Photograph by Ed Kashi

Oil leaves its mark in Okrika, from a company umbrella to a trail of pipelines coiling through town. Since oil started flowing, most communities have seen living standards fall, betraying the hope that oil once brought to Nigeria.

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## APPENDIX 5 EXTRACTS FROM THE STERN REVIEW

"The need for action is urgent: demand for energy and transportation is growing rapidly in many developing countries, and many developed countries are also due to renew a significant proportion of capital stock. The investments made in the next 10-20 years could lock in very high emissions for the next half-century, or present an opportunity to move the world onto a more sustainable path.

International co-operation must cover all aspects of policy to reduce emissions – pricing, technology and the removal of behavioural barriers, as well as action on emissions from land use. And it must promote and support adaptation. There are significant opportunities for action now, including in areas with immediate economic benefits (such as energy efficiency and reduced gas flaring) and in areas where large-scale pilot programmes would generate important experience to guide future negotiations.....

There are ways to reduce the risks of climate change. With the right incentives, the private sector will respond and can deliver solutions. The stabilisation of greenhouse gas concentrations in the atmosphere is feasible, at significant but manageable costs. The policy tools exist to create the incentives required to change investment patterns and move the global economy onto a low-carbon path. This must go hand-in-hand with increased action to adapt to the impacts of the climate change that can no longer be avoided.

Above all, reducing the risks of climate change requires collective action. It requires co-operation between countries, through international frameworks that support the achievement of shared goals. It requires a partnership between the public and private sector, working with civil society and with individuals. It is still possible to avoid the worst impacts of climate change; but it requires strong and urgent collective action. Delay would be costly and dangerous."

### Box 12.3 Economic opportunities from reducing gas-flaring in Russia

In total, leaks from the fossil fuel extraction and distribution account for around 4% of global greenhouse gas emissions. Within this, gas flaring – the burning of waste gas from oil fields, refineries and industrial plants – accounts for 0.4% of global emissions. Increasingly, there has been a move to capture these gases, driven by economic as much as environmental reasons. This is by no means universal, and in some countries the potential for emissions savings in this area remains significant. The post-Soviet collapse of Russia's energy-intensive economy cut carbon emissions and left it with a surplus of transferable emission quotas under the Kyoto protocol. Decades of under-investment, however, mean that current 6-7 per cent GDP growth, spurred by higher energy and commodity prices, is both raising emissions and putting pressure on the infrastructure. Sustaining growth requires very large energy and

related infrastructure investment. In June 2006 the government approved a \$90bn investment programme to replace ageing coal and nuclear generating plants, increase generating capacity and strengthen the grid system.

A recent IEA report<sup>16</sup> on Russian gas flaring, however, indicates that without accompanying price and structural reforms, especially in the gas sector, investment alone is unlikely to deliver the full potential for efficiency gains or reductions in GHGs.

The report indicates that low prices for domestic gas, coupled with Gazprom's monopoly over access to both domestic and export gas pipelines and the high levels of waste and inefficient technology, restrict its ability to satisfy rising export and domestic demand, and to reduce both gas losses and GHG emissions.

In 2004 Gazprom lost nearly 70 billion cubic metres (bcm) of the nearly 700bcm of natural gas which flowed through its network because of leaks and high wastage from inefficient compressors. Gas related emissions amounted to nearly 300 MtCO<sub>2</sub>e of GHG, including 43 MtCO<sub>2</sub>e from the 15bcm of gas flared off, mainly by oil companies unable to gain access to Gazprom's pipes. On this basis, Russia accounted for around ten per cent of natural gas flared off globally every year. However, an independent study conducted by the IEA and the US National Oceanic and Atmospheric administration, calibrated from satellite images of flares in the main west Siberian oilfields, indicated however that up to 60bcm of gas may be lost through flaring – over a third of the estimated global total. Gas flaring represents a clear illustration of the potential efficiency gains from new technology linked to more rational pricing policies and other structural reforms. These would also yield significant climate change mitigation benefits.

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## APPENDIX 6 IRISH TIMES 25<sup>th</sup> OCT 2006

Decision to locate gas terminal at Bellanaboy a mistake

Consultants should be appointed to re-examine the location of the controversial Corrib gas terminal, argue Leo Corcoran and Brian Coyle

Sometime before October 2000, Enterprise Energy Ireland (EEl) and the minister for the Marine and Natural Resources agreed to locate the gas processing terminal for the Corrib gas project in Bellanaboy. It is on a site surrounded by blanket bog, within the catchment of the primary water supply for the entire Erris region, located directly across from an established community. This resulted in a production pipeline carrying unprocessed gas running 9km (5.6 miles) inland parallel to another established community, and traversing the Broadhaven Bay Special Area of Conservation, all in breach of the code of practice.

The minister made a number of errors:

1. He agreed to sell the terminal site to EEl without first obtaining advice on its suitability and its compliance with the codes of practice.
2. The minister's consents for the onshore and offshore pipelines are in breach of EU Directive 98/30 because he failed to include a requirement that the pipeline comply with a code of practice.
3. The minister's consents for the pipeline are in breach of the code of practice.

4. The minister confined the terms of reference of the Advantica Safety Review to the pipeline even though the key issue was the siting of the terminal in Bellanaboy.
  5. The minister confined the terms of reference of the mediation process to the pipeline even though he knew that the key issue was the siting of the terminal in Bellanaboy.
- We have previously outlined in several reports that the terms of reference of the Advantica report were too narrow, since it focused on the effect (of the pipeline) rather than the cause (the Bellanaboy site) of the controversy. We have recommended that the gas processing terminal be located on the coastline thereby eliminating the requirement for an onshore production pipeline.

Advantica has stated in its own report that: "It does not include detailed examination of the feasibility of alternative project design options, alternative pipeline designs or routes."

The current impasse can be traced to the land deal entered into between the minister and the EEl to locate the terminal at Bellanaboy without first ensuring that a rigorous analysis of alternative sites was carried out.

The ground for proper planning was narrowed even further when, in October 2000, before the developer applied for planning permission, the Taoiseach and the minister attended a public meeting to witness the signing by the developer and Bord Gáis of a deal whereby Bord Gáis built a pipeline from Bellanaboy to the national grid at

Galway and the announcing of a purchase by Bord Gáis of 26 per cent of the promised production.

An Bord Pleanála inspector stated that: "The issue of the siting of a gas processing terminal in a remote location, inland at a significant . . . distance from the landfall, was avoided in my opinion and I would be strongly of the view that . . . any review of the documentation submitted would justify this conclusion . . ."

He added: "There is no evidence in the totality of the documentation now before the board that . . . specific alternative terminal sites were seriously investigated."

He stated that "the developer . . . ignored the board's request that it provide information about alternatives" and that the minister's consent for the pipeline "could reasonably be determined as being premature" and had "emphasised a perception to some degree that the granting of planning permission for the . . . processing terminal at the Ballanaboy site is a fait accompli". As the connecting downstream pipeline from Ballanaboy to Galway was already decided and announced, this conclusion is unavoidable.

When An Bord Pleanála granted permission for the site, it was unaware that the consents for the connecting upstream pipelines were essentially void, since the minister failed to include a requirement in his consents that the pipelines comply with a code of practice. This is perhaps why Shell is seeking a new consent for the onshore pipeline. Uniquely for a high-pressure gas pipeline, a code of practice was not specified by the minister. Likewise, the consent given under the foreshore licence for the offshore section of the upstream pipeline does not specify a code of practice. The Gas Act is not prescriptive on this point, however, for good reasons, it has always been the case in Ireland that the developer of a high-pressure pipeline is obliged by law, under the letter of consent, to comply with a pipeline code of practice. In the UK, all pipeline consents issued by the Department of Trade and Industry include a requirement to comply with a pipeline code of practice. Engineers required to operate a pipeline are very aware that the letter of consent imposes a legal obligation on an undertaking and its employees to design, construct and operate the facility in accordance with the code. In the case of the Corrib pipeline, the developer claimed to comply with BS 8010. However, this document was not specified by the minister in his consents for both sections of the upstream pipeline, and he issued his approvals without an obligation in law for the pipeline to comply with a code of practice. This was a very serious omission, as it could allow the developer to legally operate the facility in breach of the code. Clearly this is an option which would not be acceptable to the local community and the wider public. It indicates that the minister was inadequately attentive to his regulatory duties and has not applied objective criteria in his consent for this pipeline. Advantica indicated that, as currently designed, the pipeline cannot comply with the code of practice BS 8010 - or its replacement, PD 8010. They concluded that the Quantified Risk Assessment carried out on behalf of the developer "fails to recognise the uncertainty in the risk modelling for such high design pressures as 345 bar" Consequently, they have recommended that the pipeline should not operate at the maximum allowable design pressure of 345 bar, and that it



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By failing to apply objective and non-discriminatory criteria in granting his consents, the minister is in breach of EU Directive 98/30, and its replacement 2003/55 which outlines common rules for the internal market in natural gas.

Article 4, clause 2 of EU Directive 98/30 states that "Where member states have a system of . . . authorisation, they shall lay down objective and non-discriminatory criteria which shall be met by . . . an undertaking applying for an authorisation to build and/or operate natural gas facilities or . . . applying for an authorisation to supply natural gas".



Also by issuing both authorisations without any requirement for compliance with a code of practice, the minister failed to ensure that natural gas undertakings were treated consistently with regard to their rights and obligations as per Article 3 of the directive.

We call on the minister to appoint Advantica to carry out a study to identify the optimum location of the gas processing terminal. We welcome the offer from Shell to engage in meaningful dialogue and call on them to co-operate in the production of the proposed study.

We would also encourage the Shell to Sea group to look positively at our proposal.

Corrib gas has been dormant for 250 million years and will be depleted in 20 years. It is a gift of nature, a precious resource, which should be developed in a manner that fully values this finite resource and which is compliant with the codes of practice.

*Leo Corcoran was engineering manager of Bord Gáis and Brian Coyle is a partner with consulting engineers Coyle Kennedy*

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