Oil and Gas Independents' Association

Ofgem Project Discovery Consultation

OGIA Submission

March 2010

The Consultation

This submission is made in response to Project Discovery, Options for delivering secure and sustainable energy supplies, Consultation Document, Ofgem, February 2010 (Ref. 1 in Bibliography, Appendix 4)

The OGIA

The Oil and Gas Independents' Association is a group of some 35 oil companies actively engaged in exploration and production in all areas of the UKCS. Our membership (see list in Appendix 1) includes a wide spectrum of companies from UK divisions of large well-established multinational organizations through to small start-ups and from companies with an active exploration drilling capability to purely financial investors. In 2008 our members participated in 18 of the 55 (33%) of the exploration wells spudded and 33 of the 67 (49%) of the 67 Appraisal wells spudded (data derived from Deloitte's "Petroview" database).

OGIA's membership is, in general terms, more focused on investing in the discovery, appraisal and development of new sources of hydrocarbons on the UKCS than exploiting legacy assets.

OGIA does not represent the production operators on whose behalf O&GUK are making a separate submission.

Contents

Introduction & Summary

1. Summary

OGIA very much welcomes the publication of Ofgem's Project Discovery material and the extensive public debate it has triggered on the important national issues it raises. We cannot recall any previous process being as successful in generating such widespread interest and comment. We hope that this process will contribute to an outcome of secure affordable energy supplies at an acceptable level of carbon emissions over the coming years.

Climate change policies will lead to more gas in the energy mix for the period to 2020. As coal and old nuclear power plants are phased out on environmental grounds, gas demand will increase due to the need for gas-fired power plants (CCGTs). Given the low carbon content of gas, the introduction of a carbon price will have the less impact on gas than it will on oil and coal. Additionally, gas can complement renewable energy. Given the intermittency with which wind and solar power operate, gas-fired plants are ideal for providing the necessary swing capacity. So on the coldest days of the year, when the wind doesn't blow, as was the case in 1Q`2010, gas fired power stations will keep us warm (Carole Nakhle).

Our particular interest is from the viewpoint of Upstream Exploration and Production (E&P) companies looking to develop oil and gas fields on the UKCS. Although we support the work undertaken by Ofgem, and much of the analysis, we have some issues which are highlighted below:

Our primary concern is that Ofgem appear to accept that a steep decline in UK oil & gas production is inevitable and the rate of such decline is independent of Government action and oil company investment. We accept that there is likely to be a material decline in North Sea production over the period to 2020 but the degree of that decline depends on government action in creating a fiscal and regulatory regime which is competitive with other basins around the world, and the oil industry developing technologies and reducing unit costs to make investments attractive. We believe that the potential variation in the rate or extent of such decline is very wide. We also note that recent (last 18 months) government fiscal policy has begun to move in the right direction with attempts to make the U.K. Continental Shelf (UKCS) less uncompetitive against rival basins and we would hope that further similar changes will continue. One direct result of these changes has been the opening up and initial gas development West of Shetland (WoS) which could unlock significant previously untapped gas potential in the future. On this basis we think domestic production could be higher than assumed and hence there would be a smaller requirement for other sources of primary energy. We certainly believe Project Discovery should put more weight on maximising domestic oil and gas production while we still have extensive offshore infrastructure available for use by new fields. We believe DECC's view on this issue (see below) is better informed than that of Ofgem, as one might expect.

Secondly we remain concerned that the document is in danger of concentrating on the lessons of the past while failing to appreciate the current revolution in shale gas/LNG and the fact that energy and gas markets will evolve (in other words that Project Discovery might be insufficiently flexible going forward to address robustly future unknown circumstances). In this respect we are concerned that Project Discovery may be at odds with industry thinking.

Similarly we are concerned that, despite helpful analysis of the North West Europe (NWE) gas markets, there is less comprehensive analysis of other markets that will be, because of LNG, just as important.

We believe that gas storage needs to be addressed in the short, medium and long terms and we remain disappointed at the lack of progress to date. Although we welcome the announcement on Budget day as a small step in the right direction, we share the ECC Select Committee's concerns about the IPC's lack of detail.

We believe that there are other barriers (which will tend to impact renewables most) that may prove even harder to address than we understand Project Discovery to assume, for example:

- Many supply chain issues so that renewables and E&P may end up in competition for scarce resources (with obvious cost implications); (lack of) UK engineering and skills base;

- Public support for the principles of the government's (HMG's) LCTP and then for the costs imposed; HMG's heroic assumptions on progress in renewables which fly in the face of all available evidence and common sense; UK politicians assumption that CCS will 'come to our rescue' with little evidence of a Plan B when it doesn't 'arrive in time' (given that industry, which is tasked with actually delivering it, believes it won't).
- Benefits of diversity of every energy resource type and geographical origin (potentially threatened by HMG attempts to 'pick winners')
- We are concerned that the impact of EU ETS Phase III may not have been fully factored in an integrated overview about energy supplies, in particular the fact that ETS Phase III may increase the operating costs of individual offshore installations by up to £27 million p.a. which threatens to foreshorten the economic life of individual oil and gas fields at the very time their production is most needed.

However the dominant factor in worldwide gas markets (out to at least 2015 and potentially beyond?) is the growth of North American shale gas which means that there will be a worldwide over-supply of LNG, much of which will end up in NWE in general, and in the UK in particular. That much is certain. The only uncertainty is how big the supply glut/over-hang will be and how long it will last.

There is good news in that the gas industry has made enormous progress and investment in the last ten years and now the gas-prone offshore area West of Shetland (WoS) is about to be developed. In the UK alone huge LNG facilities have been constructed recently and we have diversified our gas supplies in partnership with many other investors in the LNG chain throughout the world. Internationally the industry has developed whole new (unconventional) gas resources that have transformed the supply of gas around the world. This has been so 'successful' that the wholesale price of gas has actually crashed and some UK producing fields have had to be shut-in while other investment plans have been put on hold because there is a danger of too much supply, for the current demand, to justify theses projects.

The gas industry and E&P producers are happy to be judged on our track record of the last ten years. We believe that we have a proven record of delivery in the provision of energy without receiving subsidies or handouts from HMG, and we hope that industry will be permitted to develop similar solutions in ALL the energy sectors in the next decade. Provided HMG can resist the temptation to 'pick winners' and instead provide a level playing field for all, we believe industry will continue to rise to the challenge of providing secure, affordable energy supplies for the next decade and beyond. Over the coming years the UK will need major contributions from all such sectors, from energy efficiency, from fossil fuels, from nuclear, renewables, clean coal and CCS (when these technologies are proven and cost effective). Equally we need investment within the UK, offshore and overseas. Any policies that do not seek contributions from ALL these areas are likely to fail but, as Winston Churchill famously pointed out 100 years ago, diversity is the key solution to our energy challenges. Different sectors all need to evolve so that each can make its own contribution at different times so that the long-term result is ongoing safe, secure, affordable energy supplies that do not make an excessive environmental impact.

In summary we believe that unconventionals/shale gas will ensure plentiful gas supplies to the UK in the period up to at least 2015 and that renewables are likely to make an increasing contribution after 2020. We believe the period approaching 2020 is more uncertain and we should seek to identify many different possible levers to cover this period including the maximum exploitation of the offshore UKCS and meaningful energy efficiency. It is only by making sensible informed decisions now that we can prepare for this period to 2020 since many energy projects, including offshore oil and gas, have relatively long lead times.

We note DECC's summary of the UK gas market in their April 2010 Gas Security of Supply paper: 'In addition to achieving high levels of investment and security, the UK gas market has generally delivered some of the lowest retail gas prices in Europe. In recent years retail gas prices for both household and industrial customers have generally tended to be the lowest in the EU15.'

1.1 Background on Gas Industry (source DECC April 2010 paper)

UK gas supply and demand

Gas is a crucial part of the UK's energy mix. Gas is used as a domestic and industrial fuel, as well as for generating electricity. It provides heat and power for homes and industries, and is used as feedstock for chemicals, pharmaceuticals and other products. The UK has one of the largest gas markets in the world. 21 million households (over 80%) use gas for cooking and/or heating. 30-45% of power generation is gas-fired. Overall gas accounts for around 50% of non-transport primary energy demand. In 2009, around two thirds of the UK's gas demand was met from UK production. Of the gas we imported in 2009, 58% came directly from Norway, with the rest from the continent via pipeline (17%) and as LNG (25%) from Algeria, Australia, Egypt, Norway, Qatar, and Trinidad and Tobago. The gas supply routes to the UK are diverse and varied. Figure 1b shows the UK's import and export routes and gas terminals.

1.2 Gas will have a central place in the energy mix in the coming decades

As the UK moves towards a lower carbon energy system, it will need to combine reducing dependence on fossil fuels with deploying new technologies to capture their emissions. Recent projections from the Government suggest that UK gas demand will fall through to 2020 due to:

- an increase in the use of renewable energy (though the timing remains uncertain);
- an increase in energy efficiency, e.g. more efficient domestic boilers or better insulated homes; and
- the short term effects of the economic downturn, that have led to a depression in recent demand.

In the longer term, there is much greater uncertainty. Government projections suggest that after 2020, the impact of economic growth may begin to offset the factors identified above.

As the cleanest and most reliable fossil fuel, gas seems certain to continue to be a central part of the UK's energy mix beyond 2020 with an important contribution role in the transition to a lower carbon economy:

- Renewable sources, such as wind energy, are variable and unpredictable. Wind power cannot be turned on and off when needed in the same way as a gas-fired power station. To ensure a balance between supply and demand there will be a continuing need for flexible means of electricity generation. Gas fired power stations can therefore play an invaluable role in providing a reliable source of electricity and in smoothing supply across the system.
- These balancing issues will be particularly important given that electricity demand is very likely to increase in the long term, as a result of greater electrification within transport and space heating.
- Carbon capture and storage (CCS) technologies are currently unproven but may be developed for both the power and industrial sectors. If the technology works well and proves cost effective, then it is possible to envisage a future where cheap, plentiful gas, coupled with CCS, becomes a major means of generating electricity.
- A significant level of gas is likely to continue to be used as feedstock within industry.

Whatever the precise level of demand, gas will continue to provide a major source of fuel – both in the UK and globally – as a long term shift to a lower carbon economy takes place. Therefore it is important that the UK maintains secure and reliable gas supply sources and infrastructure, within a changing global energy market.

2. OGIA's response to the issues raised in the Project Discovery Document

As stated above our expertise is in the E&P field. We have therefore confined our response to areas we are knowledgeable about which means that we leave large areas of Project Discovery to others to comment from their positions of knowledge. We believe much of the analysis and process that Project Discovery has followed is very helpful and we welcome the fact that Ofgem has actively sought feedback and comments from a wide range of respondents, and has evolved its work in the light of such information. We believe this is a constructive model to follow and that it is likely to be necessary to fine tune the work on an ongoing basis as circumstances changes, technologies develop etc. Inevitably our comments tend to highlight areas where we either disagree with Ofgem or would like to offer additional material rather than list the areas of agreement.

(i) Impact of markets

- We believe Ofgem's analysis of UK/NWE gas markets is helpful. However we think the range of possible outcomes of UKCS domestic oil & gas production is much greater than Ofgem appears to assume. If HMG works with industry on the cost base and tax structure and there are underpinned oil and gas prices the activity levels could be materially higher than is likely if the opposite conditions occur. In an environment less attractive to petroleum investors indigenous production could decline dramatically. The imposition of EU ETS Phase III certainly adds to these concerns with opex increases up to £27million p.a. (at 2008 prices) per installation (source O&GUK).
- However we have concerns about the understanding of security of supply and its simplistic application to resources solely on the criteria that they come from outside our country. Ofgem's material appears to imply that such resources, by definition, are more risky. We are concerned that such thinking could prove simplistic in the future; there have already been many examples where 'home-produced' energy turned out to be less secure than previously believed e.g. Hurricane Katrina in the USA, fuel industry/coal mining disputes in the U.K. etc. while gas supplies from Norway, our main overseas source, look relatively secure to us.

(ii) Other gas supplies

We are concerned that Project Discovery may underestimate the impact of Shale gas in North America and beyond. We would expect Ofgem to consider different profiles according to the intensity and duration of shale gas.

In short we believe Ofgem's scenarios may prove inadequate to cover the most likely outcomes. At least one additional scenario beyond Dash for Gas/Slow Growth may need to be added which reflects the existing role of unconventionals (let alone a further scenario that allows for future potential). Furthermore we believe that a scenario based on one of these two outcomes is more likely than any of Ofgem's four existing scenarios.

We had been looking forward to studying, and then commenting, on DECC's planned paper on Security of Gas Supply because we hoped it might refer to some of the more recent (2007 onwards) information but it has been unexpectedly delayed with the result that it has effectively been 'timed out' of this consultation process, an unfortunate situation..

We remain concerned that Ofgem's analysis of the global primary energy supply for the next ten years is at odds with the views of oil and gas companies. We are concerned that these companies are likely to be better informed than Ofgem and therefore we continue to recommend to Ofgem that it commissions some primary research by acknowledged experts in the field.

Ofgem's 'Key Findings':

Finding 1: There is a need for unprecedented levels of investment to be sustained over many years in difficult financial conditions, and against a background of increased risk and uncertainty.
OGIA: Ofgem is absolutely correct in identifying a need for large investments, but most likely not as large as Ofgem assume, and certainly not as high as Ofgem's most expensive scenarios. We would also highlight the significant investments by the gas industry alone in the last 10 years.

Finding 2: The uncertainty in future carbon prices is likely to delay or deter investment in low carbon technology and lead to greater decarbonisation costs in the future.
OGIA: Prior to 2020 very low carbon technologies are unlikely to be available at a pace that politicians like to assume and at a price that consumers will accept. In the meantime CCGTs, cheap and based on available technology, will reduce the carbon intensity in place of coal and oil.

Finding 3: Short term price signals at times of system stress do not fully reflect the value that customers place on supply security, which may mean that the incentives to make additional peak energy supplies available and to invest in peaking capacity are not strong enough.
OGIA: Agree with Ofgem that this funding has a range of possible outcomes.

Finding 4: Interdependence with international markets exposes GB to a range of additional risks that may undermine GB security of supply.
OGIA: The assumption that international markets necessarily increase risk is not a given. A much better method to reduce risk is to seek diversity of energy supplies and a step change in energy efficiency.

Finding 5: The higher cost of gas and electricity may mean that increasing numbers of consumers are not able to afford adequate levels of energy to meet their requirements and that the competitiveness of industry and business is affected. Consumer bills could rise by up to 60%.

OGIA: The best way to limit cost increases for the foreseeable future, based on proven technology and available resources, would be to invest in CCGTs which are unlikely to require much government subsidy unlike most/all alternative options. We do not foresee such large rises in the wholesale price of gas as either likely or necessary (and we don't accept Ofgem's gas price starting point in 2009/10).

Of Ofgem's four scenarios we would estimate that 'Slow Growth' is the least unlikely. However we would need to see more detail on the investment sums that Ofgem claim would be needed (£95 billion) and the 19% increase in bills because these seem potentially high to us.

Ofgem's 'Five Possible Policy Packages':

Project Discovery identifies five policy packages, A through E. Assuming we correctly understand HMG's 'Energy Market Assessment' [that is 'Electricity Market Assessment'] by HMT/DECC, March 2010, HMG has already ruled out two of these five possible policy packages, apparently beyond Ofgem's control. On this basis we believe that these policy packages would perhaps best be discussed after the general election on the assumption that the position of the government of the day may be clearer at that time.

Ofgem's 'Energy Markets Scenario Updated':

In Ofgem's 'Energy Markets Scenario Updated', an appendix to Project Discovery, Ofgem note that the actual gas price in 2009 was lower than for all scenarios Ofgem assumed. The current actual and forward curve for 2010 is also lower than for all scenarios assumed by Ofgem. It is clear that the market does not believe that any of those Ofgem scenarios are likely in the near term because the historic and forward price of gas is less than that predicted by Ofgem in all of its scenarios. This appears to reinforce our request for some independent research because we struggle to have confidence in the Ofgem scenarios, particularly in the period to 2015, as we understand them.

3. The oil and gas potential of the UKCS and its contribution to Energy Security.

We would refer to the Oil and Gas UK 2010 Activity Survey and 2009 Economic Report, both of which explain that the Oil and Gas Industry in the U.K. is a high tech, high investment industry on the 'cutting edge' providing employment for around 450,000 people, 45% of them in Scotland, and pays 20% of total UK corporation taxes. It has a large export-led supply chain and contributes enormously, not just to Scotland's economy but to that of the UK as a whole. In 2009 25% of total U.K. FTSE 100 dividends were paid by the two largest UK listed oil companies (source Daily Telegraph June 2009), a figure that rises to over 30% in 2010 and around 35% if you also include the next two largest oil companies (source State Street Global Markets, March 2010).

Secondly we need to learn from other mature basins around the world. The Gulf of Mexico (GoM) seems to have been able to constantly reinvent itself many times over on every occasion that its detractors claim it is finished. There are hopeful signs with Heavy Oil, HPHT, exploitation of the basement and WoS that perhaps the UKCS can do something similar.

Rather than repeat the highlights of the O&GUK 2010 Activity Survey (which we think is a document well worth studying) OGIA makes the following points re UKCS/NWE E&P business dynamics:

- Maturity/remaining potential of NWE: Although production from most of the region may have peaked, except for Norwegian gas, mid-size potential remains in many different areas.
- UKCS Exploration: Excellent potential remains in deep/HPHT prospects (based on the relative immaturity of the play c.f. DECC creaming curve analysis for the UK CNS), the current 26th Licensing Round is likely to be popular and competitive.
- UKCS Producing assets: while some participants are disposing mature/aged assets which are still generating positive cashflow, others are seeking to invest in such assets to give them a new lease of life.
- UKCS Opportunities for acquisition and new entrants: the market remains very active, new opportunities arise frequently
- UKCS Existing infrastructure: very developed network of pipelines as well as existing hosts means that tie-in opportunities readily available subject to ullage/capacity

- **In summary the UKCS has available and accessible opportunities across the life-cycle to make material additions to reserves, production, profit & cashflow.**

We believe the UKCS has much to contribute to the Energy Security of the UKCS but even that needs to be seen in the wider context.

Hence we include the following overview of point made by Dr Carole Nakhle regarding Energy Security:

- Current UK HMG policy puts carbon emissions first and then energy security second.
- Fossil fuels will still dominate up to 2020.
- As coal and old nuclear plants are phased out, gas demand will increase.
- Renewables are being hit by cost of green energy, failure of Copenhagen, scandals of climate change scientists.
- Imports alone are not the problem; domestic production is not immune from, for example, miners' strike, hurricanes, terrorist acts, labour disputes etc.
- Winston Churchill stated some 100 years ago:
    - Diversity is the key to security of energy (oil) supply.
    - It is wise to look ahead but foolish to look further than you can see

- **Energy markets have evolved, will continue to do so, and policies will have to be flexible and adapt**

Although Project Discovery allocates little time to this issue, DECC explicitly acknowledges the contribution that domestic production can make and identifies how economic production from indigenous resources can be maximised in its April 2010 Gas Security of Supply Paper:

'Although North Sea reserves are declining, substantial gas remains. The Government has taken action to ensure that these reserves are fully exploited, through incentivising new exploration and investment:

- **Regular offshore licensing rounds** aim to maximise acreage available for new exploration. Greater flexibility in licensing helps to attract the widest possible range of participants. These initiatives have led to significant renewed interest in the North Sea in recent years.
- **Regular review** of all fallow discoveries or fallow blocks, prompts operators to bring forward development, or else relinquish the acreage. We continue our drive to identify and scrutinise fallow acreage and discoveries carefully. Where it is clear no work plans exist, licensees are encouraged to relinquish the license, so that such acreage can be made available again via licensing rounds. This allows others the chance to bid for such acreage and exploit it.
- **Taxation regime reforms** have resulted from productive dialogue with industry. A number of refinements to the UK oil and gas fiscal regime have been made in recent years. The most notable of these is the 'field allowance', a targeted incentive designed to encourage development of new fields, with limited cost to the Exchequer. This was announced in Budget 2009, with extensions announced in the December 2009 Pre-Budget Report. Further extensions, announced in January 2010, have brought remote deep water gas fields, such as those found West of Shetland, into scope. Licensees in qualifying fields will benefit from relief from the 20% supplementary charge on an initial tranche of production income.
- **West of Shetland:** This area potentially contains 20% of remaining UK oil and gas reserves. The Government has been working with industry to bring forward developments in this area and has recently approved the project to develop the Laggan and Tormore gas fields. The project will include a new gas export pipeline from the Shetland Islands with capacity for gas from other fields in the area. The Industry and Government Taskforce (to examine the potential for new infrastructure in the area) and the Government's recent tax change to support the development of remote, deep water gas fields, have been significant factors in bringing this project forward.

[OGIA would add to DECC's list opportunities that could be delivered by improved access to [transportation] infrastructure, an issue DECC is currently seeking to address with industry].

A further potential source of indigenous gas is biomethane. This is biogas (sourced from organic material) that has been upgraded so that it is suitable for supply through the gas pipeline system. A number of biomethane pilot projects are under development. The Government has published a document setting out the main legal, technical and regulatory requirements to enable biomethane to be injected into the gas pipeline system. This aims to ensure that producers of biogas have the information to make informed choices between the various marketing options.'

DECC goes on to identify that gas supplies are secure to at least 2024 on the basis of what we know already:

'There is ample capacity within the system to supply our gas needs up to 2020 and beyond. Even with the expected falls in UKCS production, our current capacity is sufficient to meet high demand projections. This is due to the large increase in import capacity experienced in recent years.

Gas demand can vary day by day and in the winter months tends to be much higher than demand in the summer. Therefore it is crucial to assess our ability to meet peak demand. This is defined as the highest daily gas demand that is expected to occur once in every 20 winters. Potential peak deliverability from capacity currently exceeds estimated peak demand by around 40%. Analysis by National Grid in consultation with DECC shows that even if we were to lose the largest infrastructure facilities, there would still be enough capacity to meet peak demand.

The peak demand projections include National Grid's business-as-usual peak demand projections, which assume that carbon targets are not met. The high and low sensitivity analysis around this is also included.

The figure also includes the peak demand estimates for National Grid's 'Gone Green' scenario (which assumes that carbon targets are met).

Tackling climate change makes it easier to safeguard secure gas supplies through reducing demand. Peak demand is lower in the scenarios in which carbon targets are met. Under this scenario, capacity that exists or is already under construction, can cover peak demand comfortably up to the mid 2020s and beyond.

In sensitivity analysis where carbon targets are not met and gas demand rises faster than expected, existing and under construction capacity will meet peak demand until at least 2020. From 2021/22 onwards, planned infrastructure will provide more than enough capacity. Even if it were assumed cautiously that much of this planned capacity does not make it to market, or comes to market later than presently planned, capacity is still expected to exceed even the highest peak demand scenario until 2024 and beyond.'

Later on DECC goes on to conclude:

'Ofgem's recent Project Discovery Consultation Document has also modelled the risk of a combination of a very severe winter with a serious interruption to gas supplies from either mainland Europe or other international markets. However, DECC's analysis goes further, by considering the probability of risk events occurring; it finds that the probability is very low, and that our gas market is resilient.

The Project Discovery Consultation Document raises a concern about whether there are sufficient incentives on the market to deliver enough storage, and goes on to consider a number of policy options to sharpen these incentives. Currently, 22 commercial gas storage projects are planned, which could quadruple GB's gas storage capacity by around 2020. The Government initiatives outlined (Planning and Energy Acts and tax relief for cushion gas) should help these to go forward. The Government will continue to monitor closely the progress of individual projects, and in the event of any further barriers emerging the Government will intervene as necessary.'

4. Unconventionals (including Shale Gas)

The gas industry constructed many new CCGT and LNG import facilities in the 2000s decade and more additional plant will come onstream in the next few years. As well as UK investment, this reflected large overseas investment in LNG production facilities and modern refrigerated tankers to transport the LNG. There are essentially three worldwide spot markets for LNG: the US, Asia and NWE, particularly the UK. If domestic US gas production (increasingly from shale gas) satisfies most US gas demand and Asia has less need for LNG, then a great deal of LNG will end up in the UK which is the major spot market left (much of Asia and Europe operates on more of a long-term contract market). Thus either producers will reduce LNG production or large volumes will arrive in the UK almost regardless of how low the gas price is. The questions then become: how large will the volumes entering the UK be and for how long will this supply glut last?

Relevance of Unconventionals

Shale gas has been described as a 'game changer/gas glut' in the US since at least early 2008 (sources: Chesapeake, Carrizo, Encana, Nexen, Talisman etc.) and in similar terms since then by many others including BP, Shell, ConocoPhillips, Chevron, ExxonMobil, Total, Statoil, Newfield, Schlumberger, IEA, CERA, Oil and Gas Journal, Petroleum Economist, Wood Mackenzie, Goldman Sachs, Upstream, The Economist magazine, Newsweek, the Wall Street Journal, The New York Times etc.

One reason why this would be so important is that in recent years the traditional relationship between crude oil prices and NWE gas prices that has lasted for decades has been shattered, with the spot price of gas collapsing well below the oil equivalent price. The more interesting questions looking forwards are if and when that old relationship will ever be restored, because one cannot take a view on the future gas market without addressing this issue.

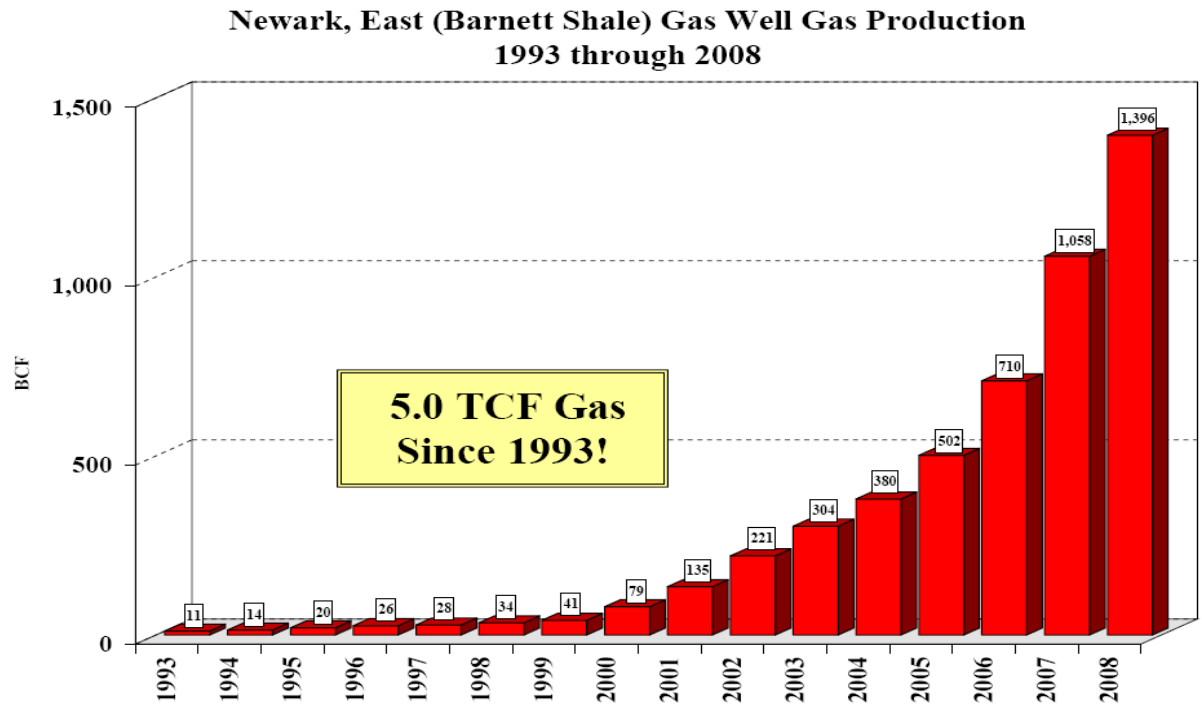
Recent History and Present status of Unconventionals

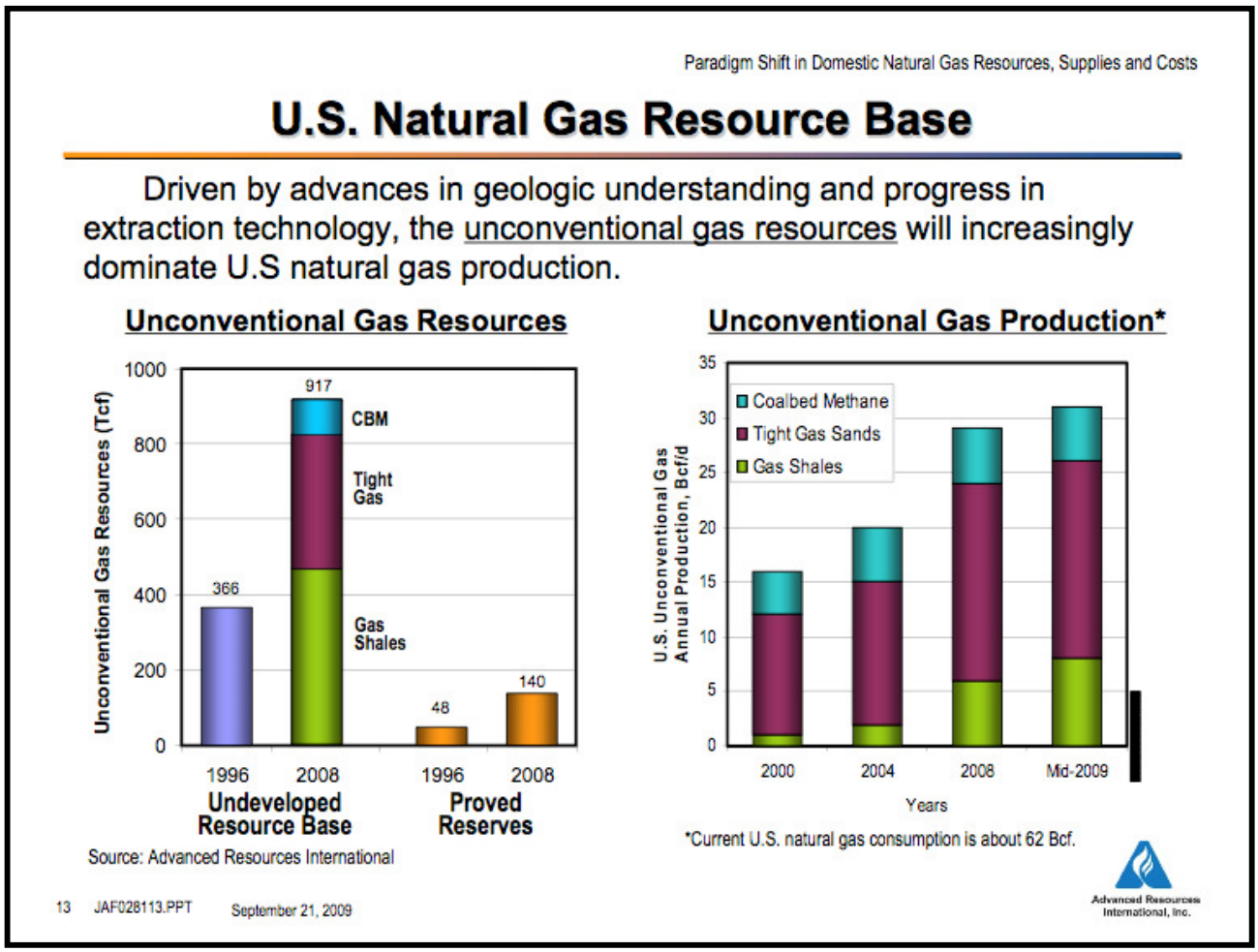
In the USA the initial success with Shale gas was in the shale play around Fort Worth in Texas but has since spread to Pennsylvania, Louisiana and other shales including:

Marcellus including West Virginia and Pennsylvania, Haynesville in Louisiana and Texas, Woodford shale in Oklahoma, Eagle Ford, Fayetteville, Bossier and other shales in the USA

and further afield throughout Canada and with major interest (completed wells or firm drilling plans) in Argentina, Australia, Austria, China (President Obama agreed in 2009 to share US technology), Hungary, India, Poland and Sweden (amongst others).

The fact that shale gas has been both around a long time and yet been exploited much more efficiently recently is illustrated below.


Newark, East (Barnett Shale) Gas Well Gas Production
1993 through 2008
BCF
1,500
1,000
500
0
5.0 TCF Gas
Since 1993!
11
14
20
26
28
34
41
79
135
221
304
380
502
710
1,058
1,396
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008


Paradigm Shift in Domestic Natural Gas Resources, Supplies and Costs
U.S. Natural Gas Resource Base
Driven by advances in geologic understanding and progress in extraction technology, the unconventional gas resources will increasingly dominate U.S natural gas production.
Unconventional Gas Resources
Unconventional Gas Resources (Tcf)
1000
800
600
400
200
0
366
917
CBM
Tight Gas
Gas Shales
48
140
1996
2008
1996
2008
Undeveloped Resource Base
Proved Reserves
Source: Advanced Resources International
Unconventional Gas Production*
U.S. Unconventional Gas Annual Production, Bcf/d
35
30
25
20
15
10
5
0
Coalbed Methane
Tight Gas Sands
Gas Shales
2000
2004
2008
Mid-2009
Years
*Current U.S. natural gas consumption is about 62 Bcf.
13
JAF028113.PPT
September 21, 2009
Advanced Resources International, Inc.

The recent exploitation of shale gas has been so successful that:

- Shale gas reserves resulted in total US gas reserves increasing by 35% in 2009 – unprecedented (source: US Potential Gas Committee 2008 year end Assessment)
- US gas production exceeded that from Russia in Jan 2010 (source Dr Carole Nakhle)
- Investment has been postponed in higher cost US gas producing areas and the Gazprom-led consortium have delayed startup of the giant Shtokman field from 2013 to 2016 because of 'market conditions', i.e. impact of the recession and of shale gas contributing to the collapse in worldwide gas prices.
- There has long been some substitution of coal by gas in the US because of the low price but in the 2009/10 winter this feature even spread to the UK (Simon Bonini of Centrica: As gas prices have fallen all our gas fired power plants on, which we weren't expecting to do this time last year or certainly two years ago, which is one of the methods we have of dealing with all the LNG that arrives in the UK. Instead of coal being the baseload supplier of power in the UK it's actually gas right now).
- ConocoPhillips applied to the US Department of Energy for permission to export LNG from a US terminal that had originally been constructed to receive imports of LNG while Apache Canada are doing the same thing with their Kitimat LNG import project which will now export LNG to Spain and Korea.
- One US company with a business plan based on projects to import LNG appears to have been driven into ongoing losses because there is reduced demand for US LNG imports given domestic shale gas production. .
- LNG suppliers withheld production in 2009 because of the low prices available
- In 2009 there was little competition from Asia or Spain for spot LNG cargoes so they came to NWE in general and the U.K. in particular. This was underpinned by Qatari involvement throughout the value chain.
- The 2009/10 European winter was materially colder than average (the coldest winter for more than 30 years) but total stocks remained near historical norms in Europe as a whole (although they were below average in the U.K.). U.K. spot gas prices never exceeded 62p/th, nowhere hear the peak of 225p/th in May 2006. At least one UK SNS gas field shut in for 5 months in 2009 because the gas price and demand were so low (source: Dana, March 2010, who also expect to shut that field in for periods in 2010).
- In 2010 Russia and Norway have now indicated a willingness to sell some of their contract gas at spot market, rather than oil-indexed prices, in an attempt to make their supplies competitive (FT 26.2.10).

<u>Future Potential of Unconventionals</u>

While it took many years to build up production in the Barnett shale (the first to be exploited), lessons learned there have been swiftly applied elsewhere. The Barnett Shale took more than 15 years to build up to a material production rate but the Fayetteville and Woodford shales took just 4 and 5 years respectively to reach that same production level. Commentators have estimated the potential of the multiple shales now available in the U.S. as possibly 20 tcf per day and point out that the U.S. gas market has been transformed: a long term, inexorable decline in U.S. gas production has apparently now become a long term increase.

As a result the U.S. demand for LNG is likely to be massively reduced and U.S. LNG import facilities are reported to be running at 10% of capacity. Given that the world faces an increased supply of LNG with more planned, e.g., Qatar and Australia, this depresses gas producer prices globally and has been exacerbated in the short term by reduced demand due to the economic crisis..

Of course it is one thing to identify potential. Actual future production will depend on many internal factors e.g. unit costs, resource availability, operating expertise etc., as well as external factors such as the prevailing gas price and competition with other fuels.

It is clear that at this stage the potential contribution of unconventionals cannot yet be accurately mapped out. In this submission we will stick only to what is proven/known potential and will ignore all the

unproven/unknown potential beyond pointing out that any serious work should include a scenario where some of that unproven/unknown potential is realized. Such a scenario would solve the 2020 emissions debate several years early. Rather than install nuclear, Europe could replace coal by natural gas and deliver a major step to a low carbon future in a cheap and low risk manner. This could then be exploited further by use of (offshore) wind when that technology is available.

The key message is that because of LNG reserves, production and infrastructure it does not require the U.K. to produce a single mcf of unconventional gas from within the U.K. or even from within NWE for the whole U.K. gas market to be profoundly impacted for years to come by the development of unconvential reserves elsewhere. However it is a fact that about 50 companies hold land positions in Europe with the intention of seeking to exploit shale gas (source Upstream, March 2010). Not only does this include all the majors (except BP) but also a host of other large/national companies such as BG, MOL, OMV, GdFSuez, Wintershall, Marathon, Devon, Nexen etc. Many companies explicitly state that one of their main aims in acquiring a position in North America is to be able to transfer that technology and experience outside the USA. It is expected that the bargaining power of these large companies will help negotiations with the service sector, push down costs and increase investment. Their financial strength is also expected to keep up momentum even in periods of lower gas prices.

Industry Reaction to Unconventionals

Regardless of the (sometimes ill informed) views of industry "experts" **OGIA believes a more reliable predictor of future energy trends is to observe where investors are spending their own money, efforts and resources.**

We note the 'buying spree' on shale gas resources that many companies, including all the majors, have been on in recent years. We assume that these assets have not been bought entirely for their option value and therefore it is expected that they will deliver, some of them in the near future.

For example Talisman claim that the Marcellus shale production costs less than $4/mcf and is decreasing with time (John Manzoni, Petroleum Review March 2010). BP explain that when they entered the Woodford Shale they were able to increase the well productivity by 20% the first 10 wells and by 60% on their most recent 10 wells over the level before they took part (source : BP Strategy Presentation March 2010).

Of course sceptics could suggest that having missed out on the early and best opportunities in the US shales, where independents operate about 85% of production and the large companies had subsequently to pay hefty premia to buy their way in at a later date, oil companies are now, mistakenly, lemming like, pursuing inappropriate opportunities around the world that will prove value-destroying (i.e. that oil companies are now behaving as irresponsible as the banks did throughout the 2000s). This could be possible but the burden of proof is very much on anyone making such a proposal. We also don't accept that it's a sufficiently robust assumption on which to base a national energy policy.

Appendix 3 identifies a selection of the opportunities that oil companies are pursuing from the public domain. No doubt there are many other projects that are still being kept under wraps and are likely to emerge in the future.

The Industry View

Although individual companies have their own different styles of communication the gap between the industry view and that espoused by Ofgem/DECC is striking.

Tony Hayward CEO of BP has discussed the 'unreasonable paranoia about gas supplies. It is curious as to why there is so much concern about us [U.K.] becoming more reliant on imported gas'. He states that worldwide gas 'reserve estimates are rising sharply as technology unlocks unconventional resources' and identifies potential in North Africa, the Middle East, Europe, China, and Latin America, beyond the existing proven [unconventional] areas… Gas is the fuel that offers the greatest potential to provide the largest reductions […] at the lowest cost and all that by using technology that is available today. '

Peter Voser CEO of Shell: 'The U.K.'s fears of over reliance on imports of natural gas in the future are overdone because supply of the fuel will remain ample and secure. The potential impact of gas on the world is underestimated. The focus of the U.K.'s fears, supply from Russia, made up less than 5% of total supplies in 2008 and will be a similar proportion in 2020. Shipments of LNG and pipeline imports from Norway will be a much larger proportion of U.K. supply. The U.K.'s energy challenge is acute. This raises the question why it can afford to dismiss natural gas as a future source of energy particularly as it contains less carbon than other fossil fuels. ….The worry that once existed – that there wouldn't be enough natural gas to meet domestic needs – has been eliminated as a result of the shale gas revolution'.

Andrew Gould, Schlumberger CEO, said that 'There is I don't think any doubt that long term, shale gas is going to be one of the big, new energy sources both in the U.S. and overseas.

Mr Nobuo Tanaka, Executive Director of the IEA, said that 'unconventional gas is unquestionably a game-changer in North America with potentially significant implications for the rest of the world'. The IEA has stated that a glut of natural gas is looming.

Daniel Yergin stated that shale gas is 'the biggest energy innovation of the [last] decade' and that 'the potential of shale gas only really became clear around 2007'. He had stated that shale gas was 'already changing the national energy dialogue and overall energy outlook in the U.S., and could change the global natural gas balance'.

Robert Hefner identifies in his book, The Grand Energy Transition, the potential of Natural Gas, wind, solar and hydrogen. Lord Stern describes the book as 'a thoughtful and practical account of how the world can move to abundant energy that is clean and sustainable. It shows that low carbon growth across the world can become a reality in the next few decades. This is a very important book.'

Scepticism

However although the potential size of the shale gas resource has been established, sceptics suggest that it is not yet clear about the longevity of production or the long-term cost basis. They query whether:

- it may become increasingly resource intensive to extract future production (assumes 'low hanging fruit' has been exploited first);
- the learning curve effect (by which technology and unit cost/efficiency improve with time) may not apply;
- decline rates are high and vary from shale to shale; individual well flows are small (many wells may be needed with implications for rigs, resources and expertise);
- shale gas may need a 'solid/high' price to cover its costs;
- the unproven potential of shale gas in places such as Poland and China may never come to fruition.

No definitive answer is yet available as to whether shale gas will continue to impact the world energy scene beyond 2015 in the same way it appears destined to do so up to 2015. Hence the U.K. needs definitive short-term strategy for the period to 2015 and a strategy for 2015 to 2020 that is still sufficiently flexible to handle the wide range of potential scenarios for 2015 to 2020 and beyond,

Russian Gas and the biggest energy crisis in history?

There have been lots of scare stories about dependence on Russian gas. In the U.K. we currently consume almost no Russian gas. Europe does consume Russian gas (and we are connected to the European market) but Tony Hayward of BP points out that imports of Russian gas into Europe have halved since 1980 and Shell make similar points. In fact most of our imported gas comes from Norway through a number of different pipelines. The view of Pravda (March 2010) is very different: '[As in the U.S.] Russia 's gas leadership in Europe is not so stable either. The countries of Western Europe cut their purchase of Russian gas by 29 percent during the first six months of 2009. Germany cut the import of Russian gas by 44 percent, Italy – by 34 percent, France – by 21 percent. Europeans try to boost their gas deals with Norway, the countries of Northern Africa and the Persian Gulf.' Wood Mackenzie report (Oil and Gas Journal March 2010) that Gazprom has

responded by focussing on Asia and its domestic market. It is hard to reconcile these facts with the alarmist headlines about the U.K. being 'in the middle of an unprecedented energy supply crisis'.

Coal Bed Methane

- This could be a significant resource with an impact on the gas scene but is not expected to rival the scale of shale gas.
- BG and ConocoPhillips are already involved in developments in Australia to produce LNG while other projects are under development in the UK and other countries around the worlds including U.S., Russia and China. Since 2007 BG have announced four major LNG sales contracts underpinned by Queensland CBM and its global LNG portfolio to customers in Chile, Singapore, China and Japan. The China contract alone is worth at least $40 billion (according to a BG spokesperson) and the Singapore contract is almost as large (Source: BG website)
- Shell/Petrochina are investing A$3.5 billion in buying the coal bed methane assets of Australian group Arrow Energy**.**

In conclusion

Supplies of gas are currently so plentiful that the meeting of the Gas Exporting Countries Forum (GECF) on April 19 2010 is expected to discuss a proposal for a natural gas supply cut, to shore up falling prices.

The Ofgem/Project Discovery view on Unconventionals

We did not find the references to 'Unconventionals' and 'shale gas' in the 110 pages of the Project Discovery February 2010 Report and the 42 pages of the Energy Markets Scenario Update that we would have expected to have seen.

The DECC view on Unconventionals

We were more encouraged by the DECC view on Unconventionals in the April 2010 Gas Security of Supply Paper which we felt gave a more balanced and appropriate overview on Unconventionals though perhaps still erring on the side of caution.

DECC do at least explicitly acknowledge that 'International gas markets are changing' and go on to state :

'Global demand for gas is rising fast, driven primarily by rapid development within Asian economies. Although the recession resulted in a fall in demand during 2009, by 2030, global gas demand may have risen by 30%.(Source IEA World Energy Outlook 2009). Increases may also occur through fuel switching to gas from higher carbon fuels such as coal. If global efforts to introduce low carbon and energy efficient technologies are weaker than expected, this could also result in higher than projected gas demand.

Global natural gas reserves should be able to cover any likely demand increases to 2030 and beyond. The International Energy Agency (IEA) has estimated that there are ***405 trillion cubic metres of recoverable conventional resources remaining – equivalent to 130 years of production at current rates. Growth in North American unconventional production has been strong in recent years. And an ongoing expansion in global LNG capacity has further boosted supply. [OGIA emphasis]***.

However, there are inevitable uncertainties around long term reserves and availability. Even if there are ample gas reserves, transporting gas to consumers can prove challenging. The abundant potential supply will not necessarily be brought to market. There are particular uncertainties about unconventional gas reserves. There have been high levels of unconventional production in North America, but resources outside of the US and Canadian markets have yet to be exploited significantly. There is certainly the potential for large volumes of unconventional gas to be brought to market in Europe, Asia and the Middle East. But there are also several possible barriers, including the environmental impact of exploitation, lack of existing infrastructure and difficulty in accessing resources in areas with relatively high population density.

A further uncertainty is the impact that the current low market prices for gas and squeezing of liquidity during the recession could have on investment levels globally. The recession has led to falling investment in global energy infrastructure, such as new gas wells, pipelines and power stations. If this were prolonged, it could risk constraining medium term supply capacity. (Investment in energy infrastructure fell by an estimated $90billion in 2009, largely as a result of global recession according to the IEA World Energy Outlook 2009).'

DECC continues:

'An increasing reliance on imports does not need to compromise our energy security. However, the greater uncertainties associated with high levels of interdependency requires a more diverse and resilient energy system, able to cope with unplanned challenges and risk. Depending too much on a single supplier or transport infrastructure would increase the UK's vulnerability to geopolitical instability, technological failures and to prices that may become higher or more volatile in the future.

The Russia-Ukraine gas dispute in January 2009 highlighted the impact that events far away can have on the transit of gas to the EU. The UK was affected only indirectly by the consequences of that dispute. However, the growing interconnectivity of the UK and European markets – and an expected increase in EU import dependence as a whole up to 2030 – points to the need to take a cautious approach.'

5. Other barriers not yet fully addressed by Project Discovery

- **Many supply chain issues in which renewables and E&P might even end up in competition for scarce resources (with inevitable cost implications),** e.g. lay barges: E&P vs. Offshore wind

  We are not aware that this issue has yet been adequately addressed.

  Over decades the Oil and Gas industry has built up a world class supply chain in Scotland. Renewables are unlikely to generate a similar world-class supply chain. (Aberdeen P & Jl February 2010). Offshore wind is only 1% of the global wind market and hence has a tiny supply chain. BWEA admit that costs have more than doubled from £1.5million/megawatt for Round 1 projects to £3.1million/MW for Round 3 projects driven by weak sterling, high commodity prices and a lack of competition among manufacturers.

  Onshore wind manufacturing is dominated by Denmark, Germany and Spain and BWEA states that 'a major concern is whether new manufacturing facilities will actually be built in the UK… or whether they will be based on the Continent..' and that 'industry will need to be mindful of potential shortages in the number of suitably qualified and experienced new candidates'.

- **(lack of) UK engineering and skills base**

  e.g. Institution of Mechanical Engineers (IMech) warned in March 2010 about the skills gap and that HMG's new apprenticeship scheme was insufficient to fill the skills gap.

  The lack of current progress on Offshore Wind and the fact that costs have doubled over a five year period has meant that DECC has had to implement a revision to the regulatory support for offshore wind to offer it twice as much support as onshore wind for projects commissioned by April 2014 (source Ernst & Young).

  Ernst & Young (2009) report that materials costs have increased, that there is a tight supply chain, that construction costs and timetables have been underestimated and there have been availability and reliability issues. Meanwhile the Scottish Government has targets to generate 31% of Scotland's electricity demand from renewables by 2011 and 50% by 2020.

  Commentators always regarded these aspirations as unrealistic, let alone when there are large and immediate pressures on all areas of government spending and financial institutions are adopting a cautious approach.

- **Public support for the principles of EU legislation, HMG's LCTP and then for the costs imposed**

  France has backed down on its carbon tax for domestic carbon dioxide emissions in the face of widespread social protests because the government prefers to focus on 'economic competitiveness', after France's constitutional Court had rejected it.

  In the face of widespread scepticism over the claims of environmentalists (ironically even if those claims are actually supported by the 'real' science) is it credible that the public will accept the full implications of current EU/HMG policy in the face of the current financial circumstances and the inevitable tax rises and HMG expenditure cuts to come?

  The Times ran the following item in March 2010:

  The Government will support a proposal tabled in Brussels for a new, much more onerous EU target for cutting carbon dioxide even though other nations with higher emissions have failed to commit to reciprocal action. Ministers have abandoned their previous condition that the world must agree a legally binding treaty on emissions before the EU commits to a tougher target. The EU has already gone farther than the rest of the world by making a legally binding commitment to cut emissions by 20% on 1990 levels by 2020. It is now preparing to raise the target to 30% despite the failure of Copenhagen. By contrast, the US is debating whether to cut emissions by 4% on 1990 levels by 2020 but is unlikely to make a decision in 2010.

  DECC has calculated the cost of Britain's contribution to the 30% target but refuses to publish the research. DECC rejected a request under the Freedom of Information Act for details of the cost of moving to the 30% target "because we feel it would weaken the UK negotiating position in climate negotiations". The

EU Commission is also carrying out a study of the policies, such as higher taxes on fuel and flights, that would be needed to achieve the 30% cut. DECC said that, given the right conditions, the EU should move to 30% even if some other developed countries failed to make comparable commitments.

- **HMG's heroic assumptions on progress in renewables which fly in the face of all available evidence**

  At the very end of March 2010 the House of Commons Energy and Climate Change committee reported that it was disappointed with the lack of progress on CCS demonstration in comparison to international competitors and that progress in wave and tidal was 'extremely disappointing… five years have been lost…. the government should avoid wasting time.. '. The committee goes on to say that 'the supply chain for offshore wind could be constrained… This poses a risk to the UK's ability to meet its renewables targets. Regarding Energy Efficiency, the committee states 'To date, Government initiatives on energy efficiency have not been nearly ambitious enough.' Finally the committee states that 'Public cynicism about the evidence for human responsibility for climate change has the potential to destroy the government's chances of meeting its carbon targets.'

  OGIA does believe this ECC committee report as lending support to many of the points we have been making for years and include in our submission, compiled ahead of the report's publication. We look forward to studying the government's response to the report in due course.

  Furthermore in April 2010 it should be possible for householders to collect a fixed fee for home solar panels and wind turbines (microgeneration). However newspapers report that a chronic shortage of certified engineers threatens this progress.

  Georges Monbiot writes that 'against my instincts I have come to oppose solar photovoltaic power (PV) in the UK and the feed-in tariffs designed to encourage it because *the facts show unequivocally that this is a terrible investment* [*our italics*]. There are much better ways of spending the rare and precious revenue that the tariffs will extract from our pockets. Money spent on ineffective solutions is not just a waste, it's also a lost opportunity'. He quotes a Ruhr University study of the similar German programme that has been running since 2000. Between 2000 and 2010 an estimated 53 billion euros is being spent and by 2008 solar PV was producing 0.6% of Germany's electricity. Monbiot also points out the common error of confusing the number of gross jobs created by the 53 billion euro spend with the much greater number of jobs had that same amount of money been spent in more rewarding activities.

- **Benefits of diversity of every type and geographical origin (potentially threatened by HMG attempts to 'pick winners')**

  Project Discovery identifies very helpfully many of the challenges the UK faces over the net 10 to 15 years to provide safe, secure, affordable energy but there are also grounds to be hopeful. The fact that some LNG terminals which were built to receive LNG into the U.S. are now exporting LNG out of the U.S. shows how rapidly things can sometimes change. If the technology for CCS, Offshore Wind etc. can be developed they will have a major contribution to make. However in 2010 no-one can predict accurately just when those resources will be available in a material way and guarantee that they can run effectively 365 days a year.

  Against that background it would seem appropriate to invest in deliverable gas/CCGT projects at the expense of coal and oil because that will reduce our carbon intensity as part of a move towards a lower carbon economy. It would follow that during this transition period three of the most useful things HMG could do are to:

  1. promote UK energy efficiency in a way that makes a real difference;
  2. remove barriers that slow down UK gas storage developments;
  3. deliver, in co-operation with other governments, meaningful progress on deforestation.

We look forward to early progress in each of these areas.

6, Impact of UK Energy Policy on future gas demand

Current Government Energy Policy

HMG has ambitious plans to increase the amount of renewables in the UK from a very low base. The main technologies cited (neither currently available) are offshore wind and CCS while new build nuclear, onstream from around 2020, will limit future carbon emissions.

EU Large Combustion Plant Directive (plus IED)

Many UK coal-fired power stations (that can't economically have FGD installed) will have to close by end 2015 or once they have run for 20,000 hours since start of 2008 (which for some could be as soon as 2013). It seems certain that new build gas plants are the only ones capable of being brought onstream to this schedule. While the directive applies to all EU countries one reason that the UK may be particularly impacted is that UK coal-fired power stations tend to be older than on the continent and FGD is less easy/economic to install.

Plant Name	Fuel Capacity (GW)
Tilbury Coal	1.1
Cockenzie Coal	1.2
Didcot Coal	2.1
Ferrybridge Coal	1.0
Ironbridge Coal	1.0
Kingsnorth Coal/Oil	2.0
Littlebrook Oil	1.2
Fawley Oil	1.0
Grain Oil	1.4
Total Capacity	**12.0**

Utilyx report that 5 of above 9 plants will complete 20,000 running hours before 2015 and therefore have to close earlier, potentially as soon as 1Q 2013.

Approval of new gas-fired power stations

HMG has approved 14 gigawatts of new gas-fired generation (not all of which may be built/required). This compares to 25 GW of gas-fired plant currently available. Over 10GW has either been completed in the last six months or is currently under construction (source: Heren/O&GUK)

Plant Name	Fuel Capacity (GW)	Date onstream
Marchwood (Southampton)	0.9	Late 2009
Immingham	0.5	Late 2009
Langage (Plymouth)	0.9	Q2 2010
Staythorpe (Notts)	1.7	Q3 2010
Severn Power (Newport]	0.8	Q3 2010
Isle of Grain (Kent)	1.3	2010/11
West Burton (Notts)	1.7	2011
Pembroke	2.0	2012
Carrington, Manchester	1.5	2013

7. Industry & DECC Overviews

OGIA has always sought to work cooperatively with government. We have had many recent successes working together and we are committed to continue in the same vein. However as part of that ongoing dialogue since 2002 we did challenge HMG, in 2006, regarding the outlook for 2010 onwards including the following questions:

- what will begin to replace Oil and Gas as a source of HMG revenues in the decade post 2010?
- how will Government deliver on 'fuel poverty'?
- how will Government contribute to the provision of security of energy supply?

Disappointingly we are now in 2010 and HMG is still struggling to answer some/all of these questions.

However some good news is that industry has made enormous progress and investment since 2006.

In the UK alone the gas industry has constructed huge LNG facilities and diversified our gas supplies in partnership with many other investors in the LNG chain throughout the world. Internationally the industry has developed whole new gas resources that have transformed the supply of gas around the world. This has been so successful that the price of gas has actually crashed and some of the investment plans on hold because there is a danger of too much supply for the available demand to justify these projects.

The gas industry and E&P producers are happy to be judged on our track record of the last ten years.
We believe that we have a proven record of delivery in the provision of energy without receiving subsidies or handouts from HMG, and we hope that industry will be permitted to develop similar solutions in ALL the energy sectors in the next decade.

We note that DECC in their April 2010 Gas Security of Supply Paper describe this Investment by industry in import capacity in the following terms:

'Demand on a typical winter day can now be met through imports alone, without using indigenous gas or supplies from storage. Import capacity can deliver around 125% of annual demand or 340 mcm per day. There has been a 500% increase in our gas import capacity in the last decade. At the start of this winter [2009/10], UK import capacity was over three and a half times that which was available during the winter of 2005/06.'
[OGIA note: by end of 09/10 winter this was about four times as much as during the winter of 05/06.].

Summary of increases in import capacity since October 2005 *[updated by OGIA]*

Project Name	Type	Period over which capacity increased	Increase in capacity
IUK (import mode)	Interconnector (Belgium)	2005/06 to 2007/08	17 bcm
Teesport	LNG	2006/07	4 bcm
BBL	Interconnector (Netherlands)	2006/07 to 2007/08	15 bcm
Langeled	Pipeline (Norway)	2006/07	25 bcm
Tampen Link	Pipeline (Norway)	2007/08	10 bcm
Isle of Grain	LNG	2008/09	9 bcm
South Hook	***LNG***	***2008/09 to 2009/10***	***21 bcm***
Dragon	LNG	2008/09 to 09/10	6 bcm
Total			***107 bcm***

(and more is planned for the next 12 months including increased capacity at Isle of Grain and BBL pipeline)

The DECC document summarises two other issues, Global Markets and Gas Quality.

'Global markets:
The UK is linked to the global gas market through trade in LNG and through European pipelines and interconnectors which are themselves connected to markets further afield. In 2009, the UK imported LNG supplies from the world market, including from Algeria, Australia, Egypt, Norway, Qatar, and Trinidad and Tobago. Drawing on diverse supply sources outside the EU improves security by decreasing the probability that a large proportion of supply will become unavailable at a particular time.

The functioning of international markets may be affected, for example, by geopolitical issues such as the rise of resource nationalism, particularly if resources are concentrated in a small number of suppliers. Reliability could also be affected by: infrastructure investment shortfalls affecting one or other overseas supply source; by rises or falls in the gas available from overseas reserves; or by global market issues.

The growth in importance of LNG to UK supply means that disruption to supply routes or political instability in the Middle East, Africa or further afield could have an impact on UK security of supply. The development of an effective gas cartel seems, however, unlikely despite the present concentration of reserves in three big producers: Russia, Iran and Qatar. This is because of divergences in the interests of gas producing states, and the increasing potential for production of gas, including unconventional gas, in other regions.

As in Europe, global gas market conditions are currently secure. The International Energy Agency (IEA) has forecast a 3% decline in global demand for gas in 2009, primarily as a result of the economic recession. A boom in unconventional gas production in North America in recent
years has resulted in additional LNG supply being diverted to European and Asian markets. The widespread development of unconventional resources outside of North America also presents the potential for a rebalancing of supplier-consumer relationships. These combined factors have kept prices low and have led the IEA to talk of a 'gas glut' for the coming years.

There is also substantial LNG infrastructure investment under construction across the EU. Regasification plants are planned in Southern and Western Europe, closest to the world's market in terms of shipping days. In addition, a project is planned on Poland's Baltic coast.

Gas quality:
Gas traded in continental Europe, and in global markets as LNG, does not always comply with statutory gas quality requirements within Great Britain.42 In these cases, imported gas must be processed before it can be conveyed into the NTS. This could be a risk to secure supply.

The additional cost of ballasting plant (to add nitrogen) is relatively small, compared with the total cost of gas import facilities. In the absence of market failures, there is a clear commercial incentive to ensure that imported gas can comply with GB quality requirements.'

DECC Summary
Finally DECC summarises the overall achievements of the UK Gas Industry as follows:
'In addition to achieving high levels of investment and security, the UK gas market has generally delivered some of the lowest retail gas prices in Europe. In recent years retail gas prices for both household and industrial customers have generally tended to be the lowest in the EU15. Domestic and industrial users have also benefited from having the lowest rates of tax on gas consumption in the EU15.'

Appendix 1 : List of OGIA Members (End 2009)

1. Atlantic Petroleum UK Ltd
2. Caithness Petroleum Limited
3. Carrizo Oil & Gas Inc
4. Celtic Oil Ltd
5. Challenger Minerals INorth Sea) Limited
6. CIECO Exploration and Production (UK) Ltd
7. Corsair Petroleum Ltd
8. E.ON Ruhrgas UK Exploration and Production Ltd
9. Elixir Petroleum Ltd
10. EnCore Oil PLC
11. Endeavour Energy UK Ltd
12. EOG Resources United Kingdom Ltd
13. GDF Suez Britain Ltd
14. Hansa Hydrocarbons Ltd
15. Hollywell Resources
16. Hurricane Exploration plc
17. Idemitsu E&P UK Ltd
18. Korea Captain Company Limited
19. Marubeni Oil & Gas (UK) Ltd
20. Nautical Petroleum AG
21. Nippon Oil Exploration and Production UK Limited
22. Oranje-Nassau Energie BV
23. PA Resources
24. Pinnacle Energy Limit
25. Rocksource UK Limited
26. Sagex Petroleum AS
27. Samson North Sea Ltd
28. Serica
29. Summit Petroleum
30. Silverstone Energy Ltd
31. TGS NOPEC Geophysical Company
32. Valiant Petroleum Ltd
33. Veritas Geophysical Ltd
34. Wintershall (E&P) Limited
35. XTO UK Ltd

During 2009 some former members have ceased active participation on the UKCS.

Appendix 2 : OGIA Contact Details

In the first instance please email to either:

Chairman:	Steve Jenkins	chairman@ogia.co.uk
Energy Lead	Simon Gell	sgell@noex.co.uk

Appendix 3 : Oil Company investments in Unconventionals (selection from public domain data) includes:

ExxonMobil purchase of XTO, transaction value $41 billion, for its Unconventional resource base (source ExxonMobil December 2009) on top of previous acquisitions in Marcellus (U.S.) and Horn River (Canada). **ExxonMobil** has large holdings in Germany (750,000 acres with some wells already drilled) & Poland..,

Shell/PetroChina bid $3bn for Arrow Energy (Queensland CBM/LNG), **Shell** bought shale gas licences in Sweden. In March 2010 Shell stated that they had acquired an additional 150,000 acres in the Eagle Ford shale to take their North American holding to over 2.4 million acres.

BP's $2 billion purchase from Chesapeake in 2008 in addition to the large shale gas position it inherited from Amoco and Lalimantan PSA in Indonesia.It states that technology/'know how' is being transferred from North America to Unconventionals in Oman, North Africa and Indonesia (BP Strategy March 2010).

Total signed an agreement to enter into a joint venture with Chesapeake and to acquire 25% of Chesapeake Barnett Shale gas portfolio for total expenditure of $2.25 billion (source: Total press release), **Total** is set to get to work in the Montelimar permit in France's emerging Montpelier shale gas play (source Upstream March 2010) and has acquired positions in Denmark, Argentina and North Africa.

ConocoPhillips is exploring 1 million acres in Poland, gas to be core of US energy (Upstream March 2010)

Encana, Canada's biggest gas producer, plans to double its production by 2015 by exploiting shale gas reserves.

Talisman are expecting to quadruple their production from the Marcellus shale over the course of 2010, drilling 170 net wells in the Marcellus and 35-40 net wells in the Montney shale (source Talisman Corporate presentations February 2010).

Statoil invested $3billion to acquire a 32.5% ineterest in 1.8 million acres in Chesapeake's Appalachian Marcellus shale project in 2008 and stated in 2010 that well results have been above expectations (February 2010 Strategy Update).

BG bought EXCO Resources Inc for $1.3billion for its shale gas position

Mitusi announced a JV with Anadarko, paying $1.4 billion for a 32.5% stake in Anadarko's Marcellus shale play in Pennsylvania.

Marathon active in Poland, **OMV** active in Austria

Consol buying Dominion Resources Natural Gas business (incl. Marcellus shale) for $3.5bn (March 2009)

China set to open CBM sector to include foreign companies (Upstream March 2010)

Meanwhile Chevron is bringing forward major LNG projects (Upstream March 2010) but:

- Gazprom is to index 15% of sales to be linked to spot market prices for 2010 to 2012 (FT 26.2.10)
- Iraq is extending time for Shell gas deal (Upstream March 2010)

Appendix 4 : Bibliography

1. Project Discovery, Options for delivering secure and sustainable energy supplies, Consultation Document, Ofgem, February 2010
2. Project Discovery - Energy Market Scenarios, Ofgem, February 2010
3. BP, Shell, Exxon Mobil, Chevron, ConocoPhillips, Chevron, Total, ENI, F.T., Calgary Herald, New York Times, Wall Street Journal, The Independent, The Guardian, The Daily Telegraph, Oil and Gas Journal. Aberdeen Press & Journal, Wood Mackenzie, Upstream, No Hot Air, O&GUK, OGIA, Ofgem, DECC, HMT websites
4. Decision time, Driving the UK towards a sustainable energy future, CBI, July 2009.
5. Gas Security of Supply Paper, Policy Statement from DECC, April 2010
6. Government Response to Malcolm Wicks' Review of International Energy Security, 'Energy Security: A national challenge in a changing world', DECC, April 2010
7. Energy Contract Company, UK Gas Markets Outlook, March 2010.
8. Goldman Sachs Natural Gas Watch, 'It's all about supply', March 2010
9. O&GUK 2010 Activity Survey, February 2010, O&GUK 2009 Economic Report, July 2009
10. 'Surprise! Surprise! Markets work: Why reports of a January British gas supply crisis were overheated', Gas Matters, February 2010.
11. Energy Security, Dr Carole Nakhle, University of Surrey, February 2010.
12. Natural Gas in the U.K.: An Industry in search of a Policy?, John Elkins, Oxford Institute for Energy Studies, February 2010.
13. LNG flows in the Atlantic Basin : Trends and Discontinuities, Howard V Rogers, Oxford Institute for Energy Studies, March 2010.
14. Energy Security and Low Carbon Transitions, Dr Jim Watson, Keynote address at the Sussex Energy Group Conference, February 2010.
15. UK Gas Security: Threats and Mitigation Strategies, Dr Jim Watson, University of Sussex, January 2010.
16. 'Ofgem plots four paths through the coming energy landscape', Gas Matters, November 2009.
17. Brave but Impossible Energy Targets, Chris Lambert & Dr Eamon Butler
18. Low Carbon technologies in a green economy, House of Commons Energy and Climate Change Select Committee, March 2010
19. The Prospects for Activity in the UK Continental Shelf to 2040: the 2009 Perspective, Professor Alexander G. Kemp and Linda Stephen, University of Aberdeen Department of Economics, October 2009
20. World Energy Outlook, IEA, November 2009
21. Energy Market Outlook, DECC, December 2009
22. Gas Transportation Ten Year Statement, National Grid, December 2009
23. Malcolm Wicks MP, Energy Security: A national challenge in a changing world, DECC, August 2009.
24. Labour prepares to tear up 12 years of energy policy, The Times, February , 2010
25. Westminster Energy Policy Forum, Issues in European Oil and Gas, 24 November 2009
26. Westminster Energy Policy Forum, Issues in European Oil and Gas, 26 November 2008

27. Transporting Britain's Energy : Development of Energy Scenarios, National Grid, July 2009
28. Adam Smith Institute– Overcoming Strategic Challenges for UK Utilities , Speech by Sam Laidlaw, Centrica, 17 March 2009
29. Securing the UK's energy future – meeting the financing challenge - An update to the Ernst & Young 'Costing the earth? The impact of climate change mitigation on UK domestic customer energy bills' study - February 2009
30. National Grid calls for UK Energy Masterplan to meet climate change challenge, March 2009
31. Do high oil prices justify an increase in taxation in a mature oil province? The case of the UKCS., Dr Carole Nakhle, 6th July 2007
32. The UK Low Carbon Transition Plan: National Strategy for Climate and Energy, DECC, July 2009.
33. Energy Security: A national challenge in a changing world, DECC, July 2009.
34. UK Government's approach to Upstream Petroleum Taxation, HMG (DECC), Oil and Gas Economic Forum, 25 April 2008
35. Energy Act 2008, DECC.
36. White Paper on Energy - Meeting the Energy Challenge - May 2007, BERR
37. Energy Review – The Energy Challenge - July 2006, dti
38. White Paper on Energy – Our Energy Future - February 2003, dti
39. The UK Renewable Energy Strategy. DECC, July 2009.
40. HMT/HMRC, Supporting Investment : a Consultation on the North Sea Fiscal Regime, November 2008
41. HMT/HMRC, Securing a Sustainable Future: A Consultation on the North Sea Fiscal Regime. December 2007
42. HM Treasury, 2005 PBR Regulatory Impact Assessment (RIA) for Changes to the North Sea Tax Regime
43. OGIA Submission to Scottish Affairs Committee, 19th July 2006
44. OGIA Submission to Energy Policy Review, 13th April 2006
45. OGIA Presentation to HMT, HMRC, dti on Competitiveness of the UKCS Fiscal Regime and Attracting Investment to the UKCS at HMG/Industry Economic Advisory Group, 23 June 2006
46. OGIA email to HMT, HMRC, dti re HMG Fiscal Changes since 2002, 19 March 2006
47. OGIA Letter to Chancellor of the Exchequer (copied to HMT, HMRC, dti) re 2005 PBR, 6 December 2005
48. UKOOA Letter to Paymaster General/Chancellor of the Exchequer: 2005 PBR, 15 Feb 2006
49. UKOOA Letter to HMT re 2005 PBR, 7 February 2006
50. Economic Aspects of Incremental Projects in the UKCS, Occasional Paper 95, Professor Alexander G Kemp and Linda Stephen, University of Aberdeen
51. Westminster Energy Policy Forum, Political and Economic Implications of Increasing UK Gas Import Future, 5 October 2004
52. A powerful and effective partnership, PILOT Report, September 2009
53. The Next 10 years, DECC at PILOT, November 2009
54. A Template for Change, The Oil & Gas Industry Taskforce Report, September 1999

Appendix 5 : Glossary

bbl	barrel (of oil) (1 barrel = 0.16 m3)
bcm	billion cubic metres (1 metre3 = 35.3 cubic feet)
BERR	Department for Business, Enterprise and Regulatory Reform (see also DECC below), renamed Department for Business, Innovation and Skills in June 2009
billion	one thousand million or 109
boe	barrel of oil equivalent: this includes oil, gas and other hydrocarbons and equates all of these with oil, so that a common measure can be made of any of them.
bpd	barrels per day
boepd	barrel of oil equivalent per day brownfield oil or gas field already in production
CCC	Climate Change Committee (a statutory body)
CCGT	Combined Cycle Gas Turbine A method of power generation where the wasted heat from a gas turbine is used to power a second turbine, thus increasing its energy efficiency.
CCS	Carbon Capture and Storage
CNS	Central North Sea
CO2	Carbon Dioxide (one of the six "greenhouse gases" under the Kyoto protocol)
CT	Corporation Tax
DECC	Department of Energy & Climate Change, formed in autumn 2008, combining BERR's previous responsibilities for energy and DEFRA's for climate
E&A	Exploration and Appraisal (drilling)
E&P	Exploration and Production
EOR	Enhanced Oil Recovery
EU ETS	European Union's Emissions Trading Scheme
HMG	Her Majesty's Government
HMT	Her Majesty's Treasury
HMRC	Her Majesty's Revenue & Customs
HPHT	High Pressure, High Temperature (reservoirs)
LNG	Liquid Natural Gas
mboepd	million barrels of oil equivalent per day
mbopd	million barrels of oil per day
MW	Mega Watt (of electricity)
NGL	Natural Gas Liquid (e.g. butane, propane)
NNS	Northern North Sea
NWE	North West Europe
O&GUK	Oil and Gas UK
OGIA	Oil and Gas Independents Association
PILOT	Industry/Government Oil & Gas Industry taskforce
PRT	Petroleum Revenue Tax
p/therm	pence per therm (for gas)
SCT	Supplementary Charge to Corporation Tax
SNS	Southern North Sea (sometimes referred to as ("southern gas basin")
Trillion	one million million or 10 to the 12
UKCS	United Kingdom Continental Shelf
Unconventional gas	Natural gas (methane) which is now becoming producible through the use of new technologies - shale gas, tight sands gas, coal bed methane, and potentially methane hydrates.
WoS	West of Shetlands (sometimes referred to as "Atlantic Margin")