

Oil and Gas Extraction

Background Paper

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Date	Details	Prepared by	Reviewed and approved by
6 th October 2015	Draft	John Martin Natalie Blackston	Carolyn Williams
12 th November 2015	Final	John Martin Natalie Blackston	Carolyn Williams

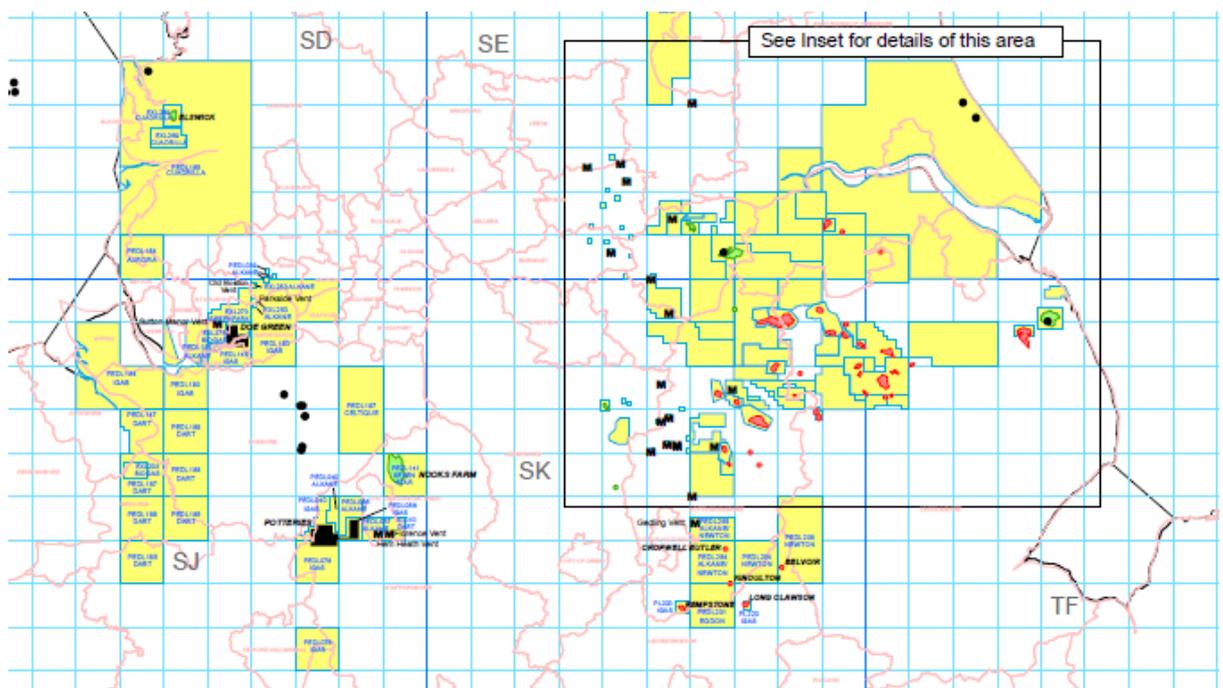
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1. Introduction

- 1.1. This background paper considers the planning issues surrounding the exploration and production of hydrocarbon (oil and gas) resources. This includes conventional resources such as oil and unconventional resources such as coalbed methane and shale gas which have yet to be exploited but which could provide important new energy resources in the future.
- 1.2. The Department for Energy and Climate Change (DECC) is responsible for administering and issuing the oil and gas licensing system in the United Kingdom (UK). The DECC issue Petroleum Exploration and Development Licences (PEDL) periodically, giving a company or group of companies exclusive rights to explore for, and develop, the resource in a particular geographic location (Figure 1).

Figure 1:- Areas currently under Licence (Source: Department of Energy and Climate Change 1 Feb 2015)



- 1.3. Licences allow a company to pursue a range of exploration activities for conventional or unconventional gas, subject to planning permission and the necessary associated consents. Previously, the Government issued separate licences for separate stages of an onshore oil or gas field's life. PEDLs were introduced as part of the eighth licencing round in 1996. PEDLs are valid for a sequence of periods (terms) and are designed to comprise the typical life cycle of a field (exploration, appraisal and production). In 2008, the 13th Onshore Licensing Round was completed and resulted in oil and gas licences in a

number of Yorkshire Planning Authorities although none were issued in Kirklees.

- 1.4. However, at the time of writing, the 14th round of onshore oil and gas licences have not been issued and it is unknown as to whether or not any will be issued to cover the Kirklees Borough in the 14th or subsequent rounds. Nevertheless, the Council consider that it is good practice to plan for the eventuality that a licence may be issued in the next or following rounds during the life of the plan.

2. Onshore Oil and Gas

What are Hydrocarbons?

- 2.1 Hydrocarbons are naturally occurring, liquid (petroleum) and gaseous (natural gas) compounds of hydrogen and carbon which were formed many millions of years ago from microscopic plants and animals which lived, generally, in a marine environment. Accumulating on the sea bed when they died, the organisms became buried in fine clay-like sediments. In the absence of oxygen and under the effects of increased temperature and pressure from the steadily growing thickness of overlying sediments, they decomposed to form oil and gas.
- 2.2 The fine-grained rocks in which these processes occur are referred to as "source" rocks. However, the hydrocarbons have normally moved or migrated from the source rocks into the pores and fissures of coarser "reservoir" rocks such as sandstone or limestone. Commercially important deposits can occur where the hydrocarbons become trapped within certain types of geological structures such as "anticlines" or "fault blocks" where the reservoir rock is overlain by an impervious bed or "caprock" that prevents further migration of the hydrocarbons.
- 2.3 The search for hydrocarbons therefore requires three broad elements. First, the regional geology has to be suitable. This generally means the presence of a major sedimentary basin of approximately the correct geological age. Second, within the basin there must be suitable reservoir rocks and traps. These are normally located by geophysical surveys. Finally, the presence of oil within the trap can only be determined by exploratory drilling

Uses

- 2.4 The UK economy is highly dependent on oil and gas as primary sources of energy. Natural gas in particular is used to generate electricity and petroleum products derived from oil (petrol, diesel and kerosene) are essential fuels for

transport on land, sea and in the air. Oil and gas are also used for domestic heating and are important process fuels in industry. In addition, and less obviously, millions of products are made from the chemical processing of oil and gas.

Production in the UK

- 2.5 In the 1980's and 90's, the UK was largely self-sufficient in the production of oil and gas, following the discovery of reserves in the North Sea. Furthermore, the UK became a major exporter of oil and gas during this period. This period of self-sufficiency is, however, at an end and the UK became a net importer of gas in 2004. Imports are likely to account for as much as 90% of our needs by 2020².
- 2.6 Total onshore oil production from 1939 to 2005 was in the order of approximately 453.4 million barrels. Onshore gas production is much smaller. Whilst onshore oil production (and particularly gas) is small in comparison to offshore, it makes an important contribution to supply with the additional advantage of proximity to demand. There is a ready and continuing need for the minerals in the foreseeable future with the Government's energy policy being to ensure secure, diverse and sustainable supplies².

Phases of Development

- 2.7 There are three phases in oil and gas development: exploration, appraisal and production. Exploration encompasses a range of activities including geological mapping, geophysical/seismic investigations and potentially the drilling and investigation of wells and boreholes to assess prospective sites in more detail. Should hydrocarbons be found, additional appraisal wells will be necessary to investigate the characteristics of the reservoir and to delineate the extent of the accumulation. This may be possible from the same site, or it may be necessary to attempt to define the extent of the find by drilling further wells at other suitable sites in the area. The production phase refers to the extraction of the oil and gas. There are usually a number of well sites accompanied by a gathering station, which separates, purifies and treats the raw material.
- 2.8 The wells themselves can be directional, which means that they are drilled by gradually increasing the angle from the vertical. This allows a target to be accessed from surface locations other than the point directly above it and so more environmentally sensitive locations can be protected.

Planning and Licensing

- 2.9 The Department of Energy and Climate Change issues landward production licences to suitably qualified oil and gas companies under powers granted by

the Petroleum Act 1998. These are called Petroleum Exploration and Development Licences (PEDLs). The licences cover designated geographical areas, or 'License Blocks' and confer the right to "search for, bore for and get" hydrocarbons under that legislation, but they do not confer any exemption from other legal/regulatory requirements, such as any need to gain access rights from landowners, health and safety regulations, or planning permission from the ¹Mineral Planning Authority. The PEDLs carry a three term lifetime: an initial term period of six years, a five year second term, and a third term for production, lasting 20 years.

3. National Planning Policy

- 3.1 The Government's 2007 White Paper 'Meeting the Energy Challenge' identified two long-term energy challenges facing the UK. These are the need to tackle climate change by reducing carbon dioxide emissions and the need to ensure secure, clean and affordable energy as we become increasingly reliant on imported fuel sources. Government policy for Energy Infrastructure is set out in a series of National Policy Statements published in 2011. National energy policy is that oil and gas make an essential contribution to the country's prosperity and quality of life. They play an important part of the UK's energy mix during the transition to low carbon energy supplies.
- 3.2 The policy goals are to maintain reliable energy supplies; to promote competitive markets; and to ensure that every home is adequately and affordably heated. The target for reducing greenhouse gas emissions was increased from 60% to 80% of 1990 levels by 2050 through the Climate Change Act 2008.
- 3.3 Increasing low carbon energy sources will be vital to help us to reduce our carbon emissions; however oil and gas still have a significant role to play in ensuring a secure, diverse and reliable energy supply. Maximising the potential of the UK's onshore oil and gas reserves in an environmentally acceptable manner is one of the short to medium term aims.
- 3.4 National policy on land-based exploration, appraisal, development and extraction of oil and gas resources, and on gas storage, is contained within the National Planning Policy Framework. It states that mineral planning authorities should clearly distinguish between the three phases of onshore oil and gas development, including unconventional hydrocarbons, and should address constraints on production and processing within licensed areas. Additionally, mineral planning authorities should encourage underground gas and carbon

² CLG & BGS (2006) Mineral Planning Factsheet: Onshore Oil and Gas

storage and associated infrastructure where the local geology indicates its feasibility.

4. Recommendation

4.1 Unlike aggregate minerals, such as sand and gravel, national policy does not require that mineral planning authorities identify specific sites to deliver a specific level of hydrocarbon development. The NPPF does not exclude designated landscapes from consideration for hydrocarbons. However, the National Planning Practice Guidance sets out that Local Plans should include:

- Petroleum Licence Areas and existing hydrocarbon extraction sites on policies map;
- Criteria-based policies for each of the exploration, appraisal and production phases of hydrocarbon extraction. These policies should set clear guidance and criteria for the location and assessment of hydrocarbon extraction within the Petroleum Licence Areas.

4.2 In December 2013 the British Geological Survey (BGS), in association with DECC, completed an estimate for the resource (gas-in-place) of shale gas in part of central Britain in an area between Wrexham and Blackpool in the west, and Nottingham and Scarborough in the east (Figure 2).

Figure 2: Location of the BGS/DECC shale gas study area



- 4.3 It is considered that due to the coal measures found in the east of the Plan area there is the potential for Coal Bed Methane development. As of February 2015 there are no PEDL licences or current extraction sites in Kirklees and it is noted that no development can take place without the existence of a PEDL.
- 4.4 Without the existence of PEDLs in Kirklees there are no requirements to produce information for inclusion on a policies map. It is unknown at this stage whether any PEDLs will be issued in the next or subsequent rounds. However, it is recommended that the Council takes account of future PEDL rounds and, if any are taken up by the industry, then this will need to be identified on a map with the relevant licence information on any plan revision.
- 4.5 There is also no requirement to include criteria based policies for each phase of the exploration, appraisal and production phases of hydrocarbon extraction in the Development Plan. However, it is recommended that the Development Plan contains such policies to ensure that any potential future applications for Hydrocarbon extraction can be assessed against robust policies.

5 Draft Hydrocarbon Policies

- 5.1 The only way firmly to establish if oil or gas is present is to drill a borehole, which requires planning permission. Although such sites are temporary and usually small-scale in nature, drilling during the exploration phase is an intensive activity undertaken 24 hours a day for both health and safety and operational reasons. During this time there could be visual, lighting and noise disturbance and impacts on local roads.
- 5.2 Proposals for exploratory wells will be considered on their individual merits and should address the impacts that such development may have on the above issues. If hydrocarbons are found the appraisal phase may follow and the operator will need to carry out longer-term testing of the reservoir (flow testing) to determine its characteristics, which could involve installing a beam pump and removing oil/gas by tanker each day or flaring off the gas. The number of tanker movements and any flaring would need to be considered as part of determining the acceptability of a proposal.
- 5.3 Proposals for appraisal should look afresh at the issues considered at the exploration phase and consideration should be given to the long term suitability of the site since such wells may be developed for production purposes.

Draft Policy X - Proposals for Exploration and Appraisal of Hydrocarbons

Proposals for exploration and appraisal of onshore oil and gas will be permitted where they meet all of the following criteria:

- a. well sites and associated facilities are located in the least sensitive areas from which the target reservoir can be accessed;
- b. any adverse impacts can be avoided or mitigated to the satisfaction of the Mineral Planning Authority, with safeguards to protect environmental and amenity interests put in place as necessary;
- c. it can be demonstrated that there would be no adverse impact on the underlying integrity of the geological structure;
- d. an indication of the extent of the reservoir and the extent of the area of search within the reservoir is provided to the Mineral Planning Authority;
- e. exploration and appraisal operations are for an agreed, temporary length of time; and
- f. well sites and associated facilities are restored at the earliest practicable opportunity if oil and gas is not found in economically viable volumes, or they are developed within an agreed time frame.

If economic concentrations of hydrocarbons are found, the operator may seek to develop the field commercially. Small fields may be exploited using the existing exploration and appraisal wells where oil/gas can be stored on site, with tankers transporting the hydrocarbon off site. However, larger fields may require additional wellhead sites linked by pipelines.

Directional drilling, whereby a number of wells are drilled from a single location, may be used to minimise the number of sites required to exploit the field. Directional drilling is considered preferable to the creation of additional well sites. Above ground facilities including, potentially, a gathering station to provide a central facility to prepare the hydrocarbons for export, transport links, pipelines and offices may be required. Impacts similar to industrial development may be experienced, with pollution prevention being a potential long-term issue.

As there is likely to be some flexibility as to the location of extraction and processing facilities, they should be located to minimise adverse effects on landscape, nature conservation interests, residential amenity, historic environment and best and most versatile agricultural land.

Consideration will need to be given to the use of tree screens and appropriately managed areas around well sites or facilities in order to reduce visual impact.

Additionally, where areas are sensitive ecologically, opportunities for habitat management should be explored.

Draft Policy Y - Proposals for Production of Hydrocarbons

Proposals for hydrocarbon production well sites and facilities, and other related ancillary development, will be permitted where they meet all of the following criteria:

- a. exploration and appraisal operations are for an agreed, temporary length of time;
- b. extraction, processing, dispatch and transport facilities are sited, designed and operated to minimise environmental and amenity impacts and provide proportionate environmental enhancements;
- c. any adverse impacts, both individual and cumulative, can be avoided or mitigated to the satisfaction of the Mineral Planning Authority;
- d. existing facilities are used for the development of any additional fields discovered unless the applicant satisfies the Mineral Planning Authority that this would not be feasible and any adverse impacts can be mitigated;
- e. where a proposal uses existing production facilities, the integrity of the existing infrastructure can be demonstrated, having regard to local environmental factors;
- f. Developments for hydrocarbon production will be required to use pipelines. Where it can be demonstrated that this is not feasible, economically and/or environmentally, rail or road transport will be considered. Where road transportation is the only feasible option, it should be demonstrated that this would not give rise to unacceptable impacts on the environment or highway safety; and
- g. Any proposed after-use for oil and gas development must take account of the landscape character of the wider area, giving particular attention to restoring and recreating habitats, maintaining and enhancing populations of priority species and promoting ecological networks.